The Pertinence of Dr. B.R. Ambedkar's Views on Agricultural Development in India with Special Reference to Uttar Pradesh

THESIS

Submitted To

DEPARTMENT OF ECONOMICS

BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY

(A CENTRAL UNIVERSITY)

Lucknow

For the Award of Degree of

Doctor of Philosophy

In

Economics

Under the Supervision of

DR. L.C Mallaiah

Submitted By

Parul Verma

DEPARTMENT OF ECONOMICS

SCHOOL OF ECONOMICS & COMMERCE

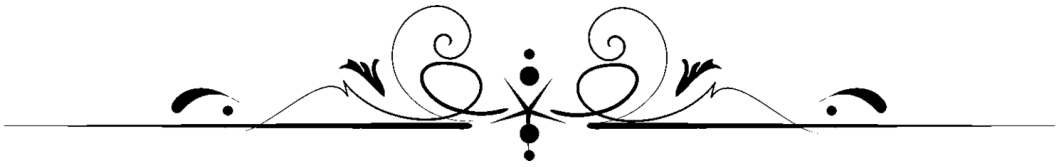
BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY

(A CENTRAL UNIVERSITY)

Vidya Vihar, Raebareli Road Lucknow-226025, U.P. India

Enrollment No. 1241/15

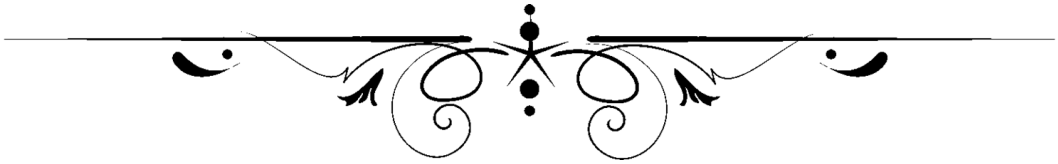
Year: 2019



Dedicated

to

My Revered Parents



CERTIFICATE

This is to certify that the thesis titled **"The Pertinence of Dr. B.R. Ambedkar's Views on Agricultural Development in India with Special Reference to Uttar Pradesh"** submitted by Ms. Parul Verma is an original research work and has not been previously submitted in part or full for the award of any other degree or diploma to this or any other university.

The thesis submitted to Babasaheb Bhimrao Ambedkar University Lucknow satisfies all the requirements as stipulated in the **Doctor of Philosophy (Ph.D.)** regulations-1999 as emended in 2008/2010/2013 and it is fit for submission and evaluation for the award of the degree of Doctor of Philosophy of the University.

Date **Supervisor**

Head of the Department

DECLARATION

I declare that the entire thesis entitled "**The Pertinence of Dr. B.R. Ambedkar's Views on Agricultural Development in India with Special Reference to Uttar Pradesh**" submitted to the Babasaheb Bhimrao Ambedkar University (A central university), Lucknow for the award of Doctor of Philosophy in Economics. It is my original work and it has not previously been produced for the award of any degree, diploma, fellowship or similar other titles anywhere.

This research study is carried out under the supervision of Dr. L.C. Mallaiah, Department of Economics, School of Economics and Commerce (SEC), Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India. This is also declared that thesis is free from all kinds of Plagiarism.

Place: Lucknow

Date:

Parul Verma
Enrollment No. 1241/15
Department of Economics
Babasaheb Bhimrao Ambedkar University
Lucknow, Uttar Pradesh

ACKNOWLEDGEMENT

By the grace of God, I have arrived at the very important and happiest junction of my life. I owe great intellectual debt to my brilliant mentor and guide Dr. L.C. Mallaiah. I am grateful for his patience and consistent encouragement that gave me strength to keep myself optimistic throughout the conductive period of this research and also for his insights and suggestions that assist me to frame my research skills. I express my sincere thanks to him for his valuable guidance in carrying out work under his effective supervision, analytical guidance, inferential criticism, encouragement and cooperation during this course of investigation. His Dynamic personality always empowers me with a positive outlook.

I would like to extend my sincere thanks to Head of the Department Prof. Sanatan Nayak, and other faculty members Prof. N.M.P. Verma, Dr. D.K. Yadav, Dr. Surendra Meher, Dr. Pranav Kumar Anand all from Department of Economics, Babasaheb Bhimrao Ambedkar University, Lucknow. Besides, my special thanks to Prof. Sukhadeo Thorat, former faculty in Department of Economics, Jawaharlal Nehru University, Delhi & Prof. Arvind Awasthi, Department of Economics, Lucknow University who have endeavored me with the wealthy insightful suggestions in order to inculcate the productive work. I am very appreciative of all the support of ICSSR, New Delhi for its worth full financial assistant in terms of Doctoral Fellowship. I am thankful to Ms. Ekta, Mr. Shekhar, Mr. Manoj Kumar and Mr. Yogendra Yadav from the Dept. of Economics, BBAU for their cooperation during the field survey of the research.

This work is dedicated to my parents, especially my father who has supported me and stands beside me, in each phase of my life. He is the one, who has taught me how to dream and act on my dreams with conviction and leadership. They taught me about how to live a life of faith, love, meaningful relationships and about the virtue of meaningful. Finally, my head bows with reverence before the Almighty God, who has given me the strength, wisdom, and willpower to complete the task.

Date Parul Verma

Place

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBRIEVATIONS

Abbreviations	Equivalence
GDP	Gross Domestic Product
GVA	Gross Value Added
CA	Conservation Agriculture
CACP	Commission for Agricultural Costs and Prices
MSP	Minimum Support Price
R&D	Research & Development
HYV	High Yielding Variety
MDG	Millennium Development Goals
TDE	Trickle Down Effect
MOSPI	Ministry of Statistics and Programme Implementation
UPSPC	Uttar Pradesh State Planning Commission
ARMA	Auto-regressive Moving Average
ROI	Returns on Investment
LFI	Land Fragmentation Index
SPF	Stochastic Production Frontier
UP	Uttar Pradesh
LDC	Least Develop Countries
ADF	Augmented Dickey Fuller
ACF	Autocorrelation Function
PACF	Partial Autocorrelation Function
AIC	Akaike Information Criterion
SBIC	Schwarz Information Criterion
NITI	National Institution for Transforming India
SDP	State Domestic Product
GOI	Government of India
DCH	District Census Handbook
SC	Scheduled Caste
OBC	Other Backward Class
IFOS	Income from Other Sources
NIFOS	Net Income from Other Sources

AHE	Average Households Expenditure
MIDH	Mission for Integrated Development of Horticulture
NMSA	National Mission for Sustainable Agriculture
SMAE	Sub-Mission on Agriculture Extension
SMSP	Sub-Mission on Seeds and Planting Material
SMAM	Sub-Mission on Agricultural Mechanization
SMPPQ	Sub Mission on Plant Protection and Plan Quarantine
SFP	Soil Fertility Problem
PMFBY	Pradhan Mantri Fasal Bima Yojana
A&AI	Agriculture & Allied insurance
ATI	Agriculture Tractor Insurance
API	Agriculture Pump set Insurance
WBI	Weather Based Crop Insurance
PKVY	Paramparagat Krishi Vikas Yojana
NMAET	National Mission on Agriculture Extension & Technology
ACs & BCs	Agri Clinics & Business Centers
KCC	Kisan Call Center
MTCs	Model Training courses
NCAER	National Council of Applied Economic Research
ASP	Awareness Spread by Panchayat
ICS	Inaccessibility to Certified Seeds
SLFI	Simmons Land Fragmentation Index
ML	Maximum Likelihood
LR	Likelihood Ratio
ANOVA	Analysis of Variance
SFLF	Small Farmers Large Fields
FPO	Farmer Producer Organization

Chapter-1

Introduction

The Indian agriculture sector has been surpassing through various structural changes since independence and it has always been the keystone of the Indian economy. In the early 1950s agriculture sector was contributing 51 percent of Gross Domestic Product and 70 percent of employment. Nevertheless, presently the share of the agriculture sector in Gross Domestic Product (GDP) is sharply declined to 16.2 percent with the reduced share of employment at 45.3 percent as per World Bank report 2016. But still, the majority of the rural populace is depending on agriculture for their food security and livelihoods. However, as per the sectoral composition of the Indian economy, the agriculture & allied sector contributes 17.9 percent, industrial sector contributes 29.3 percent while the services sector contributes 52.8 percent in the total Gross Value Added (Central Statistic Office, 2016). The agriculture sector has been anguishing with a set of acute general, technological and institutional obstructions in India. However, this sector has its own imperativeness in the contemporary era.

Agriculture plays a major role in industrial development. For the last several decades' agriculture functions as the reservoir for raw materials used in industrial operations. It furnishes the leading industries with the required raw materials. A set of industries such as jute, textile industries, sugar, vanaspati, flour mills directly depends on agriculture. Further, the small scale and cottage industries also equally rely on agriculture for their raw materials. Secondly, the significance of agriculture originates with its contribution to international trade. Agricultural produce such as- tea, tobacco, sugar oilseeds and spices are demanded at the international platform. Therefore, agriculture has an outstanding significance in economic development as it helps to make earnings from exports and raise the net foreign income from abroad (NFIA). Thirdly, agriculture sectors play a vital role in stepping down poverty. A major survey of the growth experiences of several developing countries by the World Development Report 2008, over the last twenty-five years expounds that one percent growth in agriculture is at least two to three times more effective in mitigating the poverty than the same growth coming from the non-agriculture sectors (V.K. Puri & S.K. Mishra, 2018). Further, if its share in GVA will incline in

future, it will provide the suffice scope to minimize the poverty in India. Moreover, agriculture is the largest industry in developing countries. It may bring a substantial push to the rate of capital formation. If it fails to escalate capital formation, the entire process of development will undergo a setback.

The agricultural sector acts as an intermediate sector that pushes the other sectors such as secondary & territory sector not only to raise the gross national income, per capita income but also bring down the other social evils such as income inequalities, poverty, malnutrition, etc. As per Mellor, agricultural development promotes the proper conditions for farming so that planting, harvesting and processing of crops can be done effectively. It ultimately can reduce poverty and save lives. Hence the agriculture sector is the keystone for the Indian economy to accomplish inclusive, faster and sustainable development. Any alter or change in agriculture has a multifold impact on the entire economy. Agriculture and its subsidiary divisions such as animal husbandry, fisheries and dairy have the spread effect in generating the income with the good nutritious health for the poor rural masses. Therefore, the development of the agrarian division is the elemental term for the development of the national economy. However, with the passage of time priority has shifted from agrarian to the non-agrarian sectors in order to create more economic opportunities for poor populace. However, the transformation of the Indian economy from agriculture to non-agriculture economy has received a strong push after 1990-91 economic reforms. But still, Indian agriculture has been struggling for its very subsistence since the initiation of the development process and with the passage of time; the priority has shifted from agriculture to the non-agrarian sectors. The uninterruptedly rising population, the declining share in agriculture growth, productivity and employment brings out other socio-economic impediments like hunger, malnutrition and poverty in Indian rural areas and ultimately retards the rural growth. Consequently, the impediments associated with agriculture can be classified into three major bottlenecks such as general problems, technological problems and institutional problems. The problems have been explained in the following manner.

1. **Rise in Small Fragmented Land Holding**

The farm size is persistently shrinking in India. There is a long-run trend and unless addressed may have a spontaneous adverse effect on agriculture sector and entrenching its prospects (PulapreBalkrishnanet.al, 2008). The small and diminutive landholding in agriculture

is the core problem that derives through institutional factors. The average size of holdings was 2.28 hectares in 1970-71 which was reduced to 1.82 hectares in 1980-81 and it further declined to 1.50 hectares in 1995-96. Presently, the average size of the holding is further decreased to 1.08 hectares (Agriculture Census, 2015). How will it go long for further reduction in continuance is the major point of concern for agricultural development. Moreover, the problem of small and fragmented holdings is more serious in densely populated & intensively cultivated rural areas in the states like Kerala, West Bengal, Bihar, Madhya Pradesh and eastern part of Uttar Pradesh where the average size of land holdings is less than one hectare and in certain parts it is less than even 0.5 hectares (Agriculture census, 2015). On the other hand, Rajasthan with vast sandy stretches and Nagaland with the prevailing 'Jhoom' (shifting agriculture) have larger average-sized holdings of 4 and 7.15 hectares respectively. States having a high percentage of the net sown area like Punjab, Haryana, Maharashtra, Gujarat, Karnataka have holding size above the national average. Further, it is shocking to note that a large proportion of 59 per cent holdings in 1990- 91 were marginal (below 1 hectare) accounting for 14.9 percent of the total operated area. Another, 19 percent were small holdings (1-2 hectare) taking up 17.3 per cent of the total operated area. However, the large holdings (above10 hectares) accounted for only 1.6 percent of total land holdings just covered 17.4 percent of the operated area. Hence, there is a wide gap between small farmers, medium farmers (peasant groups) and big farmers in India. Sub-division and fragmentation of the holdings are one of the main causes of our low agricultural productivity, backward state of our agriculture and our farmers too. Fragmentation of the land holdings further deteriorates marginal and small farmers' income-generating capacity and their sustainable survival.

2. **Weakening of Inputs Delivery and Local Agriculture Governance System**

The second major challenge before agriculture sector is input and service delivery systems and inputs accessibility by farmers that includes low level of development of service delivery system, poor competition, high transaction cost, interlocked market, missing mechanism to check standards and adulterations. Input services in terms of custom hiring for farm machinery, equipment and irrigation are difficult to access especially by the small and marginal farmers. On the other hand, physical inputs such as seeds pesticides and fertilizer are also in a poor state in terms of quality. A further, small and marginal farmer faces high costs in accessing these inputs

and services; consequently, it hampers the agricultural productivity and income-generating capacity of the farmers. The linkage that allows small & marginal farmers to access the range of input resources and services such as purchasing of farm inputs, seasonal and long term finance, information regarding technology access and market scenario is critical to receive by these farmers. On the other hand, some studies reveal that subsidies on inputs have resulted in skewed and unsustainable use of inputs too. Subsidies on Urea have resulted in unbalanced use of Nitrogen (Urea), Phosphorus (Phosphate) and Potassium (potash) fertilisers. Further, the subsidies on electricity and diesel have led to the cultivation of water-intensive crops such as rice and wheat with the skewed consumption of nitrogenous fertilizers prone to the unsustainable cropping pattern (V. K. Puri, 2016). Therefore, there is a need for an appropriate mechanism to manage the standard agrarian inputs delivery system and it should also capable of assessing the influence of subsidies on the distribution of the entire inputs. It will reduce the unbalanced use of inputs along with the proper distribution of quality inputs to the farmers in India.

3. **Pressure of Population on Agriculture**

The growth of population and labour force is an impediment to the raising of average income and alleviation of poverty (A.J. Coale & E.M. Hoover, 1993). Consequently, agricultural development in an economy where the population has been growing rapidly is harmful to its development. Agriculture purely concerns with the rural economy and the population growth mounting the pressure on agricultural land and it is directly responsible for the low marginal productivity of this sector. Therefore, the huge redundant labour or surplus labour persistence in agriculture reveals the minimal labour absorption capacity and further results in the low employment creation for the rural populace. Due to the low employment creation in agriculture farmers are searching for opportunity in non-agricultural sector. This attribute of agriculture sector expresses the government failed to arrest the rapid growth of the population in India.

4. **Limited Employment Opportunity in Agriculture Sector**

With overall rapid population growth, the labour force in the rural areas has been growing at a faster rate but the agricultural growth has not been responding in order to accelerate income and employment. It is the rural non-farm sector that has emerged as the major source for providing employment to rural populace, but agrarian division is presently standing at its limits

in order to facilitate sufficient employment to rural population of India. This is the main cause of migration in India. Despite accelerating economic growth, the structural transformation of the Indian economy has been slow with widening labour productivity differentials between the non-agriculture sectors and agriculture sector. The dependent population on agriculture sector has been sharply declined from 70 percent and presently left about 45.3 percent during the period of 1950-51 to 2016-17 (World Bank, 2016). This divulges the weakening of employment opportunities in India.

5. **Mounting Risk& Uncertainty in Agriculture**

In India, agricultural risks are exacerbated by a variety of factors, ranging from climate variability, frequent natural disasters, uncertainties in crop yields, obtainment of reasonable prices, lack of financial services including limited span and design of risk mitigation instruments such as credit and insurance. These factors not only endanger the farmer's livelihood and incomes but also undermine the viability of the agriculture sector. Even not only this, it encumbers the potential to become a part of the solution to the problem of endemic poverty among farmers and agricultural labour as well. The criticality of Indian agriculture in the rural transformation and the national economy seen along with its structural characteristics require substantial governmental and financial sector interventions not only to ensure household food and nutritional security of the farming community but also to generate savings and investments in this grossly underfunded sector.

6. **Growing Market Inefficiency and Increasing Agriculture Waste**

Strong evidence supports the idea that fragmented and inefficient domestic agricultural marketing chains seriously hinder agricultural competitiveness and its growth. Measures to boost marketing efficiency by reducing the regulatory barriers that have impeded investment in agricultural wholesale and retail trade services may also improve marketing conditions for marginal and small farmers in India. In India's agricultural and food markets, the marketing chain typically consists of a primary or local market where farmers sell their product, wholesale markets where wholesalers purchase from primary markets to sell the agriculture produce to food processor entrepreneurs and retailers. At last, retail markets where retailers finally sell agriculture produce to consumers. The subject of distress is that a farmer still not able to get a

reasonable price for their produce and this phenomenon is hitting more marginal & small farmers in India. Further, intermediaries may be present in supply chain make the process more informal and complicated for poor farmers to attain reasonable revenue by selling their agrarian produce. Therefore marketing inefficiencies are hampering farmers' profitability to a greater extent in India.

7. **Inadequate Weights to Public Investment and Subsidy**

The total public expenditure on agriculture (including public investment & input subsidies) as a ratio of GDP has almost doubled in the last decade from 8.6 per cent in 1993-94 to 20.6 per cent in 2009-10. Thus, it appears that there are sufficient public resources going to agriculture. Nevertheless, the bane lies in the composition of expenditure that Indian agriculture receives are mostly on the name of subsidies rather than public investments. Almost 80 percent of public expenditure is in the form of subsidies and only 20 per cent of investment is allocated to agriculture. The present scale of subsidy in the agricultural sector poses a high fiscal burden on the central and state governments. Also, high agricultural input subsidies result in inefficient resource allocation; crowding out of public sector investment; and degradation of the environment and thus, affecting agricultural productivity. Agricultural growth and poverty reduction depend critically on investments in rural infrastructure (irrigation, roads, transport, etc.) as well as investments in markets, rural finance and research & extension. Thus, this imbalance between subsidies and investments needs to be urgently corrected for sustainable growth in Indian agriculture (Ashok Gulati,2014).

As a result, the agriculture sector has been facing insignificant growth since independence. The major challenge of Indian agriculture is production and land size and capital formation. The state has taken several measures to increase production by introducing schemes like land reforms, green revolution and farming system. There are several studies on these issues. Some of the major studies are reviewed and highlighted the findings and gaps.

Review of Literature:

The entire review has been classified into two broad categories in the light of predetermined objectives for this extant study. One segment of reviews deal with the major agrarian issues that act as an impediment in agricultural production and debilitate farmers' profitability& sustainable

income whereas, another segment of reviews is dealing with Ambedkar's agrarian theoretical approach and its germaneness. However, various economic contributors reexamine Dr. Ambedkar's agricultural theoretical approach. Hence, in order to link the theoretical line of approach of Dr. Ambedkar with the current agricultural developmental obstructions, reviews of both the pillars have been articulated. Therefore, the first section of the reviews explains major agricultural hurdles and the second deals with Dr. Ambedkar's agrarian developmental notion. Some of the major studies reviewed for each section are given below:

Brendan Brown et.al. (2017), paper titled "Negative evaluation of conservation agriculture: perspectives from African smallholder farmers" examines the conservation agriculture (CA) followed by soil health management in Africa. The interpretation of the study was done with the help of primary data. It has been discerned that conservation agriculture practice has not been widely adopted by small & marginal farmers in sub-Saharan Africa. They have a very small piece of land holdings; hence, operation of conservation agriculture is a difficult one. Small farmers have a greater magnitude of marginal utility from their owned land; thus, they compelled to use the same piece of land for extensive agriculture. It will give rise to the deterioration of soil health in the long run in Africa. Therefore, upholding the soil fertility of small and marginal piece of land is the vast subject of concern of the study. Study put forwarded CA adoption pathway in accordance with the observations of the study and this CA adoption pathway comprises of major four elements are;(1)development of financially viable CA adoption; (2) incorporation of wider livelihood objectives into a CA 'package'; (3) re-evaluation of current extension policy; and (4) development of CA-complementary agricultural policies. Without addressing these key four issues, the potential benefits of CA adoption are unlikely to be achieved in African smallholder systems.

Joanne Millar & Jane Roots (2012), paper titled "Changes in Australian agriculture and land use: implications for future food security" examines the relative importance of land use and its influence on other associated factors in agriculture. The author analyses Land use, social and environmental instability in terms of their impact on the role and future productive capacity of Australian agriculture. The study resolved that due to recent declines in farmer populace, available fragmented agrarian land and water restrictions, Australia will not continue to produce enough agricultural products for domestic and export markets. Furthermore, in a long period,

food security for Australia and its trade partners are likely to be threatened by fragmented holdings, climate impacts (e.g. droughts, flooding and cyclones), and lack of planning. It also has observed in the study that over urban development, mining on agrarian productive compatible land, shortages of skilled labour and underinvestment in agricultural research and development with a non-corrective measure for diminutive land holdings worsening the growth of agriculture in Australia.

Manish Jose (2015), paper titled "Dynamics of agricultural land-use change in Kerala: a policy and social-ecological perspective" explicates Land-use change is a phenomenon highlighting significant shifts in human interaction with the natural environment. The author argues for an interdisciplinary analysis of rapid land-use change to unpack the multiple dimensions of sustainability: economic, ecological and social factors. The study has found that up to 70% reduction in the area under paddy by 2010. Reduced economic viability, labour shortages and population pressure on land and unceasingly incline in fragmentation of land holdings are the major drivers for the transformation of paddy fields to other land uses and for the decrease in paddy production as well. As fragmentation degree gets higher, changes in land use also absorb greater variations and consequently this agrarian structure reflects livelihood strategies adopted by marginal & small farmers in response to these drivers.

Bred G. Peter, Joseph P. Mesina (2018), paper titled "A Multiscalar Approach to Mapping Marginal Agricultural Land: Smallholder Agriculture in Malawi", the main objective of the study is to analyze the agricultural productivity in terms of different landholding size. The study resolved that marginal agricultural lands are defined here by suboptimal biophysical conditions and historically indicates low agricultural production. The major findings of the study:(i) Productivity and marginality in Malawi are spatially organized, and an assessment of productivity at multiple scales highlights the importance of presenting both global and local spatio temporal variability for managing agro ecological variance. (ii) Marginal land has less productivity as compared to large land holdings in Malawi. Spatiotemporal variability also indicates that agrarian operations executed on the marginal land have been provided less production weigh against the large landholding production.

Mark Paul (2017), "Small farms, smaller plots: land size, fragmentation, and productivity in Ethiopia" paper explains the dominance of smallholder farms composed of multiple plots and it

states the relationship between fragmentation, agrarian productivity and poverty. The study reveals that fragmentation coupled with small farm size is an impediment in order to increase yields and thus decreasing poverty and food insecurity. Utilizing an Ethiopian national survey, the study explores the relationship between yield, farm size and fragmentation. The inverse relationship between farm size and yield and a positive association between yield and land fragmentation has been observed. Nevertheless, in terms of the implication of technology on land and future soil fertility management perspectives, small landholdings will never be proven a good option.

Peter Anyang' Nyong'o (2013), paper titled "The land question, land grabbing and agriculture in Africa", main purpose of this paper is to evaluate and explore the marginal agrarian class struggle. The study has found that improved production by large landholding commercial farming generates profit capacity of farmers in recent years in Africa. The study also portrays a detailed marginal agrarian class struggle since ancient times to present contemporary India. Study advocates, that land distribution is an imperative aspect in order to reduce the struggle of deprives farmers' class. Therefore, the issue of equity and poverty elimination needs to be placed at central in addressing the land issues and agriculture question in Africa.

Arsaul Hoque (2006), in his paper titled "Farm (Land holdings) size and economic-allocative efficiency in Bangladesh agriculture" author analyses the association between farm size and efficiency (economic and allocative efficiency) has been estimated by applying the random coefficient method in the production function. It has been found that a farm size between 7 and 12 acres is the most efficient in the context of Bangladesh agriculture. Therefore small and marginal land holdings have found least efficient in Bangladesh. The diminutive size of land resulting in growing economic and allocative inefficiency at large and farmers possessed a lesser land or small patches less than 7 acres has revealed their less profit-generating capacity that makes their survival critical in Bangladesh.

Nicolas J. Sitko & T.S. Jayne (2014), in his paper titled "Structural transformation of elite land capture? The growth of emergent farmers in Zambia" study analyzes the factors underpinning the growth in Agrarian division gorged in a comprehensive manner. On the other hand, it also scrutinizes the working of policies in Zambia's land administration and in agricultural spending. It has been perceived that socio-economic conditions of farmers were miserable before

implementing policies on the subject of land administration, but after implementing effective land acquisition programmes that promote the collectivization of land and further availability of required resources for agricultural growth, Zambia's agriculture sector has been on the winning streak. Therefore, the study elucidates that marginal land operations are constraints in agrarian advancement while the collectivization of land and further spending policies are a better route in order to promote agriculture in Zambia.

Herman Geyar (2016), his paper "Poverty Traps in South African Agriculture" attempted to analyze the poverty traps in South African agriculture with the help of African agricultural census and it also scrutinizes different class farmers' costs and benefit interpretation with their respective agricultural land size. The study has found (i) technology trap is evident with average incomes of small farms is very low relative to the average capital asset values and in most of cases marginal & small peasants are not capable to apply technological advancement in their agrarian operations. Therefore, the conception of Cost-effectiveness is ruled out under marginal & small land holdings. (ii)The mean productivity of workers in terms of revenue per employee supports the argument that productivity declines in small farms due to the demographic trap. Initial declines in income per ton outputs of smaller farms validate the stochastic returns poverty trap.

S. Qasimet.al. (2011), paper titled "Socio-economic determinants of land degradation in Pishin sub-basin, Pakistan" attempted to study the following objectives i) find farmers' perceptions on land degradation, ii) examine the socio-economic determinants of land degradation. Binary logistic regression technique has been utilized in the study by predicting seven determinants of land degradation in the study area. The findings of the studies are: a major determinant of land degradation has been observed as cropping nature & pattern that divulges exhaustive agriculture in small agrarian patches while an optimum agriculture practice has been perceived in medium and large agrarian patches. Therefore, land usage is a critical determining factor for reducing average size of land holding in Pakistan.

Kathryn Sebby (2010), paper titled "The Green Revolution of the 1960s and its impact on small farmers in India" discusses the various types of impact generated by Green revolution on small farmers in India. Small Agriculturists affected by small, diminutive size of land holdings and subsequently, it affects their income creation path in form of achieving efficient production

capacity. As Keith Griffin wrote in 1979, "The growth in inequality in rural areas stem in large part from the fact that small, marginal & poor peasants who have restricted access to credit, technical knowledge, usage and the material means of production are unable to innovate as easily or as quickly as those who are largely landed, liquid and literate" (Griffin, 1979).

Grammatikopoulou, I., Myyrä, S., & Pouta, E. (2013), in his paper titled "The proximity of a field plot and land-use choice: implications for land consolidation" explores the farmers' perception concerning predilection for land use is snubbed or partly overlapped by various reasons. On the ground of applied econometric models fitted to stated preference data, the study revealed that proximity of a field plot is a relevant factor affecting land-use decisions. One-fourth of landowners would change the use of a field plot if the condition of distance was changed. Landowners would continue farming a field plot if its distance from the farm compound was reduced, being willing to accept on average €79.60 less in net income per ha per year. The study also explicates that the effect of greater proximity of field plots to the farm compound following land consolidation was heterogeneous, particularly depending on the farm size and its location. It has been shown in the study that preference analysis and decision making is disadvantageous for marginal land owner with the grater magnitude as it hampers their profitability.

C. Ramasamy (2004), Paper titled "Constraints to Growth in Indian Agriculture: Needed Technology, Resource Management and Trade Strategies" explores an assortment of technological constraints, for instance, a modern variety of irrigation, agro-chemical use, mechanization, Rain fed bias. The study also describes a range of resource and capital constraints such as Marginalization of land holdings, Land degradation, Water demand and Agricultural investment, Capital Formation with an empirical data analysis. Major findings of the studies are: Indian agriculture is principally distressed byte above-mentioned constraints, particularly by technological constraints and marginalized land. Simultaneously, above constraints are also responsible for the upturn in rural poverty and generating a negative impact on farmers and agricultural laborers well being.

S. Mahendra Dev (2003), paper entitled "Agriculture, Employment and Social Sector Neglected" highlights the urge for removal technological and other the resource constraints in agriculture and also addressed the major problem of employment under agrarian sector of India. The study

analyzes the drift in gross capital formation, rural employment with the available data for the period of 1993 to 2001. The study has illuminated the fact that inappropriate usage of devolved funds to agriculture, undoubtedly reflects in farmers suffering from drought, high cost of inputs, no substantial increase in agricultural investment, lack of incomes and inadequate marketing mechanism. The study emphasizes that the state governments have major accountability and liability for agrarian and social sector development as well as towards the subsistence populace depending upon this sector.

Jean-Jacques Dethier (2012), his paper titled "Agriculture and development: A brief review of the literature" is an attempt to underscore the role played by agriculture in the development process and explain the interaction of the agriculture sector with other economic sectors. Various dimensional traits, for instance, determinants of the Green Revolution, issues of income diversification by farmers, approaches to rural development issues of international trade policy and food security have been evaluated to examine the crisis in agricultural produce and rising volatility in recent years. Moreover, the paper also reflects recent stumbling blocks by which the agrarian sector has been languishing. Authors advocated hypothesis that increasing farm size is key for improved incomes in agriculture as it allows the use of mechanization that has indivisibilities (with differences in access to credit by small and large farms favoring the latter), implying increasing returns to scale and higher profitability per hectare.

M Raghavan (2001), paper titled "Public Sector Investment and Agricultural Growth", expounds association between agrarian growth & public sector investment and relation between private &public sector investments in agriculture. Paper resolved that there is a positive correlation between Public sector gross capital formation and agricultural growth. Nevertheless, this public sector investment is not realized on ground level in terms of utilization of funds for providing rural infrastructure. Therefore, the synergy effect of this investment has not been reflected in farmers' welfare and in their income engenders capacity. Moreover, public sector investment has the capacity to trigger the high productivity of crops by facilitating agricultural infrastructure in villages. However, on the ground level realization of this public investment would be possible with appropriate utilization of the investment in a productive manner in all the states of India.

Shantanu De Roy (2017)**,** paper titled "Economic Reforms and Agricultural Growth in India", highlighted the following objectives (i) impact of economic reforms on agricultural growth (ii)

problems and challenges faced by Indian agriculture in increasing the yield of food grains between the period of 1981 to 2014. iii) Role of public sector investment in agrarian advancement. The major findings of the study: (i) second phase of green revolution grasp economic reforms with the greater magnitude and consequently yield of food grain were high during the period of 1985 to 2011, nevertheless the decline in the public sector investment nullifies the impact of the green revolution in the later years. Public sector investment is the eventual key for the provision of inputs to farmers for good agrarian production. (ii) Reveals the trend of accentuating private investment and diminishing public investment in agriculture. Besides this, growth rates of the agriculture sector as a whole and across major crops cultivated in India have deteriorated and this implies disparity in income generation between agriculture and other sectors, particularly between services and agriculture.

Amiya Baghchi (1965), paper titled "Growth of Agricultural Production Regional Differences in Rates" draws attention towards the uneven distribution of land holdings in north western and north eastern states of India. The study has found that large farmers only benefited by community development projects as compared to small & marginal farmers in both states. Besides this, the study also divulges that a higher degree of income generation is followed by only farmers owned large land holdings. The study outlines the fact that small land holdings and their income capacity creation have been weakening in India.

P. Venkatesh and M.L. Nithyashree (2012), paper titled "Institutional Changes in Delivery of Agricultural Inputs and Services to Farm Households in India", study scrutinized the impact of key institutional changes in agrarian input markets and usage of inputs throughout the farming community of the country in the preceding decade. Furthermore, it discusses the three facets of inputs: (i) drift in foremost agricultural inputs use, (ii) their approachability to small farmers, and (iii) institutional shift in the delivery of input and services. The study has obtained the data from different government reports mainly from NSSO, input survey and CACP. The major findings of the study are: i) A significant growth in input use have been perceived in the previous decade and a noticeable change has been observed in the shares of public and private sectors in the factor markets during the period of 2001-2010. ii) Accessibility to institutional credit has been limited for marginal and small farmers. About 40 per cent of the farmers have access to information on modern technology from any source. iii) Easing procedural norms in accessing

institutional credit is essential for the inclusion of marginal and small farmers in the formal credit system. In addition, extension system should be rejuvenated with recent developments of information and communication technologies for better dissemination of farm information, particularly among the remotely located rural areas of India.

Edison Dayal (2016), paper titled " Agricultural Productivity in India: A Spatial Analysis" has studied the following objectives: (i) To depict three indexes of agricultural productivity- land productivity, labor productivity, and aggregate productivity to measure and map the productivity patterns in India. (ii) Regional inequalities in the levels of productivity with the help of Regression analysis revealed that the spatial variation of land productivity is positively related to fertilizer use, irrigation, and urban-industrial development and is negatively related to population density. (iii) The positive relation between Labour productivity and agricultural wages while the negative relation between fertilizers uses in relation to the density of agricultural workers on net sown area. He found the following facts: (i) High productivity of agriculture take place in India by expanding irrigation resources, fertilizer supply, and credit facilities in order to allow small farmers to benefit from the availability of physical inputs. (ii) Desperate need for a transfer of population from agricultural to non-agricultural activities in densely populated eastern states. (iii) The significance of urban-industrial development in the study suggests that a decentralized policy of urban-industrial development will benefit agriculture.

Marco Ferroni and Yuan Zhou (2012), paper titled "Achievements and Challenges in Agricultural Extension in India" attempted to discover major challenges faced by Indian government in order to augment agrarian extension in India & to analyze the role of high-value products and processed foods in advancing the agriculture echelon in India. The major findings of the study are i) Private sector is enjoying dynamic growth opportunities in agricultural supply chains, and its presence will become more and more pervasive. The private sector readily responds towards farmers' demand for technology and services. ii) Implementation of agricultural extension services and practices on ground levels is widely cited as a bottleneck in Indian agriculture and rural development.

Arun Chaturvedi et.al (2012), "Reorienting Land use strategies for socio-economic development in Uttar Pradesh" in this paper author evidently expounds that per capita availability of agricultural land has been decreasing rapidly everywhere in India. This statement has been

justified with the help of the empirical data of Uttar Pradesh state. The study suggested that a judicious land use policy; with the synergy of physical, economic and institutional factors should be framed, even if the investment is encouraged in non-agricultural sector for employment. The institutional factor is one of the essential and critical components to determine the welfare and prosperity among marginal land holders in India in general and in Uttar Pradesh in particular.

Ramesh Chand et.al (2011), paper titled "Farm Size and Productivity: Understanding the strength of small holders and improving their Livelihood" examines the relationship between farm size and per hectare agricultural productivity in India and association of technology adoption with the different farm size in India. The study has found that smallholding in Indian agriculture still exhibits higher productivity than large holdings. These smallholdings, however, have been showing lower per capita productivity and the incidence of poverty is widespread. Minimal association of technology adoption has been observed for marginal & small holdings. The author suggested strategies for Indian agriculture and smallholding households should include reducing the inequality in land distribution and promoting off-farm work in rural areas. However, lower per capita productivity is a weighty attribute in the case of small and marginal holdings, which directly affects the income-generating capacity of these farmers.

A.Amarender Reddy (2009), paper titled "Pulses Production Technology" has studied the following objectives:(i) analyses the status of pulses production technology, (ii) constraints in the cultivation of pulses and the possibilities of increasing production. The author has found that expansion of area under short-duration varieties, development of multiple disease/pest resistance varieties, use of micro-nutrients like zinc &Sulpher and increase in area under rabi pulse crops to raise pulses production is still required to channelize a piece of information, communication. This channelization of information & appropriate communication should develop in such a way that educates farmers to raise the production of pulses. Secondly, he has also discerned, the minimum support price (MSP) is not effective for pulse crops; prevailing market prices should be taken into account while fixing the MSP to bridge the gap between demand and supply, then only small farmers will be benefitted by pulses production. Technology adoption has not been bringing into being optimality under the pulses production.

M Raghavan (2008), "Changing Pattern of Input use and Cost Cultivation" This paper appraises and evaluates the paid-out cost of cultivation of wheat in India. It also examines the cost of

cultivation of wheat during the input subsidy regime of the 1970s & 1980s and after its abolition in the 1990s. The study utilizes time-series information collected as part of the "comprehensive scheme" of the ministry of agriculture. The study has found, the pattern of changes in inputs as well as costs of cultivation vis-à-vis the wholesale price index (a proxy for the general price level), the value of inputs is exclusively market-purchased and it stood at usual standards during the input subsidy regime of the 1970s & 1980s. Contrariwise, analysis of the weighted average of the total costs establishes unequivocally; flaunts that costs of farm inputs increased very sharply in the post-reform period in India. It indicates that efficient input usage in agriculture becomes intricate especially for small & marginal farmers of India.

Suresh Pal (2008), paper titled "Agricultural R& D Policy and Institutional Reforms: Learning from the experience of India and China" has the objective to analyze the implication of institutional reforms in both the countries. It has been observed that both nations diversifying the sources of funding and increase research efficiency in agriculture domain. Competitive funding, commercialization of technologies, strengthened intellectual property rights, facilitating regulations and flexible extension approach are some of the major reforms undertaken. Nevertheless, the pace of implication through appropriate governance has witnessed relatively higher in China. Moreover, commercialization of technologies strengthened intellectual property rights in China has been escalated since1975 at a greater pace in the agrarian division.

Ramesh Chand et.al (2010), paper titled "Effect of Global Recession on Indian Agriculture" has the major objective to assess the trajectory of growth in agriculture and to discover the causes for growth crises in agriculture. The study has found that there is a sharp deceleration in the growth of the agricultural sector against the background of the impressive growth of other remaining two sectors i.e. industry and service sector. Subsequently widening disparities between the incomes of workers group engaged in non-agricultural and agricultural activities adversely affect the welfare of the majority of the population, which is dependent on agriculture. Growth crises in agriculture are widening due to weak input-output association, poor technological inputs usage and less productive attention of the government in terms of expanding investment in agriculture.

Maumita Bhattacharya & Sudipta Bhattacharya (2007), "Agrarian emphases in West Bengal in the liberalization Era" This paper analyses the process of growth of the agrarian economy of West Bengal from 1980-81 to 2002-03. The entire time period is divided into two sub-periods,

namely, 1980-81 to 1991-92 and 1992-93 to 2002-03. Simple exponential growth rates, kinked exponential growth rates and log quadratic estimates have been utilized in the study. Total eight variables related to the agrarian economy of West Bengal, namely, area, production, yield, consumption of fertilizer, proportion of HYV, cropping intensity, institutional credit and land reform shows a decline in growth from first to the second sub-period. Land reform measures have been implemented in West Bengal since the late 1970s and early 1980s. However, it has been witnessed in the study that attention of policymakers towards land reforms becomes neutral. Therefore, it was expected that land reforms and their implication will rise in the chosen period of the study, particularly in the second sub-period but it is evident that land reforms perceived a slight decline during the second sub-period of the study.

Archana S.Mathur (2007), paper titled "Status of Agriculture in India: Trends & Prospects", has attempted to depict trends in the growth of agricultural production in India for the period of the 1990s to 2005. The study also identifies factors affecting agricultural growth. The study has found that public investment/ government expenditure on agriculture as being a crucial determinant in stepping up the growth rate of agricultural production. Furthermore, the stagnant trend in the growth of agrarian production has been witnessed. The study also stated that given other factors; a consistent increase in public investment to 15 per cent per annum should lead to agricultural growth of 4 per cent, which is concomitant with the projected growth rate in the Eleventh Plan.

A. S.Bhullar& R.S.Siddhu (2006), Paper titled "Integrated Land & Water use" has the objectives to detect the efficient use and management of land and water in state Punjab and secondly to examine the practice of conservation agriculture in Punjab. It has been found in the study that land and water are overexploited in order to generate higher income and productivity. The dimension of sustainability is totally disregarded as marginal and small farmers have no option to utilize their land exhaustively. The study also spells out the policy agenda, aimed at an integrated system for the use of land and water to ensure the sustainable development of the agricultural sector in Punjab.

Ashok Gulati (1989), paper entitled "Input Subsidies in Indian Agriculture- A State-wise Analysis", highlighted the following objectives: (i) to estimate the quantum and distribution of input subsidies across states in Indian agriculture during the 1980s. (ii) To observe the dispersion

pattern of input subsidies in the agriculture sector within the different states of India. The major findings of the study are:(i) input subsidies with the implications of incentive structures in different states determine the quantum and distribution of these subsidies; and subsequently, it becomes an efficient determinant of efficiency in agrarian production. (ii) Principle of comparative advantages determines rationale/desirable cropping pattern in different states as per the different agro-climatic zones. (iii) A high degree of dispersion in the distribution of input subsidies has been found in various states during the 1980s in India.

Pranav Bardhan (1969), paper titled "Agriculture in China & India output input and Prices" has the following objectives: (i) to analyze the scale of agrarian production in china & India (ii) to inspect the price policy of both the countries and its impact on the agriculture sector. The major findings of the study are: (i) growth in the agrarian produce of both countries has grown at fairly similar rates during the period of 1951-52 and 1967-68. But the Chinese yields per hectare in agriculture exceed from India by a significant margin. (ii) Chinese agricultural performance has been much better than Indian agricultural performance in terms of the provision of agrarian inputs. (iii) Chinese price policy has also been more favorable towards the agricultural sector and its subsistence working-force as compared to Indian price policy.

S.P. Gupta (1995), in this paper "Economic Reforms and its Impact on Poor" author, attempts to study the impact of the economic reform measures on the poor. Paper has the following objectives: (i) to evaluate the effect of economic reforms on income & consumption in agriculture and small industry sector's associated working force, (ii) to analyze the direct and indirect effects of the government's social services and human development programmes on the rural working force in the pre and post-reform period. It has been found that influence of economic reforms on poor is minimal as compared to in other developing countries. Social costs of reforms may have also been low as compared to in many other developing countries, but it has not reflected in terms of access towards the government's social services in India. As the major proportion of the rural populace comprises agricultural farmers and laborers; hence the indigent reflection of the government's social services has been perceived in India.

Shankar Rao (2017), paper titled "Caste Discrimination and low agricultural Performance in India", attempted to study the caste-based discrimination and the differences in the performance of Indian agriculture in terms of accessing various inputs by different caste categories. Data from

the Situation Assessment Survey of Agricultural Households have been utilized. The study has found that disadvantages originated through caste-based discrimination and subsequently create a group of socially marginalized rural farmers in agriculture; that begins with the low access to resources, low levels of productivity, and low realization of returns from agricultural operations.

N Krishna Ji (1981), paper titled "Cobb-Doglus Production Function: A Sceptical Note with special reference to Agriculture" explores and investigates the application of Cobb-Doglus Production function in agriculture. Paper expounds that observations generated from technological input variables (irrigation, fertilizers, electricity) with fixed coefficients can be approximated welt by a Cobb-Douglas function with constant returns-to-scale. Furthermore, paper has utilized regression analysis followed by limited substitution possibilities. The approximation has shown to be robust, with respect to both heterogeneity in the input-output ratio and the aggregate function, under reasonable assumptions of Cobb-Doglus production function. With the range of limited substitution, the Agriculture sector may perform efficiently and draws the well-behaved function.

Bhupat M Desai & N V Namboodiri (1997), in his paper "Determinants of Total Factor Productivity in Indian Agriculture" prime objective of the study, is to develops a more comprehensive framework of price and non-price factors for determining total factor productivity in the agrarian sector. The study has found widely that no pricing factor is accountable to raise the total factor productivity of agriculture in the long-run period. Furthermore, technical change in agriculture is also determined by non-price factors like government expenditure on Research & Development and infrastructure. While, other price factors such as inputs, credit, rural literacy, and marketing and banking infrastructure in addition to land reforms directly influence the functioning of the agriculture sector in short-run as well as in the long-run period.

R S Deshpandey& V.M. Rao (1986), paper titled "Agricultural Growth in India: A Review of Experiences and Prospects" has the major objective to examine the shifts in the resources of agrarian growth from agricultural area for improving the agricultural yields; growth in irrigation and the use of modern inputs. It has found in the study that the attention of policymaker is more towards the non-agrarian sector due to the higher scope of employment and employability. However, the study has recognized the positive relationship between agricultural growth and the

welfare of the rural masses. The study also identifies three major frontiers i.e. yield improvement, irrigation growth, use of modern inputs are needed to be augmented to push the agricultural growth beyond its present limits.

Beena Agerwal (2010), paper titled "Rethinking Agricultural Production Collectivities" argues for a new institutional approach to poverty reduction, agricultural revival and social empowerment. Paper describes a range of successful cases of agricultural production collectivities from the transition economies in south Asia. Moreover, the paper also makes a strong case for a group approach to agricultural investment and for production by promoting collectivities of the poor which argues more efficiency than the traditional individual-oriented approach of agriculture. The collectivities proposed here in the form of collectivization of small-size farms, collectivized use of technological inputs with the adoption of voluntary, socio-economically homogeneous and participatory approaches.

A. Ganesh Kumar (1992), his paper titled "Falling Agricultural Investments and its consequences" attempted to analyse the investment policy in major three sectors of an economy; Agriculture, Industry and Services. The study has revealed slowing down agricultural growth would lead to growing income inequality in rural areas. Neglect of agriculture, an important sector of the Indian economy; is likely to have an adverse impact on the country's growth. Moreover, this neglect has been observed as a fall in agricultural investment during the 1980s. Paper utilizes a general equilibrium model in assessing the adverse impact of the fall in total agrarian investment on agriculture in particular and on the economy in general. Although, shifting investment resources away from an agrarian to non-agrarian division may result in faster growth in total gross domestic product yet the growth across the sectors is likely to be highly uneven. It results in a non-agriculture sector likely to show higher growth than agriculture sector.

Ashok Rudra (1978), paper titled "Class Relations in Indian Agriculture", has endeavored to study the class composition of the Indian agricultural population and its impact on the agrarian production. The study has found that only two classes in Indian agriculture have been persisting. One is termed as 'the class of big landowners' and the other is 'the class of agricultural laborers'. These two classes are in antagonistic contradiction with each other and this contradiction constitutes the principal contradiction in the rural society of India. Moreover, class differentiation appears in terms of agricultural laborers, poor peasants, middle peasants, rich

peasants, landlords, etc. The study also expounds that this composition of the agrarian populace will harm the agricultural development in the long gestation period.

SeemaBathla et.al. (2017), paper titled "Where to invest to accelerate agriculture growth and poverty reduction" has the foremost objective to understand the drivers that helped India in achieving the challenging targets of the Millennium Development Goals (MDGs) for reducing poverty before 2015. The structural equation model has been utilized for the period of 1981–82 to 2013–14to execute the study. Authors have found that education and agricultural research & development produced the highest marginal returns for promoting agricultural income. On the other hand, investments in rural infrastructure development and health provisions are the most effective in reducing rural poverty and that would be directly advantageous to marginal & small farmers to sustain their income from agriculture.

Manebandhu Chattopadhyay (1979), "Relative Efficiency of owner and tenant cultivation: A Case Study", the author examines the relationship between the size of holding and the intensities with which different types of input are applied under different kind of holdings. The author also attempts to study the total output obtained under different types of tenancy. It has been found in the study that the application of various kinds of inputs is more effective in case of large land holdings as compared to a smaller one. Small & marginal holding states poor relationship with the applicability of farm inputs. Moreover, it has been observed in the study that most of the large holdings have been allotted to tenancy; hence the sufficient agrarian output is produced by farmers due to the pressure of large land owners on the marginal farmers to pay the amount of tenancy on regular basis. Eventually, marginal farmers get the negligible income for their work.

Kalpna Wilson (2002), paper titled "Small Cultivators in Bihar and New Technology" has attempted to study the adoption of new technology by small farmers in Bihar state and analyze the drift in the prices of the inputs after the introduction of the new economic policy in 1991. The study has found that there is an inclined drift in the cost of cultivation due to the rise in input prices and subsequently increasing costs of cultivation render these small farmers to depend on large landowners for the source of money, for instance, high-interest-rate loans. Furthermore, the study has found that, in the scenario of unequal distribution of land and other resources, the embrace of new technology by small cultivators, cannot be accomplishable in Bihar.

B.B. Mohanty (2001), "Land distribution among scheduled Castes and Tribes" in recognition of the basic proposition that scheduled castes and tribes are the most disadvantaged in respect to land, which largely accounts for their perpetual poverty and makes them vulnerable to injustice and exploitation. Attempts have been made by the union and state governments to promote and protect their rights with regard to the use of land. The present study shows that even after 50 years of planned initiatives and policy measures, there has not been a substantial improvement in the landholding status of scheduled groups, and in some states, it has declined further.

P.Radhakrishnan (1982), paper titled "Land Reforms and changes in land system study of Kerala Village" has the major objectives to explore the status of pre-reform land ownership patterns& the post-reform land ownership pattern in agrarian societies of Kerala. It has been observed in the study that the abolition of the institution of land-lordism& tenancy with the dis-solution of the nexus between the Landlords and those who functioned under them has achieved in Kerala. Therefore, it reflects in the marginal & small farmers' well being and income creation as their exploitation has been reduced in Kerala. Furthermore, changes in the institutional framework of agriculture land system making land ownership patterns more efficacious in the post-reform period of the study.

Chandrama Goswami (2002), paper titled "Agriculture land use in plain of Assam" has studied the three aspects of agricultural land use in the state Assam. This land utilization has been examined in terms of extensive cultivation, intensive cultivation and underutilization of cultivable lands. The compound growth rates obtained from the estimated trend equations have been used to examine these three aspects. The major findings of the study are: (i) in order to increase agricultural production, extensive cultivation through land shifts from outside the agricultural sector is neither feasible nor possible. (ii) The study suggested that it can be best done through (a) fetching most of the area cultivated under irrigation (b) bringing all fallow lands under cultivation of region-specific remunerative crops. (c) For bringing cultivable waste into cultivated land, heavy investments would be a pre requisite on its retrieval. Thus, it would be wiser to ensure optimal utilization of fallow lands and reap the benefit of increased production.

Sheetal Seekhri (2012), paper titled "Caste-based clustering of land parcels in two villages of Uttar Pradesh" has the key objective to examine the land parcels in Indian villages based on

caste- oriented clusters in Uttar Pradesh. The study utilized, digitized cadastral maps of two villages and a unique data set collected by conducting a survey in these two villages. Moreover, the spatial method to calculate Moran's Index for caste-based clustering has been practiced. The study has observed a statistically significant level of clustering of land parcels based on caste groups. This finding has important implications for social learning in technology adoption, sharing of agricultural inputs, and development of fragmented markets for inputs.

Remmy Herrera& K.C. Lau (2018), paper titled "Convergence of peasant struggles worldwide" has the objective to explicate a plethora of problems confronted by Southern and Northern agriculturists in the current neo-liberal era in India. The study explores the fact that peasant struggle has been continuing in the present era for their social emancipation and legitimate right of access to land & food. The study has found that the similar struggle of all categories of workers and people is also a point of distress in an economy because it reaches them towards food sovereignty and in access to the other essential resources. Paper suggested that peasant struggle should be addressed to build our societies as inclusive at the local, national and global levels, on the principles of social justice, equality and real democracy.

Arun Chaturvedi, N G Patil & S N Goswami (2011), his paper titled "Reorienting land Use Strategies for socio-economic development in Uttar Pradesh" examines the current land use and effectiveness of management strategies in the U.P. agrarian economy. Paper explicates various kinds of management strategies. It has been perceived that the per capita availability of agricultural land has been decreasing rapidly in India, particularly in Uttar Pradesh state. The study argues that a judicious land use policy, in synergy with the physical, economic and institutional factors should be framed, even if an investment is encouraged in the non-agricultural sector for employment. But in the absence of resurgence in the institutional reforms, land use strategies would not become effective in order to develop the agriculture sector and its subsistence work force in Uttar Pradesh.

Suma Scaria (2010), paper titled "Changes in land Relations: the political economy of land reforms in Kerala Village" has the following objectives (i) to understand the changes in land relations through the lens of land reforms. (ii) To study the impact of political economy on the implementation of land reforms in Kerala. The major findings of the study are: (i) micro-level village study show that much-acclaimed land reforms have failed to provide land to the actual

tillers of the soil. The scheduled castes still stand at the bottom in landownership. (ii) Causes for standing at the bottom in landownership are hidden in the commercialization of agriculture, rapid migration, weak social reforms and demographic pressures.

Bharat Dogra (2002), his paper titled "Land reforms, productivity and farm Size" attempted to study the productivity level under small holdings and large holding in India. It has been evident in the study that small farms having a more equal distribution of agricultural land in contrast with large farms. It has been perceived in the study large farmers tend to plant monocultures because they are the simplest to manage with heavy machinery. On the other hand, small farmers are more likely to plant crop mixtures – 'intercropping'. It also reflects in the study that the land reform effort faces several obstacles due to which there can be temporary setbacks. Nevertheless, in a broad support base of redistribution & and carefully implementation of planning may be improve the land reforms and productivity of small farms in India.

D Rajashekhar & G N Rao (1994), paper titled "Land Use Pattern and Agrarian Expansion in a Semi-Arid Region- Case of Rayalseema in Andhra Pradesh" is an attempt to trace the land use pattern and agrarian expansion in Rayalaseema during the late 19th and early 20th centuries. It has been observed in the study that there is an increase in land use but marginal & small farmers were still landless or possessing less land. Therefore, marginal & small farmers' wellbeing still faces significant struggle and the study also argues that demographic factors, market-related and infrastructural factors were equally responsible for the outcome.

Rekha Bandyopadhyay (1993), paper titled "Land System in India- A Historical Review" explicates historical trends in land relations in India with an elaborative approach. The study analyzed land reform status during the four years of planning period in India. It has been witnessed in the study that efforts were made towards (i) abolition of intermediaries; (ii) enactment of radical tenancy laws; and (iii) provision of land ceiling laws. Moreover, stress was placed in giving land ownership right to the actual tiller. Nevertheless, the pace of land relations in India remained stub-bornly unchanged. Thus even after independence, the system remains non-egalitarian and oppressive in spite of the proclaimed desire to the contrary. Overall, the study clarifies that after more than four decades of planned efforts the basic nature of land system has undergone only a marginal change.

Madhur Gautam (2016), paper titled "Making Indian Agriculture More Resilient Some Policy Priorities", expounds evidently that India is a large and heterogeneous country, with a diverse agricultural economy; this sectoral component is presently underperforming. Paper also analyzes the implication of some prioritized policies in the agriculture sector. It has been found in the study that growth trajectories of the agriculture sector may be modernized with effective agricultural production management. The study also suggested that to arrive at appropriate, implementable and politically feasible solutions, the contemporary debates on the agrarian need to shift from the traditional focus on physical productivity targets towards smart policies, strengthened and relevant institutional arrangements. It will be advantageous to foster a more profitable, sustainable and resilient agricultural sector capable of ending poverty and boosting shared prosperity. Furthermore, technological advancement and attention towards prime factor for instance land would substantiate the growth in agriculture and farmers as well.

The first section of the review highlights that there are various studies have been conducted on agricultural issues confronted by Indian agriculture. The above reviews expounded various impediments faces by the agrarian sector on the ground of inputs access such as land, irrigation, fertilizers, technological inputs, electricity, etc. and their betterment along with the effective policy implications such as land reforms, land ceilings law. In this context, the reviewed studies are divulging the situation of prime input factor land and the usage of other subsidiary factors in India and in different countries as well. It clarifies from the above reviews that the situation of agricultural land holding and its management has not been performing well to augment agrarian development. Further, the poor access to other agrarian inputs and its inefficient usage due to high agrarian diminutive land has been mounting in India.

On the other side, the second section of reviews deals with the retrospection with Dr. Ambedkar's Agrarian theoretical approach. In the light of the above persisting agricultural rundown, there was an astounding economist and well-known intellectual in the history Dr. B. R. Ambedkar; had first materialized the role of agriculture sector in economic development of India. In accordance with him, this sector has an imperative appearance in accelerating the pace of development of Indian economy in both direct and indirect ways, however, industrial & manufacturing sector performs as a forward linkage for agrarian division. According to Dr. Ambedkar, backwardness of agriculture was the mainly caused due to the widespread poverty,

hunger and malnutrition within the nation. In addition to this fact; the structural inter-relationships among sectors in the economy are generally examined in different ways. The institutional, demographic and socio-political context within which the production process has been taking place over the years plays a pivotal role in shaping the sectoral linkages within the economy. Changes in any of these perspectives would lead to changes in the growth and composition of different sector sub-sectors within the sectors and thereby, the sectoral linkages (Saikia, 2009). Therefore among all three sectors, Indian agrarian sector owns weak forward linkages that enable it to generate more spread effect as Hirschman framework in 1958 argued that sectors with high backward linkages should be preferred to agriculture sector and this view further expanded by Chenery & Watanable (1958) and they opined that modernized agriculture has comparatively higher potential linkages in contrast with traditional agriculture. Dr. B.R. Ambedkar's agrarian development approach has been acting as a special purpose weapon to solve the obstruction of agrarian organization in India. There are several studies conducted to validate & scrutinize the theoretical agrarian approach of Dr. B.R. Ambedkar in contemporary India. Some major studies have been reviewed in the light of agrarian thoughts propounded by Dr. B.R. Ambedkar given below:

R.S.Nandal (2004), in his paper titled "socio-economic ideology of DR. B.R. Ambedkar", stated about the problems of marginalized people and their socio-economic status which leads to economic inequality and backwardness. This paper exhibits Ambedkar as a social and educational reformer and his struggle for the betterment of the depressed class. Ambedkar ideology was an independent line of action for improving the social and economic conditions of marginalized people as they were also a part inclusive wide-ranging segment of society. Therefore, the paper revealed that state socialism is a strong contrivance to rectify the inequality of wealth and resources among all the sectors of an economy. Good governance is a key part of state socialism; hence if the state puts efforts in order to formally organize the agrarian division, the obstruction may be reduced in the future.

S.P. Kanaga Anbuselvam (2004), in his paper entitled "social and economic philosophy of B.R. Ambedkar" has expounded Dr. Ambedkar's socio-economic philosophy for the upliftment of the poorer section of the society, particularly of marginalized people. The study has resolved that in the absence of economic & social justice and equity, real independence would not bring about

either social solidarity or national integration. Subsequently, the betterment of rural clusters would also not be accomplished. National integration is derived from the concept of inclusion and inclusion in totality will be realized only when there will be no exploitation of any section of the populace. Dr, Ambedkar's views to abolish the exploitation in the agrarian division of marginal farmers has been advocated by the study and the study also explicates the role of the state in land ownership and in determining the other means of production is apex.

G. Hariharan (2003), paper titled "the social and economic thoughts of Dr. B.R. Ambedkar" has depicted the overall contribution of Dr. B.R. Ambedkar in the formation of egalitarian Indian economy that includes all noteworthy dimensions through which an economy can achieve the steady-state point. These dimensions were precast on the pillars that can be explainable in terms of public finance, agrarian reforms, healthy industrialization, and monetized statement of affairs. The focal point of these dimensions is the oppressed and depressed segment of the populace. Moreover, Study has found that Ambedkar's approach is valid in the extant context in terms of initiating an extensive programme of technical education for improving efficiency, agrarian & non agrarian productivity and prioritizing the principle of state management and state ownership.

S.K. Patel et.al. (2005), his paper titled "Economic Thought of Dr .B.R.Ambedkar" has attempted to study Dr. Ambedkar's views on agrarian problems and on the fiscal system in India. The study has found that Ambedkar's views on agrarian development concerning the scattered land and its low productivity are still valid in the present context. Moreover, the definition of economic holdings from the production point of view and ideal labour blocks the capital formations, these two approaches of him, have been well-founded and justified in the study. The study also stated that Dr. Ambedkar's agrarian production function was quite valid as compared to the Gandhian agrarian Production function and Dr. B. R. Ambedkar was more realistic in his approach studied and analyzed by Pack, Rhee, Westphal, Ranis and White, etc. who reinforces the views articulated by Dr. Ambedkar.

Sunil Kumar (2019), paper titled "Ambedkar's Economic Ideas & Contributions" has reevaluated Dr. B.R. Ambedkar's economic ideology regarding financial and agricultural sector. Agricultural ideology is reviewed by revisiting his original paper titled "Small Holding in India and Their Remedies". The study has found that agrarian advancement and farmers' betterment would be achieved with an optimum input-output relationship only. On the other hand, the

financial approach of Dr. Ambedkar has been evaluated by analyzing the evolution of provincial finances in India. It has found that his line of thinking has a valid rationale and due to this the present structure of taxes & revenues has altered gradually in many ways and decentralized budget & devolution of funds have been adopted in India as per his line of thinking.

Koti Reddy Tamma (2017), paper titled "Dr. Ambedkar Perspective on Agriculture and its Relevance to Current Agriculture in India" has the following objectives: (i) to understand Dr. Ambedkar's Perspective towards the development of agriculture. (ii) To study the present status of Indian agriculture. (iii) To suggest the policy measures based on Ambedkar's insights on agriculture and offer incentives for agriculture development. The major findings of the study are: (i) Economic thoughts of Dr, B. R. Ambedkar is significant in the era of Liberalization, Globalization and Privatization (L.P.G.). (ii) State plays a major role in allocating resources in agriculture & industry as well and is required to pursue by Indian policy makers. (iii) Policymakers should adopt the theoretical approach of Dr. Ambedkar for the upliftment and welfare of the farmers of India.

P.K Srivastava (2003), paper titled "Relevancy of socio-economic Ideas of Dr. B.R. Ambedkar today" is an effort to discourse Dr. Ambedkar's views for equality at both social and economic echelon. The study clarifies that Dr. Ambedkar's contribution to agricultural economics is imperative in the present context; where the number of marginal farmers' has been continuously up-surging. The study has stressed that the concept of agrarian holding is an economic one as it was based on production function and such input-output relationship should be taken as the true economic test for collectivizing agricultural holding. The study also advocated the institutional structure designed by Dr. Ambedkar; which is not projected on the basis of caste and class, augment the "Trickle Down Effect (T.D.E.) in the society".

M.S.Gupta & J.B.Singh (2016), paper titled "Dr. Ambedkar and his Economic Thought" has explored "Dr. Ambedkar's Economic Thoughts associated with the land reforms, decentralization of finances, Labour Problems and economics of caste systems in India. The study has found that Dr. Ambedkar's model of economic development is based on the peaceful eradication of Poverty, inequalities and exploitation. He perceived an active but well-defined role for the state in economic affairs and his concept of democratic state socialism provides

maintenance of productive resources in an economy under the agrarian and industrial sector of India.

B.L. Mungekar (1992), paper titled “Dr. Ambedkar on India’s Agrarian Problems” divulges the appropriate practicability of Dr. Ambedkar’s agrarian thoughts on Indian agriculture sector. The paper advocates the ideology of Dr. Ambedkar’s fundamental thought that the state must intervene in the economic sphere of society. With the same line of the economic approach, paper holds up a strategy for collective farming in agriculture with no tenant and no landless laborer. Thus, Dr. Ambedkar's views on India’s agrarian problem proved to be prophetic as the situation of marginal and small farmers has been continuously deteriorating since the instigation of agriculture in India. Therefore, Dr. Ambedkar's views on India’s agrarian problem proved not only to be prophetic but also reflect his unflinching commitment to democracy based on liberty and equality as well.

Karnati Lingaiah (2004), paper titled “Dr. B.R. Ambedkar views on Agrarian Reforms”. This paper attempts to analyze Dr. B.R. Ambedkar's views on Agrarian Reform and Agricultural Development. A review of Land Reforms reveals that the contemporary situation of the land issues in India has not been remarkably revolutionalized. There are many steps between objectives insinuation under the legislation and within the laws in their implementation. Hence it is necessary to identify the deficiencies and take steps for the elimination of par amounting obstruction. The further paper revealed that Dr. Ambedkar's views are designed to eliminate the ills of agriculture as well as the appearance of the bad social economy from grass root level. Even today his propositions hold good and relevant to the present circumstances and crises faced by the country from time to time at different levels.

H. S. Parmar (2004), “Dr. B. R. Ambedkar’s views on land holdings”, paper has studied and supported Dr. Ambedkar’s notion behind the development of the agrarian sector. The paper highlights Dr. Ambedkar’s comprehensive theoretical approach from the point of view of the inclusive growth of society and to mitigate unequal allocation and division of economic resources. Paper divulges major aspects of the problem of land holdings in India are in fulfillment of consolidation of land holdings and enlargement of land holdings. Consolidation of land holding was a practical obstacle whereas enlargement of these holdings was a theoretical problem. The study has found that elucidation of the notion of economic holding is true and

should be perceived in India. The author strongly advocates the strategy of Dr. Ambedkar to solve the agrarian problem with the help of economic instrument of "fast industrialization" is one of the foremost relevant tools. Furthermore, industrialization would help in destroying the premium on land that will give rise to the sub division and fragmentation of land.

K. S. Ingole (2006), paper entitled "Ambedkarian Perspective for Economic Development" studied Dr. Babasaheb Ambedkar's economic philosophy for the better future of India. The study has the objective to study Dr. Ambedkar's economic philosophy focuses on the egalitarian path of development with the stress towards the public sector and private sector systematically. The study has found that the concept of State Socialism is significant as it defines the entire governance in the following manner- a) Active role of state in the planning of economic life of people. b) Emphasis on increasing productivity and production by providing physical capital and Human capital. c) Freedom to the private sector to plan and manage their industries and trade except in selected areas. d) Equitable distribution of national wealth and income among all sections of society irrespective of castes, creed, gender, region and religions. Moreover, the study also explores the threefold strategy of Dr. Ambedkar as follows: a) Provision of equal rights (overturning the customary framework of caste system based on the principle of equality and denial of equal rights). b) Provision of legal safeguards against the violation of these rights in terms of laws. c) Pro-active measures against discrimination for fair share and participation in the legislature, executive, public services, education and other public spheres for discriminated groups (in the form of reservation).

Padmaja Saxena Bagga (2014), "The practice of Economics by Dr. B.R.Ambedkar and its relevance in contemporary India", paper deliberated Dr. Ambedkar's exceptional skill of diagnosis of economic problems that India has been facing since first five-year plan. Along with this, the study has provided practical solutions for the economic problems of India. Paper conferred agrarian and international issues in the study and the exploration has been executed on the basis of secondary data. At last, the study suggested agrarian theoretical approach of Dr. Ambedkar is germane and has an ideal justification to pursue in the policy-making of agrarian division. On the other hand, dealing with the problem of the rupee, the study explicates that the rationale behind Dr. Ambedkar's premonition regarding currency & trade deficit has found to be true in the present time.

Ishita Aditya Ray & Sarbapriya Ray (2011), paper titled "Dr. B.R. Ambedkar and his philosophy of Land Reform: An evaluation" highlighted Dr. Ambedkar ideology for accelerating the growth of agrarian based economy. It has been found that Dr. Ambedkar strategy and approach have appropriate rational. The study laid emphasis on the concept of land reforms while noting that smallness or largeness of an agricultural holding is not determined by its physical extent alone but by the intensity of cultivation as reflected in the amounts of productive investment made on the land and the amounts of all other inputs used, including labour. Eventually, the study explores land reforms bestowed by Dr. Ambedkar's are enough rational & justifiable as the focal point of Ambedkar's philosophy is to uplift the oppressed people of the society. Therefore, synthesis of Ambedkar's idea towards land reforms and other allied economic constraints provides an insight into his thoughts on economic development, planning.

M.R. Singariya (2013), paper titled "Dr. B.R. Ambedkar: As an Economist", has put forwarded an approach of Dr. Ambedkar in context of agrarian and overall economic development. Study has analyzed prophetic statement made by Dr. Ambedkar long before modern theorists of development systematized notions of disguised unemployment or under-employment: "A large agricultural population with the lowest proportion of land in actual cultivation means that a large part of the agricultural population is superfluous and idle". The study has suggested that agriculture should be a state industry, organized by the state taking over all land and letting it out for cultivation in suitable standard sizes to farmers of villages; there shall be cultivation operated as collective farming by groups of families. Moreover, the study advocates his notion of healthy industrialization so as to move surplus labour from agriculture to other productive occupations, accompanied by large capital resources.

S. K. Thorat. (2009), "Ambedkar's thoughts on economic development and planning", paper draws attention towards the main agrarian issues concerning small and scattered holdings and their consolidation in order in order to operate collectivize farming. Paper laid stresses on the development of infrastructure such as road, communication, transport services, irrigation and electric power as these are the prerequisites for agrarian & industrial development. However, along with this institutional obstacle of agrarian division requires depth attention for resolving the issue of fragmented land holdings in India.

R.D. Gadekar (2009), paper titled "Socio- economic thoughts of B.R.Ambedkar", has examined the socio-economic thoughts of Dr. Ambedkar. Paper tries to relate the present situation of Indian society with the concept and ideas of Dr. Ambedkar that deeply concern with the social and economic reforms. It has been found in the study that Dr. Ambedkar's theoretical approach is appropriate and constructive in order to advance the situation of present Indian society. Furthermore, the study emphasizes that Ambedkar's concept of society and socialism deserve special and careful attention which are aimed at the welfare of the poor classes; reorganizing political economy for the benefit of all, and maintaining full employment and education without any kind exclusion.

T.K. Shandilya (2017), paper titled "The Economic Thoughts of Dr. B.R.Ambedkar" attempted to reinvestigate Dr. Ambedkar's views related to land reforms, Labour reforms and currency issue. The study has found that recommendations for solving agricultural impediments bestowed by Dr. Ambedkar are valid in the present context. For instance, collective farming, economic holdings or equal distribution of land holdings, large scale of industrialization are effective policy instruments to improve the agrarian situations in India. The study also explicates that the formation of the union and minimum wage Act are the significant instruments to curve to the exploitation of labours, nevertheless their implementation still has been lacking in India. While discussing the labour problem, Dr. Ambedkar considered agricultural and industrial labour equally and the government should be made an effort in making agriculture organize, then only the realization of his theoretical approach would be possible to accomplish.

P.Abraham (2002), "Ambedkar's Contribution for Economic Planning and development – its relevance", author exhibits the Dr. Ambedkar's contribution in sphere of Public Finance, taxation, fiscal deficit, principles governing Government's expenditure, agriculture, industrialization, status of poor and labour in economic planning, and labour legislation, which has the key for amelioration of widespread poverty. The author analyses Dr. Ambedkar's views on agriculture, industrialization and he evident that Dr. Ambedkar's thoughts are reasonable and have found appropriate in the present ambience of Indian economy. Finally, the author resolved that the impact on economic planning and development of Dr. Ambedkar's views has been substantial and should ponder in framing the policy.

S Bauri (2017), paper titled “Dr. Ambedkar’s thought on Economic Development & Growth” attempted to comprehend the views of Dr. Ambedkar in the light of the economic development of India. The study has found that comprehensive views regarding agrarian views, land reform, healthy industrialization with the use of capital intensive technology, establishment of primary industries are relevant in the present context of India. Moreover, the paper put forward that Ambedkar’s views on the removal of poverty and inequalities with the removal of exploitation of the poorer and marginalized sections of the society are relevant and it should be considered in policy making.

S.Ambirajan (1999), paper entitled “Ambedkar's Contributions to Indian Economics” attempted to study the overall contribution of Dr. Ambedkar in resolving the problems of the Indian economy and its efficacy in policy making. Study explicates Ambedkar had a tremendous forecasting quality that helped him to understand an economic problem persisted in the era of 1918s and its further consequences in the future; that have been confronted by us in the present. The study also revealed that Ambedkar digs deep in the bowels of history to understand the significance of various economic impediments. Furthermore, the study explicates the dialectical approach used by him in his writings. Thus, dealing with the need for legal solutions to social problems, he said: "Society is always conservative. It does not change unless it is compelled to and that too very slowly. When change begins, there is always a struggle between the old and the new, the new is always in danger of being eliminated in the struggle for survival unless it is supported", which is based on a more analytical approach.

L.C. Mallaiah (2006), “The Relevance of Dr. Ambedkar’s Views on Indian Agriculture Development”, Author empirically analyses the Dr. Ambedkar notion on Agricultural development. The comprehensive theoretical conception of Dr. Ambedkar firstly pronged into five major pillars accountable for Indian agricultural development such as a) Consolidation, b) Enlargement, c) Idle Labour, d) Collective Farming. The first two pillars laid stress on mitigating the evil of fragmented agrarian land and the third pillar discussed the excess labour in agriculture and its further transfer as a productive work force to the industrial sector. Lastly, collective farming provides the mechanism of farming with the active role of the state in order to administer the distribution of land therefore the emphasis on the state socialism has been enunciated. The study concluded that the agrarian stature of India is directly associated with

poverty. Poor farming system and diminution of land holding asserted poor agriculture operations in India. Collective farming has been affirmed as an effective tool for the betterment of Indian agriculture.

B. H. Damji et.al. (2012) paper titled "Dr. B. R. Ambedkar's' Thoughts on Agriculture and its Relevance to Current Agriculture in India" attempted to study notions and his views on land holding, collective farming and land revenue. It has been found in the study, that a redefined definition of economic holdings assisted marginal & small farmers to generate optimum output and profitability as well. The study supports his notion that the small size of holding is the cause of low production therefore; consolidation of land holding must be undertaken. He advocated the collective and co-operative farming in the country and his thoughts are even relevant to today. The Government must adopt co-operative and collective farming that Dr. Ambedkar had already suggested in 1918.

M. Vijaykumar Gawai (2017), paper titled "Dr. Ambedkar's Multidimensional Approaches towards the economic development of India" has attempted to study the multidimensional approaches of Dr. B.R. Ambedkar towards economic Development. Secondary data has been utilized to fulfill the objective of the study. The major findings of the study are: (i) Dr. Ambedkar was the true follower of decentralized planning. (ii) Role of government is essential for removing the widening gap between the rich and poor. (iii) Farmers and labour welfare would be accomplished in India with an appropriate implementation of land &labour reforms, it will also escalate human development with an inclusive approach.

K. Majumdar (2017), paper titled "Indian Agriculture in the Vision of Dr. Ambedkar" attempts to elucidate the linkage between Ambedkar's agrarian thoughts and scenario of land holdings during the period of 1971-72 to 2010-11. Paper thoroughly describes the concept of Industrialization and its impact on agricultural surplus labour. Further, the sarcastic system of social structure hinders the upliftment of marginal and small farmers. It also reflects in their socio-economic well-being and prosperity. The study revealed that decreasing the average size of land holdings and the increasing number of tiny holdings is the central concern for agricultural development. The study has explicated that the agrarian marginal & small farmers even now still big sufferers in terms of their socio-economic well being and their standard of living. Higher

intensity of migration, suicides among farmers is somewhere expounds the distress among them, especially marginal and small farmers in India.

With the depth and immense literature exploration, it has flaunted that there are various studies have been conducted in order to reexamine Dr. Ambedkar's theoretical line of approach. The above reviews elucidate Dr. Ambedkar's approach for agrarian and economic development is reasonable and well-founded in the context of India. In the former reviews, the studies revealed that agrarian division of India has been languishing under various impediments. Major obstruction in front of the agrarian sector is diminutive land holdings, poor application of technological inputs, and weak implication of land reforms. On the other hand, the second section of reviews elaborated and bestowed the rationale of Dr. Ambedkar's theoretical approach. Most of the studies mentioned in the second section have highlighted the reevaluation and rationalization of Dr. Ambedkar's theoretical ideology. Moreover, the second set of reviews reveals the significance of Dr. Ambedkar's economic &agrarian ideology. However, the various studies have been conducted to analyze the impediments existed in the agriculture sector, but hardly any study has been exercised presently in order to set an association between agricultural impediments and Dr. Ambedkar's agrarian development approach in the context of India with specific reference to Uttar Pradesh. Therefore, the present study endeavors to integrate and link Dr. Ambedkar's agrarian views with the extant situation of agriculture in India. In this direction, the following objectives of the studies have been listed which are described below in detail.

Agriculture in Uttar Pradesh

In Uttar Pradesh, the majority of the population engaged in Agriculture where crops such as wheat, rice, pulses, oil seeds are the major crops of the state while sugarcane as a major cash crop. It is also one of the most important states in India so far as horticulture is concerned with a specialty in mangoes. The following are some importance of agriculture in Uttar Pradesh. According to the MOSPI report 2013 with the base year 2004-05, the value of output from agriculture and allied activities in the Uttar Pradesh stood at 1,065.4132 & 1,251.108 Rs. (Billion) in 2004-05 & 2010-11 respectively showing a rising trend in agriculture productivity within the state. Unlike Punjab and Haryana, the mechanization of the agrarian division has been slow in UP due to falling size of land holdings (over 75 per cent of land holdings are less than

one hectare) is partly to blame for low productivity. The majority of small farmers are indebted to the state Uttar Pradesh.

Further, what is more, worsening agriculture is the decline in public investment in agriculture, stagnant gross capital formation and a falling share of agriculture in the total plan outlay. There has been a noteworthy deceleration in the sector over the past decade (State Planning Commission2013). The main reasons for lower productivity levels in Uttar Pradesh are: a) Irrigation even 80 percent of the area is giving an account to have been under irrigation but in terms of the number of irrigation as per prerequisites of crops is not sufficient. 65 percent area irrigation is by mostly Diesel operated privately owned tube wells. The cost of diesel operated pumps being high, the farmers are not irrigating through pumps in Kharif. Even in Rabi, they irrigate only 2 to 3 times instead of 5 to 6 times required for wheat crop. In canal commands due to poor maintenance of canal and distribution system, the availability of water is poor. Water availability is also poor especially at tail ends. b) Penurious availability of inputs like seed, pest & fertilizers c) Dwindling agrarian extension services as farmers are not getting timely and required technical inputs& additional assistance. d) Land holding size is gradually getting smaller witch resultant in the impecunious investment capacity of the farmers, resulting in low productivity. e) Problematic area: the state has a total problematic area of around 120 Lakh hectares which includes erosion, soil salinity, alkalinity, ravines, water logging, diyara lands, etc. f) Poor soil health and low organic matter content in the soil is also a major cause for low productivity in Uttar Pradesh. Soils are steadily getting deficient in some important nutrients like Sulpher, Iron, Zinc, Boron, etc. which also results in low productivities of different crops and vegetables & low seed replacement rate particularly in case of pulses & oilseeds the main crops of the rain fed areas (Uttar Pradesh State Planning Commission, 2011).

The above-highlighted impediments are affecting the productivity of agriculture sector in Uttar Pradesh. Hence, this study examines Dr. B. R. Ambedkar's views on agriculture development and its germaneness in a comprehensive manner in order to evaluate the present condition of agrarian-based inputs such as land holdings, fertilizers, irrigation & technological inputs. The study absolutely deals with the key drawback of fragmented land holdings as it is a prime factor for agriculture production and other inputs are utilized only with the readiness and accessibility of that prime factor. Further, the study has reexamined Dr. Ambedkar's agricultural

theoretical approach within the purview of the above statement, as he observed and prognosticated the datum that marginal land holding will become a key failure for deteriorating agrarian production and inflate farmers' poor socio-economic stature as well agrarian distress among them. Hence, this study scrutinizes Dr. Ambedkar's views in the present Indian agronomy context. Moreover, the implication of Collectivized farming has been analyzed at India level with the help of secondary data. Secondly, the harmful diminution of the farm sizes has been evaluated with the help of primary survey executed in Uttar Pradesh.

Objectives

The research study has the following objectives to fulfill:

1. To examine and integrate Dr. B. R. Ambedkar's views of agricultural development in the light of the contemporary Indian economy.
2. Comparative analysis of the small and large band foodgrain production in India.
3. To evaluate the farmers' potential in terms of land fragmentation Index, returns on investment, production, income, expenditure, savings and participation of farmers in Agricultural programme in Uttar Pradesh.
4. To analyze the technical inefficiency of farming with reference to wheat production.

Hypotheses

H_{01}: The views of Dr. Ambedkar on agricultural development are pertinent for Indian Economic Development.

H_{02}: There is no similarity in the foodgrain production of small &large farmers in India.

H_{03}: The potential of the farmers in terms of Land Fragmentation Index, Returns on Investment, Income, expenditure, savings, and participation in the agricultural program is similar among different farms.

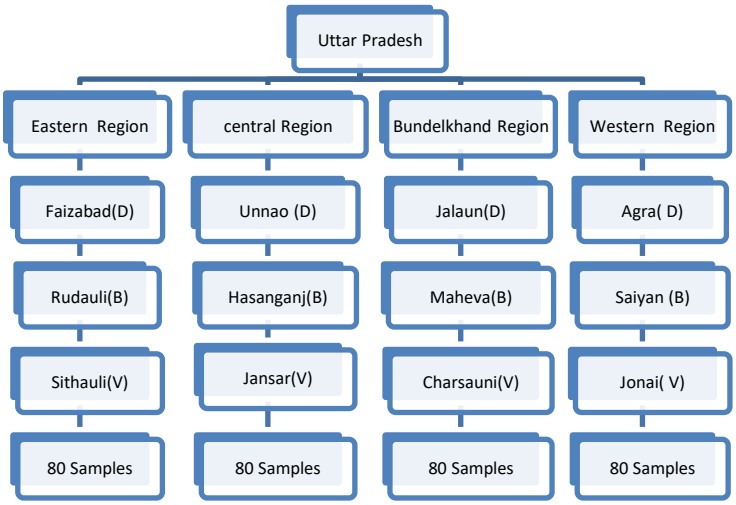
H_{04}: Technical inefficiency of farming in wheat production is not significant.

Research Methodology

The study is an attempt to realize the validation of Dr. Ambedkar's agricultural thoughts on agrarian advancement. The study is based on both secondary as well as primary data to accomplish the predetermined objectives. To achieve the first objective of the study various agricultural theories have been reviewed and compared with Dr. Ambedkar's agrarian ideology. For the second objective, data from the agriculture census have been collected for the period of 1971 to 2015. At last, to achieve the third and fourth objectives of the study, primary data is collected from the farmers from four villages of each economic region of Uttar Pradesh. Further, the farmers' potential to obtain sustainable income has been investigated through field survey. Besides, farm wise returns on investment with land fragmentation Index analysis have been exercised. Lastly, the farm size and productivity relations also have been examined with the help of stochastic production frontier analysis.

Sampling Design- The method of sampling adopted for the study is multi-stage random sampling and the total sample size determined for the study is 320. Multistage random sampling is a method of sampling in which large clusters of the population are divided into smaller clusters into several stages in order to make primary data collection more manageable. This method refers to the plan where the sampling is carried out in the stages along with the property of randomness. Performa of the multistage random sampling is:

Data has been gathered from the chosen village that comes under the economic region of Uttar Pradesh. The State is divided into four economic regions. In the first stage, firstly the state is clustered into four regions and after that, in the same order, one district randomly has been chosen from that each economic region. Therefore, the next stage is the random selection of the blocks from each district and it will further make us unable to select the village from each block randomly. Lastly, the 80 samples from each village have been picked randomly by chance. Sampling design has been given below:



(D=district, B=Block, V=Village)

Analytical Tools:

Some of the statistical & econometric tools and techniques have been utilized in order to accomplish the determined objectives. This mainly covers, weighted average method, times series analysis, Trend and Regression Analysis- Auto-regressive Moving Average (ARMA Model), Land fragmentation Index, Return on Investment analysis and stochastic production frontier analysis. The execution of these techniques at the different echelons of the study has been done. Furthermore, SPSS, E-views and Stata software is exercised on part of detailed analysis and interpretation in the study.

Significance & Rationale of the Study

As per the Agriculture Census, In India, 121 million agricultural holdings exist and among its small and marginal holding together accounted for 99 million holdings. The average size of land holding has decreased from 2.3 hectares in 1970-71 to 1.37 hectares in 2000-01. Thus, there are significant land inequalities prevailing in India. Moreover, small and marginal farmers have been facing several challenges from access to inputs to the marketing of Agril produce. They are usually dependent on other large farmers to access land, water, credit and technology and market infrastructure. They find extreme difficulties in adapting to climatic changes and face modern technological challenges and its effect, integration of value chains, market volatility and other risks. Therefore, mainly marginal and small landholders encounter with these obstructions. Hence, these are the major constraints in front of agrarian development

in general and for poor farmers in particular. Reviews express that countries like Zambia, Pakistan, Africa and Philippines also have been distressing with these major agrarian impediments along with the persistence of small and marginal farmers. Further, India is Agricultural dominated country and since the 1980s, hardly any study has been carried out to address the agrarian land issues in the light of Dr. Ambedkar theoretical conception of agricultural development. Dr. Ambedkar famously derided the village as ―a sink of localism, a den of ignorance, narrow mindedness and communalism, he was perhaps on to a deeper truth— an Indian social complement to the Lewisian economic insight— that in the long run people need to move and be moved out of agriculture. Dr. Ambedkar was warning about the patronization of agriculture masquerading as a romanticization of rural India. So the irony is this: we must care deeply about farmers and agriculture today because we want there to be fewer but more productive and prosperous farms and farmers tomorrow (Arvind Subramanian, 2018). So, this research work, in this new dimensions to strengthen the agrarian sector in India and to empower the actual tiller of the soil i.e. farmers. Therefore, Dr. Ambedkar's conception of empirically has been probed in the study.

Chapterization of the Study

The whole study is catalogued under seven chapters keeping in mind the predetermined objectives. A brief description of each chapter is as follows:

Chapter 1: Introduction

The first chapter highlights the problem of study. This chapter outlines the entire review of the literature, major objectives of the study, hypotheses, research methodology of the study and chapter plan of the study.

Chapter 2: Theoretical Framework of Agricultural Development

The second chapter frames linkages between Dr. Ambedkar agrarian theoretical notion and other agricultural development theories in order to evaluate their applicability in India for the growth of the agrarian sector.

Chapter 3: Dr. B.R.Ambedkar and Agricultural Production in India: A Technical Analysis

The third chapter explains Dr. Ambedkar theory of collective farming for agrarian development in India. The empirical evaluation has exercised in the chapter for validating his theoretical line of approach.

Chapter 4: Profile of the Field Study Area

The fourth chapter portrays the profile of the chosen area in the state of Uttar Pradesh. Performa of the sampling design is explained in this chapter. Further, the brief profile of four randomly selected villages has been presented in the chapter.

Chapter 5: Economic Analysis of Potential of the Farmers for Agrarian Development in Uttar Pradesh

The fifth chapter shows the primary details of the filed survey along with the analysis of land fragmentation index and returns on investment per hectare for each category of farmers that have been analyzed. Besides this, the chapter also explains the sources of income &expenditure and savings of the farmers in the surveyed area. The further chapter also analyzed the farmers' participation in agricultural programmes.

Chapter 6: Economics Analysis of Technical Inefficiency of Farming

The chapter analyzes and compares the technical inefficiency persisting in the wheat production of the farmers in the state. Stochastic Production Frontier has been utilized for the assessment of inefficiency with the help of pre-determined variables.

Chapter 7: Summary & Conclusions

This chapter is entirely provided sum up of all the above chapters. Conclusion and inferences have derived on the basis of the comprehensive and technical analysis with the appropriate results of earlier chapters.

References

1. Abraham, P. (2002). *Ambedkar's Contribution for Economic Planning and development – its relevance.* New Delhi, India : Kanishka
2. Agarwal, B. (2010). Rethinking agricultural production collectivities. *Economic and Political Weekly*, 64-78.
3. Alexandra, E., & Jean-Jacques, D. (2011). Agriculture and development: a brief review of the literature. *Policy Research Working Paper Series*.
4. Ambedkar, B. R., & Moon, V. (1979). Dr. Babasaheb Ambedkar: Writings and Speeches. Vol 1.
5. Bagchi, A. K. (1965). Growth of Agricultural Production, Regional Differences in Rates. *Economic Weekly, Annual Number, January1965*.
6. Bagga, P. S. (2014), The Practice of Economics by Dr. Ambedkar and its Relevance in Contemporary India, *Journal of Business Management & Social Sciences Research (JBM&SSR)* Volume 3.
7. Balakrishnan, P. (2008). Imagining an economy of plenty in Kerala. *Economic and Political Weekly*, 14-16.
8. Bandyopadhyay, R. (1993). Land system in India: A historical review. *Economic and Political Weekly*, A149-A155.
9. Bardhan, P. (1969). Agriculture in China and India: Output, input and prices. *Economic and Political Weekly*, 53-65.
10. Bathla, S., Thorat, S. K., Joshi, P. K., & Bingxin, Y. (2017). Where to invest to accelerate agricultural growth and poverty reduction. *Econ Pol Weekly*, *52*(39), 36-45.
11. Bhattacharyya, M., & Bhattacharyya, S. (2007). Agrarian impasse in West Bengal in the liberalisation era. *Economic and Political Weekly*, 65-71.
12. Bhullar, A. S., Sidhu, R. S., & Singh, J. (2006). Reformulating Policies for Integrated Land and Water Use for Sustainable Agricultural Development: A Case of Punjab State. In *2006 Annual Meeting, August 12-18, 2006, Queensland, Australia* (No. 25798). International Association of Agricultural Economists.

13. Brown, B., Nuberg, I., & Llewellyn, R. (2017). Negative evaluation of conservation agriculture: perspectives from African smallholder farmers. *International Journal of Agricultural Sustainability*, *15*(4), 467-481.
14. Chand, R., Prasanna, P. L., & Singh, A. (2011). Farm size and productivity: Understanding the strengths of smallholders and improving their livelihoods. *Economic and Political Weekly*, *46*(26), 5-11.
15. Chand, R., Raju, S. S., & Pandey, L. M. (2010). Effect of global recession on Indian agriculture. *Indian Journal of Agricultural Economics*, *65*(902-2016-67939).
16. Chattopadhyay, M. (1979). Relative efficiency of owner and tenant cultivation: a case study.
17. Chaturvedi, A., Patil, N. G., & Goswami, S. N. (2011). Reorienting Land Use Strategies for Socio-economic Development in Uttar Pradesh. *Economic and Political Weekly*, 169-173.
18. Chenery, H. B., & Watanabe, T. (1958). International comparisons of the structure of production. *Econometrica: Journal of the Econometric Society*, 487-521.
19. Damji, D. B., & Jamma, A. P. (2012). Dr. BR Ambedkar‟ s thought on agriculture and it‟ s relevance to current agriculture in India. *Review of Research*, *1*.
20. Das, D.K. (2004), Great Indian Economists- Their Creative Vision for Socio Economic Development , Dr. B.R. Ambedkar Life Sketch and Contribution to Indian Economy, *The Indian Economic Association.* Deep & Deep Publications Pvt. New Delhi Ltd.Vol3.
21. Dayal, E. (1984). Agricultural productivity in India: a spatial analysis. *Annals of the Association of American Geographers*, *74*(1), 98-123.
22. De Roy, S. (2017). Economic reforms and agricultural growth in India. *Economic & Political Weekly*, *52*(9), 67-72.
23. Desai, B. M., & Namboodiri, N. V. (1997). Determinants of total factor productivity in Indian agriculture. *Economic and Political Weekly*, A165-A171.
24. Dev, S. M. (2003). Agriculture, Employment and Social Sector Neglected. *Economic and Political Weekly*, 1353-1356.
25. Dogra, B. (2002). Land reforms, productivity and farm size. *Economic and Political Weekly*, 532-533.

26. Dr. Ambedkar Writings and Speeches, Govt. of Maharashtra-1989 vol.no.2 *pp*. 88-89, 96-100, 129-137.
27. Ferroni, M., & Zhou, Y. (2012). Achievements and challenges in agricultural extension in India. *Global Journal of Emerging Market Economies*, *4*(3), 319-346.
28. Gautam, M. (2016). Making Indian agriculture more resilient: Some policy priorities. *Economic and Political Weekly*, *51*(8), 24-27.
29. Gawai, V.M. (2017). Dr. B.R. Ambedkar's Multidimentional Approaches towards the Economic Development of India. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Building,* Volume 1, pp.390-397.
30. Goswami, C. (2003). Land use in Assam_ a spatio_temporal study.
31. Grammatikopoulou, I., Myyrä, S., & Pouta, E. (2013). The proximity of a field plot and land-use choice: implications for land consolidation. *Journal of land use science*, *8*(4), 383-402.
32. Gulati, A. (1989). Input subsidies in Indian agriculture: A statewise analysis. *Economic and Political Weekly*, A57-A65.
33. Gupta, M.S., & Singh, J.B. (2017). Ambedkar & his Economic Thought.*The Indian Economic JournalDr.B.R. Ambedkar Contribution to Nation Buiding,* Volume 1, pp.1-7.
34. Gupta, S. P. (1995). Economic reform and its impact on poor. *Economic and Political Weekly*, 1295-1313.
35. Hoque, A. (1988). Farm size and economic-allocative efficiency in Bangladesh agriculture. *Applied Economics*, *20*(10), 1353-1368.
36. Ingole K.S. (2006). Ambedkarian Perspective For Economic Development In *Social Justice : Gandhi, Nehru and Ambedkar,* Lucknow.
37. Jose, M., & Padmanabhan, M. (2016). Dynamics of agricultural land use change in Kerala: a policy and social-ecological perspective. *International Journal of Agricultural Sustainability*, *14*(3), 307-324.
38. Krishnaji, N. (1981). Cobb-Douglas Production Functions: A Sceptical Note with Special Reference to Agriculture. *Economic and Political Weekly*, PE45-PE51.
39. Kumar, A. G. (1992). Falling agricultural investment and its consequences. *Economic and Political weekly*, 2307-2312.

40. Kumar, S. (2019). Ambedkar's Economic Ideas & Contributions. *IOSR Journal Of Humanities And Social Science,24* (3), 50-54
41. LAU, K. C., & HERRERA, R. (2018). The Convergence of Peasant Struggles Worldwide. *Economic and Political Weekly*, *53*(11), 42-49.
42. Majumdar, K. (2017). Indian Agriculture in the Vision of Dr. Ambedkar. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding,* Volume 1, pp.130-136.
43. Mallaiah, L. C. (2006). *The relevance of Dr. BR Ambedkar's views on Indian agricultural development*. Abhijeet Publications.
44. Mathur, A. S., Das, S., & Sircar, S. (2006). Status of agriculture in India: trends and prospects. *Economic and political weekly*, 5327-5336.
45. Millar, J., & Roots, J. (2012). Changes in Australian agriculture and land use: implications for future food security. *International journal of agricultural sustainability*, *10*(1), 25-39.
46. Mohanty, B. B. (2001). Land distribution among scheduled castes and tribes. *Economic and Political Weekly*, 3857-3868.
47. *Mungekar, B.L.* (1992), *India's Agrarian problem*, In *Ambedkar and Social Justice,* Publications Division, Ministry of Information and Broadcasting, *Vol.II*, New Delhi.
48. Nanchraiah G., 'Dr. B.R. Ambedkar strategy of Economic Development and it's Relevance', *Dr. B.R. Ambedkar Trust*, Hyderabad, 1995.
49. Nyong'o, P. A. (2013). The land question, land grabbing and agriculture in Africa. *International Journal of African Renaissance Studies-Multi-, Inter-and Transdisciplinarity*, *8*(2), 23-31.
50. Pal, S. (2008). Agricultural R&D policy and institutional reforms: Learning from the Experiences of India and China. *Economic and Political Weekly*, 145-155.
51. Paul, M., & wa Gĩthĩnji, M. (2018). Small farms, smaller plots: land size, fragmentation, and productivity in Ethiopia. *The Journal of Peasant Studies*, *45*(4), 757-775.
52. Peter, B. G., Messina, J. P., & Snapp, S. S. (2018). A Multiscalar Approach to Mapping Marginal Agricultural Land: Smallholder Agriculture in Malawi. *Annals of the American Association of Geographers*, *108*(4), 989-1005.
53. Radhakrishnan, P. (1982). Land reforms and changes in land system: Study of a Kerala village. *Economic and Political Weekly*, A107-A119.

54. Raghavan, M. (2001). Public Sector Investment and Agricultural Growth. *Economic and Political Weekly*, *36*(31), 2980-2981.
55. Raghavan, M. (2008). Changing pattern of input use and cost of cultivation. *Economic and Political Weekly*, 123-129.
56. Ramasamy, C. (2004). Constraints to growth in Indian agriculture: Needed technology, resource management and trade strategies. *Indian Journal of Agricultural Economics*, *59*(902-2016-68037).
57. Rao, G. N., & Rajasekhar, D. (1994). Land Use Pattern and Agrarian Expansion in a Semi-Arid Region: Case of Rayalaseema in Andhra, 1886-1939. *Economic and Political Weekly*, A80-A88.
58. Rao, S. (2017). Caste discrimination and agricultural performance in India. *Economic and Political Weekly*, *52*(25), 32-38.
59. Rao, S. K. (1971). Inter-Regional Variations in Agricultural Growth, 1952-53 to 1964-65: A Tentative Analysis in Relation to Irrigation. *Economic and Political Weekly*, 1333-1346.
60. Rao, V. M., & Deshpande, R. S. (1986). Agricultural growth in India: a review of experiences and prospects. *Economic and Political Weekly*, A101-A112.
61. Ray, I. A., & Ray, S. (2011). BR Ambedkar and his philosophy of Land Reform: An evaluation. *Afro Asian Journal of Social Sciences*, *2*(2.1).
62. Reddy, A. A. (2009). Pulses production technology: Status and way forward. *Economic and Political weekly*, 73-80.
63. Rudra, A. (1978). Class Relations in Indian Agriculture: I. *Economic and Political Weekly*, 916-923.
64. Scaria, S. (2010). Changes in land relations: The political economy of land reforms in a Kerala village. *Economic and Political Weekly*, 191-198.
65. Sekhri, S. (2012). Caste-based clustering of land parcels in two villages in Uttar Pradesh. *Economic and Political Weekly*, 106-109.
66. Shandilya, T.K. (2017). The Economic Thoughts of Dr.B.R. Ambedkar. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding*, Volume 1, pp.101-107.

67. Shinde, S.B. (2017). Dr.B.R. Ambedkar's Contribution in Economic Thought. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding,* Volume 1, pp.176-182.
68. Singariya, M. R. (2013). Dr. BR Ambedkar: As an Economist. *International Journal of Humanities and Social Science Invention*, *2*(3), 24-27.
69. Sitko, N. J., & Jayne, T. S. (2014). Structural transformation or elite land capture? The growth of "emergent" farmers in Zambia. *Food Policy*, *48*, 194-202.
70. Tamma, K. R. (2017). Dr. Ambedkar Perspective on Agriculture & Its Relevance to Current Agriculture in India. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding,* Volume 1, pp.25-32.
71. Thorat, S. (2006). *Ambedkar's Role in Economic Planning, Water and Power Policy*. Shipra Publications.
72. Venkatesh, P., & Nithyashree, M. L. (2014). Institutional Changes in Delivery of Agricultural Inputs and Services to Farm Households in India. *Agricultural Economics Research Review*, *27*(347-2016-17158), 85-92.
73. Wilson, K. (2002). Small cultivators in Bihar and'new'technology: choice or compulsion?. *Economic and Political Weekly*, 1229-1238.

Chapter-2

Theoretical Framework of Agricultural Development

Nexus of agricultural advancement and the broad spectrum economic development can be traced back in the classical period during the late seventies - eighties. In considering the role of agriculture in economic growth, the development economists have been emphasizing their attention primarily to what may be called supply-side factors from the very beginning. However, the primary source of dynamic growth-whether through the accumulation of capital or through the dynamic process of learning and technical change would be provided by industry. But modicum agricultural growth is never being in favor of the expansion of the Indian economy despite this fact the full potential of the agriculture sector has not been recognized in the long development process. The contribution of agriculture to economic development lies in- a) providing more food to the rapidly expanding population, b)increasing the demand for industrial products and thus necessitating the expansion of the secondary and tertiary sector, c) providing additional foreign exchange for the import of capital goods for development through increased agricultural exports, d) increasing rural income to be mobilized by the state, e) providing productivity employment and improving the welfare of the rural people.

It was Adam Smith who first challenged the agrarian ideas, arguing that agriculture progression would produce a positive impact up to some extent on the development of the economy. Adam Smith's argument was extended by John Stuart Mill & David Ricardo in the form of comparative advantage approach and trade etc. The key belief in the wake of the free trade is to amplify the factor of specialization and to widen the growth of agriculture & allied activities in order to utilize the optimum amount of land, labour, capital. Moreover, these prime inputs are supplemented in working order by other subsidiary inputs which strengthen the latitude of the agrarian organization too. However, there were no precise theories and models concluded with agricultural development that can be applied universally in the world as the geographical and environmental peripheral is distinct from country to country. Nevertheless,

there are some precise and exact theories & models framed and promulgated by some prominent economists in order to present well structure theoretical agrarian approaches.

The developing economies have been generally depicted as dual economies where one segment i.e. traditional agricultural sector and second is the modern capitalist sector. Productivity is assumed to be lower in agriculture than in the modern sector. The canonical model was put forward by Lewis (1954) and subsequently extended by Ranis and Fei (1961). Lewis' model depends on the notion of surplus labor in the agricultural sector. With lesser productivity in agriculture, wages will be superior in the modern sector, which comprises labor to move from agriculture to the modern sector, which in turn engenders economic growth. Other precursors, namely Schultz (1964), also highlight the importance of food store & supply by the agrarian sector. In Schultz's view, agriculture is essential for economic growth in the sense that it guarantees subsistence for society, without which growth is not imaginable. This early vision on the role of agriculture in economics is well-matched with the Kuznets' (1966) empirical examination. Kuznets' stated and empirically observed that "the importance of the agricultural sector declines with economic development". In this view, the function of agriculture in economic development is to supply low priced food and low wage labor to the modern sector. Otherwise, both sectors have few interconnections. Growth and higher productivity in the agricultural sector can furnish with overall economic growth by discharging labor as well as capital to other sectors in the economy. However, industrialization is seen as the decisive driving force behind a country's development and agriculture as a traditional low-productivity sector. Building on the Lewis model, Johnston and Mellor (1961) theory, it unambiguously provides a rationale for agriculture, as an active sector in the economy. In addition to facilitating labor and food supply, agriculture plays an active role in economic growth through production and consumption linkages. For example, agriculture can arrange raw materials for nonagricultural production or demand inputs from the modern sector. On the consumption side, higher productivity in agriculture can upsurge the income of the rural populace, thus creating demand for domestically produced industrial articles. Such association can upturn employment opportunities in the rural non-farm sector, thereby obliquely generating the rural income. Moreover, due to production and consumption linkages, a country's development strategy should be agriculture-driven and increased agricultural productivity would be the initiator of

industrialization. Moreover, stress should be placed on small-to-medium-size farmers because they have more concern to use domestically produced intermediate goods, as resisted to large scale producers who might import machinery and other inputs, which would weaken the linkages between agriculture and other sectors (Adelman, 1984). The fact is that there is an important linkage between the traditional and modern sectors in developing countries makes agricultural growth an important instrument for reducing poverty. The contribution to poverty elimination takes place directly in order to effect agricultural growth on-farm employment and profitability.

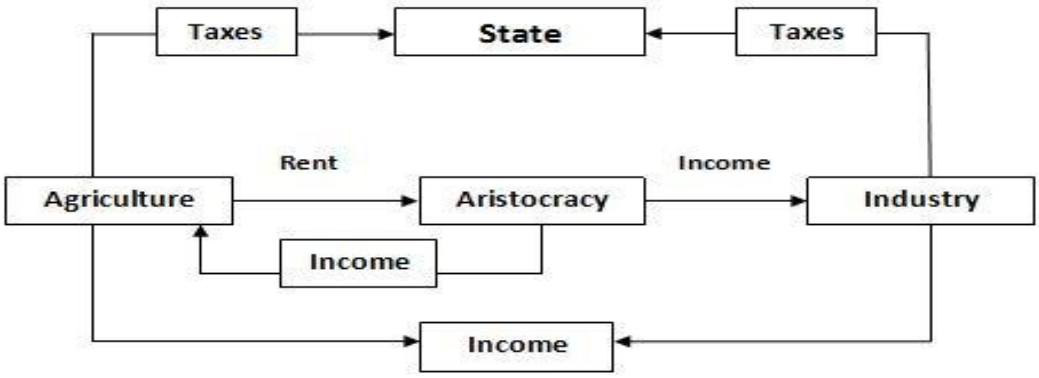
Some Agrarian development theories propounded by various economists have been articulated in this chapter. This chapter compares those agricultural development theories with Dr. Ambedkar's agrarian theoretical approach and also put an effort in order to understand & find the best compatible theory to Indian agrarian structure. Some economists like Francois Quesnay, Adam Smith, Ricardo, Malthus, and Mills had recognized the role of agrarian organization with the utmost principle of diminishing marginal productivity inland and added its categorization with respect to marginal efficacy. The agriculture development extremely hinges on the superiority and properties of cultivated land for any explicit food or cash crops.

1. Francis Quesnay's Theory of Economic Growth: (1694-1774)

Quesnay theory distinguished among three divisions of an economy to grasp the theory more easily in a comprehensive manner. Three divisions of an economy are: Proprietary, the producer class and the urban population, artisans and merchants. The Physiocracy is based on one core proposition; the agrarian sector is the only sector able to generate a net surplus and this net surplus is circulated or paid as rent or revenue to the landlords, whereas the industrial sector remains uninventive because it cannot produce profits. Quesnay thought that the industrial sector would always have a rate of return of zero, the manufacturing sector would not produce a surplus over cost. The justification was that competition among entrepreneurs would prevent them from generating a surplus over cost. An increase in industrial efficiency would seem to cheapen products and not produce a surplus for the producers. These are some important suppositions that have been taken by Quesnay in order to derive his theory in the simplest manner. According to Quesnay, the net surplus generated by the agricultural sector was the main contributing factor in determining the aggregate demand of the economy. To share out the wealth to the whole nation,

this surplus or circulating capital should be disbursed in its totality by the landowners, and nothing should hold back or lost overseas. According to Quesnay theories, the economic flow originates as soon as farmers would produce the economy's net surplus. A small part of it would be intended for own consumption and replacement of working capital, and the exchange of money used to acquire urban products. The remaining balances would be accustomed to pay the landowners, and this will utilize it in their own consumption. This particular component would appear in possession of the country's net income. Moreover in the same process, after paying taxes these landlords would contribute to the country's stock of wealth (Blaug, M, 1962). The agricultural sector would engender the income to the tenants every year and maintain reserve income - circulating capital or "annual advances" for the following year. The sterile sector, the third component of an economy would also incur expenditure in part and quasi on food. The effectiveness of agriculture depends on three main subjects: human capital, technology, and physical capital. Even though Quesnay considered the profitability of different techniques and their impact on the production, he did not contemplate the possibility of improvements in the existing technology at the time. He shared this view with Malthus. He thought that it was an increase in the farm capital that would allow France to reach the stationary state (Victor Lanza, 2012).

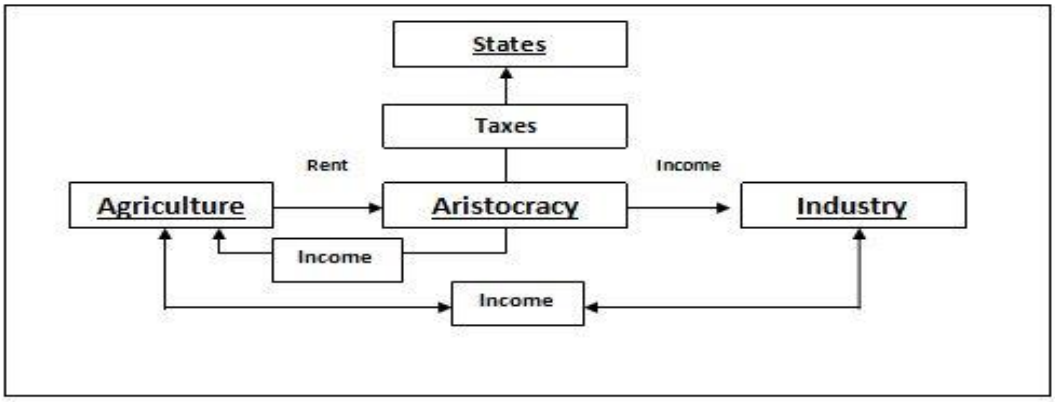
Fig: 2.1 Circulation of Money between the Sectors



In the above figure, the circulation of money is started by agriculture, which transfers rents to the aristocracy. The aristocracy uses this money to supply itself with foodstuffs and finished

goods. Income is transferred to agriculture and the manufacturing sector, and both sectors pay taxes on this income and buy goods from the other sector. The agriculture reserves then part of the income as the "annual advances" to produce again the next year in order to generate the net surplus of the economy. However, Quesnay put forwarded another process of the circulation of money and its effect on the economy had witnessed in the growth of the agriculture sector. The circulation of money is given as follows:

Fig: 2.2 Circulation of Money between the Sectors



The figure portrays that the aristocracy pays no one single tax. Agriculture is still the only sector generating revenue. However, in this situation, the "annual advances" would be bigger since agriculture does not have to pay taxes anymore. The combination of this measure with a rise in the prices of foodstuffs would allow an increase in capital accumulation. Quesnay has found this circulation of money modus more effective for the growth of the agriculture sector and the entire economy as well.

2. Adam Smith's Theory of Economic Growth (1723-1790)

Agriculture was still the main focus of study; Great Britain was a developed country. But agriculture was of vital importance in developed nations in the 18th century Smith propounded division of labour. Smith considered the principle of division of labor & capital accumulation as a key element in overall sectoral development. The expansion of the supply of agricultural produce would be possible only with an increase in capital, although more workers would have

to be employed; more fixed capital would be needed as well. In accordance with Adam Smith, an increase of capital in agriculture would generate diminishing returns. Then, Smith realized that an increase in the demand for agricultural products would raise the prices in this sector – as Quesnay assumed. The upsurge in prices would enable an incline in the wages of the farmers, so the cost of production would be higher. The increase in wages would be followed by an expansion of the labor force in the long run. Consequently, an increase in the labor force would generate a diminishing marginal product of capital per worker. At last, Unit costs would rise as employment would increase with the rise in agricultural production. In Smith´s theory, accumulation of capital would depend on the allocation of the output between consumption and investment. He recommended that investment should be managed towards productive activities, such as agriculture or manufacturing sector. Smith recognized productive operations, where the workers produce profits, and something storable, supplies of equipment and agricultural produce kept for use. Such activities should be able to maintain production without constant infusions of capital.

However, Smith's theory of economic growth makes a distinction between labor that produces capital, and labor that does not. Investment, consumption and government expenditure were in Quesnay's model possible because of the rents produced by agriculture. With Smith, profits can also be generated by the industrial sector. To get more investment, a reduction in consumption would be necessary. It was also important to direct the investment to projects capable of generating surpluses and not losses. (Victor Lanza, 2012)

3. David Ricardo Theory of Development (1772-1823):

"The product of the earth - all that is derived from its surface by the united application of labor, machinery, and capital, is divided among the three classes of the community; namely, the proprietor of the land, the owner of the stock or capital necessary for its cultivation, and the laborers by whose industry it is cultivated. But in different stages of society, the proportions of the whole produce of the earth which will be allotted to each of these classes, under the names of rent, profit, and wages, will be essentially different; depending mainly on the actual fertility of the soil, on the accumulation of capital and population, and on the skill, ingenuity, and instruments employed in agriculture(Ricardo David 2001, E-book)"

Ricardo denied the theory of Physiocracy and the idea that agriculture was the only sector capable of generating a net surplus. He thought that all sectors of an economy could be profitable. Ricardo stated that wages would be regulated not only by the market, but by the requirements for subsistence. Wages in the long term would always be around the level of subsistence. But even with constant wages, the profits would suffer the impact of the diminishing returns in agriculture (Barber, William J 1967). Ricardo agreed with Malthus point of view that there is decreasing returns on land. According to Ricardo, productivity would fall with the use of less fertile land. He thought that prices in the long term were expected to grow in agriculture and this would raise wages in agriculture. This would cause economic growth in terms of an increase in agricultural production eventually. Furthermore, it will reflect in better living standards of the farmers.

Ricardo describes the effects on the labor class. Wages change according to the demand of labor and the demand of labor increases when capital increases, so an increase in the capital means an increase in wages too. Ricardo thought that wages would increase with capital accumulation, and the purchasing power would be in the hands of the labor class. Nevertheless, wages fall as the supply of workers would increases at a higher rate that the demand for workers. This phenomenon happened to the diminishing marginal product of capital. Wages would continue falling until the economy reached the steady-state, where wages would be sufficient to maintain the actual populace of an economy.

4. Lewis Theory of Unlimited Supply of Labour (1954)

Prominent economist Lewis (1954) has developed a systematic model of economic development that fits perfectly in the context of overpopulated economies. His views were very similar to the classical economist who believed that the development process initiated from the agrarian sector and flow to other sectors in a two-sector economy. He emphasized in his classical model, that the agrarian sector in the undeveloped economies is characterized by an unlimited supply of labour relative to capital and natural resources, whose marginal productivity in the agrarian sector itself is negligible, zero or even negative. Thus, economic development takes place when capital accumulation takes place due to the withdrawal of surplus labour from the subsistence sector (agrarian sector) to the capitalist sector. Indeed this is true in respect of

the underdeveloped economies such as India in which a large population is heavily dependent on the agrarian sector for its very survival and earning of their livelihoods. Therefore, the theory of Lewis keeps significant importance in such economies where there is more need for balanced development. Hence, the fiend associated with the excess population can be removed by utilizing the abundant human resources in a more balanced and efficient way from subsistence to the capitalist sector.

Lewis model laid stresses on putting equal attention towards the agrarian and capitalist sectors. Lewis model identifies that the surplus labor act as an engine of development between the sectors and this reminds us of Bentham's dictum that "labour is a real source of wealth". According to Lewis, the subsistence sector is that part of an economy that is using non-reproducible capital and this sector is recognized as the agriculture sector in India. In subsistence sector, the average productivity of labour is low and it's often set a floor price in the capitalist sector. Whereas, in the capitalist sector the use of capital is controlled by the capitalist, who hire the services of the labour and it may be either public or private. The capitalist sector comprises of advanced, literate, sophisticated and skilled people with the peerage. Since, lewis considered over populated labour surplus economies only and this scenario prevailed in agro-based developing nations like India. In this situation, new industries can be created or old industries can be expanded without limit at the existing wage prevailing in the subsistence sector in those nations. Further who left in the subsistence sector was ability to maximize their marginal efficiency due to possible expansion in the presence of capital and technology change primarily occurs through the advancement in the capitalist sector. As a result, productivity in this subsistence sector does not decline. Therefore, this raises productivity and profits margins, investment in each sector and initiates the development process with more steadiness. However, the prerequisite of the capitalist sector is the only skilled workforce for its expansion. Nevertheless, in accordance with Lewis, this unskilled labour is only quasi-bottleneck as it is temporary and can be confiscated by providing training to the unskilled workers.

Capitalist Surplus- Lewis observed that shortage of skilled persons is likely to be provisional if the capital is made available for constructive utilization by employers and government in order to train and to endowed technical know-how to the unskilled labour force. The wage level in the capitalist sector depends upon the earnings in the subsistence sector and it cannot be less than the

average product of the worker in subsistence or agrarian sector. Lewis opined that transferable workers should be paid only that much wage which should enable these workers to uphold the same standard of living. Earning in the subsistence sector set a floor to wages in the capitalist sector, but in practice, the wages should be higher than this and there is usually a gap of thirty percent or more between capitalist wages and subsistence wages. The higher wages in the capitalist sector may be due to certain reasons- a) Arise in the real income of the subsistence sector due to inclined output may induce to demand higher wages before offering themselves for employment in the capitalist sector. b) With the withdrawal of surplus labour from the subsistence sector, the total product is likely to remain the same. Hence the average production and the real income of those remaining in that sector will increase too. c) Higher cost of living in the capitalist sector may also compel employers to raise wages. In case employers fail to do it, the government may take the initiative or the workers may organize into trade unions to strengthen their power. Therefore, as a whole Lewis model explains the role of capital formation in the Least Develop Countries (LDCs) where labour is surplus and capital is scarce. Lewis has interpreted the various development parameters such as population growth, technical progress, investment of profits, credit creation, international trade, etc but Lewis interpretation was not applicable to that country where capital accumulation is labour saving and wages are not constant in the capitalist sector. Thus, the model can aptly apply to labour surplus economies. However, some of the obstacles undermine the working of the model like improper working of the multiplier process in LDC's.

5. T. W. Schultz's Transformation of Traditional Agriculture (1964)

"Economic Growth and agriculture", A Book propounded by Schultz's had concerned with the problems of agriculture and economic growth with more stress laid on the understanding of rural growth and enlargement of this sector. Schultz believes in lack of economic opportunities to the farmers as the real culprit causing the poor performance of agriculture in less developed countries. According to him, lack of economic incentives induced by government, farm price suppression, lack of competitive farm input prices, and priorities given to industrialization, are the principal reasons for agrarian backwardness in the less developed countries. Moreover, no attention is given to institutional constraints such as land tenure, rural credit, absentee landlord, and lack of effective demand within the agrarian sector which directly followed by lack of

purchasing power rather than distorted prices and reduced incentives. Nevertheless, the introduction of the principle of efficiency prices in the framework of competitive capitalism automatically ensures an optimum allocation of resources between and within the two sectors.

Agriculture is a significant sphere of traditional and feudal economies. The alteration of feudalism into capitalism necessarily infers a transformation of agronomy structure. Theory explicates the transformation problem that arises principally due to poor investment in agriculture. Thus, it is not the problem of supply of fixed & working capital that retards the growth in agriculture but to determine the procedure and practices of investment in agriculture to make it more cost-effective and gainful. Moreover, his main emphasis rest upon the notion that "once there are investment opportunities and efficient incentives continued to be practice; farmers will turn sand into soil.

Traditional agriculture possesses three main attributes as: farming is a way of life-based on long-established tradition, in other words, traditional agriculture is a cultural characterization of the way people live. b) Second attribute of traditional agriculture is the institutional setup which deals with the ownership of land, legality of tenure ship and share of home consumption in agriculture production. c) Traditional sector has some technical properties. Shultz has not paid much attention to these traditional attributes and believes that there are only economic attributes which explicate certain cultural values and standard relating to work thrift and towards the aspirations for the higher standard of living of farmers and stakeholders. But when incentives to work are weak as marginal productivity of labor is low and incentives to save are also poor due to marginal productivity of capital is very low". Hence, in order to modernize agriculture by the way of investment is significant to eliminate the differences in institutional arrangements. Traditional agriculture in the opinion of Schultz can easily be transmuted into a relatively cheap source of economic growth by the method of the cumulative value of farm products and other conveniences such as new transportation, irrigation, and reducing the cost of different factors of production. Schultz theory of agricultural development also laid down emphasize on an allaocative efficiency, in this the economic acumen of people in such communities is generally maligned because they unutilized the factors they posses. It is commonly found that they save more and invest too little of their income in view of what capital earn. He stated that the idea of poor agricultural communities is incorrect, but at the same time, it is a common factor that poor

communities have not experienced any significant alternations in the art of farming and they continue year after year the same type of cultivation with the old techniques of production. The profitability of using a new agricultural factor depends on the rate of acceptance by traditional farmers. Schultz emphasized investment in human capital as it provides the best modern alternatives or factors that entail both knowledge and skill to the farmers. But the investment in human capital has social and economic implications. To overcome such a situation, there are three ways of a) learning from experience; b) on the job training; and c) Individual learn while they young and gradually skills are constituted at the young age and new ideas weighted against traditional outlook through better education at the school level. Therefore, primary schooling is more profitable as it entails the lowest cost per year of schooling. Thus if farmers will learn skills and knowledge at a younger age it will be better for farmers to become more dynamic as per the requirement of the time. It will further sharpen their skills and subsequently augment agricultural production. Hence in the light of the above conjuncture, it is necessary to invest in farm people. "Therefore, education is the best form of investment in human capital. Thus Schultz theory divulges the approach of development of agriculture with the immense focus on education i.e. primary education and thus it will stimulate innovation in agriculture which turns into better production and better life of farmers.

6. Jorgenson's Model (1967)

The model begins with the framing of economy consisting of two production sectors, with different technologies, distribution systems and labour markets, which is generally referred to as the dual economy. This term has been used mainly for developing countries where the industrial and agricultural sectors differ markedly with respect to the above-mentioned aspects. Jorgenson (1967) has classified dual models for developing countries into two types, classical and neoclassical. The main difference between the two lies in their assumptions about behavior in the agricultural sector, which in turn has a bearing on the existence of surplus labour. D. W. Jorgenson has presented a theory of the development of a dual economy. The author segregates the economy into two divisions-the manufacturing or contemporary sector, and the traditional or agrarian structure. There is an asymmetry in the production relations in two sectoral divisions as the agriculture sectoral unit is a function of land, labour alone while the manufacturing sectoral unit is a function of capital and labour. On the other hand, population growth depends entirely

upon the per person availability of the food supply. So if in any time period the food supply is more than what is required to feed the population, the emergence of agrarian surplus is possible outcome which enables labour to move for availing employment opportunities in the manufacturing sector. If there is no agriculture surplus, all labour remains stick to their agriculture land. In other words, if the surplus in agrarian sector emerges it enables the excess labour force to migrate from the agricultural sector to the manufacturing sector, but the labour force in the manufacturing sector grows at the rate which is equal to the growth of the agricultural surplus. Hence, there may be some wage differential among these two sectors. This wage differential determines the terms of trade between the manufacturing and agriculture sector and thereby the rate of investment in the manufacturing sector under a closed economy. As the agricultural surplus begins to decline, the agriculture labour force grows at a rate that is more rapid than the growth rate of the population. On the other hand, the labour force has declined absolutely in the manufacturing sector and returns to the agricultural sector. The output in the manufacturing sector drops to zero and capital is dissimulated at the rate of depreciation. Ultimately, the process of capital accumulation comes at a cessation. Food output per capita declines to a stationary level and population growth reduced from its prior rate. This is low level equilibrium trap, which steadfastly depicts the substandard echelon of the agronomy section. According to Jorgenson the necessary and sufficient condition for sustained growth of output in both the agricultural and manufacturing sectors is $\alpha-\beta_E > 0$, where Alfa is rate of technical progress, E is the maximum rate of population growth and $1-\beta$ is the share of labour in the product. Thus the development of a dual economy relies not only on the existence of agricultural surplus but also on the technical conditions in the manufacturing sector. The more prompt the rate of growth of technical progress, the higher the saving ratio, and the more rapid the rate of population growth, the more rapid is the pace of growth in the industrial sector. Ultimately the industrial sector develops more and dominates in the economy and fetch economy in the stage of the more advanced economic system as portrayed by the Harrod- Domar growth theory. There are three points to note about Jorgenson's model. The first is that the production functions of both sectors are specified to be of the Cobb-Douglas type. The second is the assumption on the price and income elasticity of demand for food. He assumes that both elasticity to be zero in the dual development process. The third is that model either assumes away capital accumulation in agriculture or includes the exogenous technical progress. It exhibits short run as and long-run

equilibrium as well, but in short-run there is the absence of capital accumulation process in the agrarian division. Moreover, Jorgenson's dual economy model which characterizes long-run equilibrium is the absence of a 'critical minimum level' for takeoff into self-sustained growth of the Leibenstien type growth theory, whatever the initial endowment of the manufacturing sector, with the initial size of populace and capital stock; sustained growth must continue in forthcoming periods (R. K .Lekhi, 2006).

7. Fei and Ranis Model

Ranis and Fei (1961) formalized Lewis's theory by combining it with Rostow's (1956) three "linear-stages-of-growth" theory. Fie and Ranis analyze the development of labour intensive economy into three phases. In the first phase, the disguised unemployed workers, who are not adding to agricultural produced, are transferred to the industrial sector at a constant industrial wage. In the second phase, agricultural workers add to agrarian yield but produce less than the institutional wage they get. Such workers are also shifted to the manufacturing sector. If the migration of workers to the industrial sector continues, a point is eventually reached where farm workers produce output equal to the institutional wage. This begins the third phase which marks the end of the take off and the beginning of the self sustained growth when the farm workers produce more than the institutional wage they get. In this phase surplus labour is exhausted and the agricultural sector becomes commercial. This phase is economically significant. Fie Ranis model has further substantiated that their model gratifies the state affairs of the balanced growth during the take-off process. The actual path is likely to be the oscillating around the balanced growth path. Balanced growth requires simultaneous investment in both the agriculture and industrial sector of economy.

His model also describes the way in which the labor-intensive economy has transformed its manpower from agrarian to manufacturing segment of an economy. Nevertheless, his theory does not bestow the alternatives and approaches to augment the productivity of agrarian division for its auxiliary expansion. The Lewis model ignores the development of the agriculture sector and concentrates exclusively on the industrial sector. On the other hand, the Fie Ranis model shows the interaction between the two sectors in initiating and accelerating development. Moreover, its explanation of the Lewis turning point is more realistic and the major merit of the

theory is that it shows the importance of the agrarian sector in capital accumulation in underdeveloped countries.

8. Marx Theory (1859)

Marx theory well built with the conflict between the modes of production and the relation to production. The mode of production regarded to particular conduct and arrangement of production in a society that determines its entire social, political and religious way of living. On the other hand, relations to production are those relations that are continually changing and mutable. This relation of production conceals to the unequal group of the structure of the society where this structure characterized by a different organization of labour and their division, co-operation, skilled approach and their geographical milieu. According to Marx, historically society has passed through five diverse stages: primitive, communal, slave, feudal, capitalist and socialist. The primitive communal stage was the first stage in the evolution of society. Primitive society established and improved its work from gathering natural products and its distribution. With the social division of labour, they can break into families whereby the family became solitary. This led to the appropriation of the surplus produced by them and the exploitation of others. This paved the way for the emergence of the slave society. The second stage was the slave stage, in these relations; the slave owner owned both the means of production and the slave along with whatever he produced. In this second stage, productive forces were additionally developed in this society. This is the significant stage to enhance the pace of the agrarian sector because this stage upgraded with the better quality of tools implementation and irrigation facilities could be ready for utilization in this stage.

Moreover, division of labour gets extra sharpen as the division of labour force spread in other fields like – mining and smelting, weaving, tanning and various consumer-oriented production and to facilitate its commerce and trade were also developed in the same phase. The evolution of economic activities and division of labour slave social order leads to some conflicts between productive forces and relations of production as a result exploited slaves upsurge with the higher skirmish with the relation of production. The third stage is the feudal stage and in this stage productive force was based on feudal relations of production where the feudal lord owned the land and the serfs as the main means of production. There was much evolution in agriculture

as more food and cash crops were cultivated with an aid of fertilizers and rotation of crops was introduced. Productive forces continued to develop and this led to further division of labour and splendid specialization in the field of agriculture and other economic activities as the manufacturing process was further encouraged. In addition to this, the capitalist stage, capitalists owned the means of production and use them for individual profit, and workers are free to work for any capitalist but Marx was with the strong notion that only labours produce the surplus-value. This surplus value was defined by him as the exploitation rate (surplus produced for every dollar spends on the labour). In the capitalist stage rate of profits can be expressed as a positive function of the exploitation rate and negative function of the organic composition of capital. This organic composition of capital is defined as the ratio of constant capital to variable capital. Replacement of labour by establishing a new fixed capital is "squashed out" amount of labour. Thus this course of action is created an industrial reserve army. Most important the last stage is the communist and socialist stage as in this stage proletarian revolution takes place against the exploitation of them. The reward of every individual is determined on the principle of each "according to his ability and each according to his needs" and the class struggle is off cuts in this stage.

9. The Johnston-Mellor Theory

Mellor's strategy is sharply different from the alternatives in the following three respects. Firstly, it emphasized consumer goods, both in the agricultural and non-agricultural sectors. Second, it emphasized increased employment both with respect to labour supply and to labour demand. Third, it emphasized international trade and comparative advantage and hence is not concerned with growth balanced to meet the domestic structure of demand as distinct from a balance among complementary production processes. Each of the three features has important implications for agriculture's structure and development pattern. Each is complementary to the others. And, each represents a sharp contradiction to the alternative strategy. Emphasis on consumer goods is, of course, a central to an agricultural strategy since agriculture is basically a consumer good providing industry. But two other features should be noted. Low-income laborers spend some 60 to 80 per cent of increments to income on food. Hence an elevated employment strategy must be a strategy of high rates of mobilization of food marketing. This point is spelled out explicitly in a recent paper (Lele and Mellor, 1981) which analyses the interacting food and

labour markets and shows the importance of influences such as factor bias in technological change on the rate of labour mobilization. Because of the low elasticity of agricultural employment with respect to output, and the inelastic demand for food except for the laboring classes, growth in non-agricultural employment is important to creating adequate increases in income and markets for food. The interaction of agriculture, employment and trade is an important aspect of the agriculture-based development model. It is the supply of wage goods (agricultural) which allows mobilization of labour and hence specialization in labour-intensive goods and services for export (Mellor and Lele, 1975). Similarly, agricultural exports may pay for the import of capital intensive goods necessary as complements to labour-intensive production. The emphasis on consumer goods, on employment and on trade represents major points of departure of the Johnston-Mellor strategy from the alternative strategy. The essential states for revolutionize agrarian production. According to Mellor, traditional agriculture is the first initial stage, which implies backward, labour intensive agriculture. In the second phase, the following steps are required for the smooth evolution of agricultural production- a) encouragement of institutions to provide incentives. b) Setting up of institutions. c) Reinforcement of research. d) Up-gradation of communication structure. e) Supply of new quality physical inputs. f) Spread of education. According to Mellor On the basis of all above measures, the agricultural output and yield can be able to enhance but Mellor experiences that sometimes, there arises a situation when the advancement process hops from the first phase to the third phase as is happened in U.S.A., and it is only due to this reasons the second stage of agrarian development point to the availability of fertilizers and other inputs. In U.S.A. fertilizers and other bio-chemical inputs were developed later than the agricultural machinery. Therefore, U.S.A. jumped straight to the third phase of agricultural transformation (R.K. Lekhi, 2006).

10. Harris-Todaro Model (1970)

This model is based on the observation and experience of tropical Africa facing the glitches of the rural-urban migration and urban unemployment. The labour migration is due to rural-urban differences in average expected wages. The minimum urban wage is substantially higher than the rural wages. If more employment opportunities are created in the urban sector at the minimum wages, the expected wage shall tend to raise the rural-urban migration. This will further worsen the problem of urban unemployment. To remove urban unemployment, Harris

and Todaro suggest a subsidized minimum wage through a lumpsum tax, but the model is not providing implications for the growth and extension of the agriculture sector. The major topography of the model are-a) migration is stimulated principally by the rational economic contemplation of relative benefits and costs, largely financial but also psychological. b) The decision to migrate depends on the expected rather than actual urban-rural real wage differentials where the expected differential is determined by the interaction of two variables, the actual urban-rural wage differentials and the probability of success in obtaining employment in the urban sector. c) The probability of obtaining an urban job is inversely related to the urban unemployment rate. d) Migration rates in excess of urban job opportunity growth rates are not only possible but rational and even likely in the face of wide urban-rural expected income differential. The high rate of urban unemployment is, therefore inevitable outcomes of the serious imbalance in economic opportunities between the urban and rural areas of less developed countries. e) Model of rural-urban migration describes why the continued existence of migration in the face of rising levels of urban unemployment often represents a rational decision in the case of a private individual. f) It provides a theoretical framework to evaluate the alternative public policies which facilitate the alleviation of urban unemployment snags (Abdul Razack et al, 2009).

11. Boserup Model (1965)

Boserupian theory focuses on the relationships between three factors: population, environment, and technology. The population encompasses population density as well as absolute size and growth. The environment refers mainly to land resources and related factors such as c1imate and soil quality. Since her focus is historical civilizations or developing countries, 'technology' for the developmental aspect of an economy. Boserup refers mainly to the tools and inputs used in agriculture, the primary productive activity in these societies. Writing after the agricultural and industrial revolutions and during the green revolution, Boserup's (1965, 1976, 1981) concept of technology naturally refers to a wider range of agricultural tools (e.g. tractors), techniques (e.g. fallow patterns), and inputs (e.g. fertilizer). The origin of Boserup's view has historical roots in diverse economic and social theory and may be traced in the work of Smith, Marx, and Durkheim as well. Boserup asserts that Malthus overlooks an important mechanism for increasing production, namely, agricultural intensification, or the "gradual change

towards patterns of land use which make it possible to crop a given area of land more frequently than before," which is induced by population growth (Boserup, 1965). In describing the development, she states that small sparsely distributed populations use 'fallow' to retain soil fertility. They operate farming activity on different plots in different years and allow the most recently used land to lay unused to regain fertility. However, with increased density, a growing population can use land more frequently and increase output by substituting technological inputs such as fertilizer or irrigation for fallow to retain soil fertility. Thus, Boserup proposes a "dynamic" relationship between arable and fallow land that changes in response to population density (Boserup 1965). Explaining dependent linkage between population dynamics, agricultural technology, and Production, she defines six different food systems with increasing technological levels and their associated population density. Although defined discretely, Boserup stresses the strategies used by any population, particularly a growing population, is an evolving mixture of these levels. For example, a sparse but growing population that had previously used long fallow systems will gradually begin to use shorter fallow on some of its lands while keeping the remaining proportion devoted to traditional long fallow. Similarly, as a population continues to grow it gradually makes transitions from shorter-fallow to annual cropping or annual cropping to multi-cropping more than once in a year on all of its land. Thus, there is a "continuum of types of land use" or "coexistence of cultivation systems" such as exists in the world today (Boserup, 1965). Boserup has attempted to show that the system of ownership of land is coupled with the system of cultivation. In this context, she asserted that the attachment of individual farm ties to particular plots becomes more and more important with the gradual shortening of the period of fallow and the reduction of the territory which is not used in rotation. Hence, Boserup tried to emphasize the point that in the pre-industrial stage, growing population does not create any obstacle in the way investment needed for agricultural development. The investment like raising of new fields, minor irrigation works, digging of cannels, drainage, etc. Need of conversion of human labour into capital assets. Therefore, a growing population is welcomed in these stages of agricultural development (R.K. Lekhi, 2007).

12. Malthus theory of development (1798)

Central tenet of Malthusian theory (1798) is that the growth of human populations always tends to outstrip the productive capabilities of land resources. The fact is that resources place a

direct restriction on population growth and size and 'positive' checks (famine and increased mortality) or preventative checks (postponement of marriage and 1imitation of family size) work to reduce population growth. Writing before the agricultural revolution, Malthus presumed that the productivity of resources, namely land, was fixed because agricultural technology was largely fixed as was the case in Malthus's pre-industrial world. From a Malthusian perspective, technology and environment (considered in terms of land resources) are therefore seen as independent variables that work together to determine the dependent variable of population, which he sees mainly in terms of population growth and size. As later interpretations of Malthus have pointed out, he does not entirely discount the possibility of technological change since historically important innovations had obvious1y occurred to his time, for example the low rates of population growth and population size may sustainably increase, according to Malthusian theory, through technological innovation, for examp1e use of the plow, that can expand the productive potentials of land resources (Lee 1989). Ron Lee calls this element of Malthusian' theory an "invention-pull view of Population history" which suggests that the caring capacity of an area expands due to autonomously occurring inventions and population size quickly follows, (Lee, 1986). The core of Malthusian theory may, therefore, be best captured by the 'dependent' role he assigns to population growth in relation to the independent factors of environment and technology.

In his principles of Political Economy (1820), Malthus was more realistic in his analysis of population growth in the context of economic development than in his Essay of Population. According to him, population growth by itself is not sufficient to bring out economic development. Rather, it is the result of the development process. As Malthus wrote, "an increase in population cannot take place without a proportionate increase in wealth". As the rate of capital accumulation increases, the demand for labour also increases. This encourages the population growth to expand, but population growth alone doesn't increase wealth. Population growth increases wealth only if it increases an effective demand. In other words, an increase in the effective demand will further directly lead to an increase in the wealth of an economy.

Furthermore, Malthus softened the harshness of his theory and gave little more importance to the preventive checks. He gave some hope through restricting the human race with the operation of preventive checks reducing the birth rate, but he still remained firms in his

pessimistic views. He put little faith in self restraints and late marriages. Moreover, in their later editions, Malthus also dropped the expression of geometric and arithmetic progression but still maintained that the increase in population would exceed the growth in food supply and if unchecked by the use of preventive checks, the excessive population would lead to the operation of positive checks to take away the surplus population. It is mainly due to this gloomy doctrine of Malthus that economics was dubbed as a dismal science by eminent writers like Carlyle.

13. Conservation model (2001)

The conservation model of agriculture development was defined during the First World Congress on Conservation Agriculture (2001), in order to encourage and push the infiltration of rainwater where it falls and its retention in the soil. Further, it also draws attention towards the more efficient use of soil water and nutrients leading to higher, more sustainable production. The conservation model of agricultural development evolved from the advances in crop and livestock husbandry associated with the English agricultural revolutions and the concepts of soil exhaustion suggested by the early German soil scientists. The conservation model emphasized the evolution of a sequence of increasingly complex land- and labor-intensive cropping systems, the production and use of organic manures, and labor-intensive capital formation in the form of physical facilities to more effectively utilize land and water resources. This involved the introduction and more intensive use of new forage and green manure crops and an increase in the availability and use of animal manures. This "new husbandry" permitted the intensification of crop-livestock production through the recycling of plant nutrients, in the form of animal manures, to maintain soil fertility. The inputs used in this conservation system of farming-the plant nutrients, animal power, land improvements, physical capital, and agricultural labor force were largely produced or supplied by the agricultural sector itself.

Agricultural development, within the framework of the conservation model, will be capable of sustaining the growth rate in agricultural production in the range of 1.0 percent per year over a long period of time. The most serious recent effort to develop agriculture within this framework was made by the People's Republic of China in the late 1950s and early 1960s. It became readily apparent, however, that the feasible growth rates, even with a rigorous recycling effort, were not compatible with modern rates of growth in the demand for agricultural output

which typically fall in the 3-5 percent range in the less developed countries (LDCs). The conservation model remains an important source of productivity growth in most poor countries and an inspiration to agrarian fundamentalists and to the organic farming movements in the developed countries (Udemezue JC, Osegbue EG, 2018).

14. Location model or Von Thunen Model (1826)

In the 1950s, interest in the location model concerned with the failure of agricultural resource development and price policies, adopted in the 1930s, and to remove the persistent regional disparities in agricultural productivity and rural incomes in the United States. The rationale of this model was developed in terms of more effective input and product markets in areas of rapid urban-industrial development. Industrial development stimulated agricultural development by expanding the demand for farm products, supplying the industrial labour inputs which further accelerate agricultural productivity, and also drawing away surplus labor from agriculture. The empirical tests of the location model have confirmed repeatedly that a strong nonfarm labor market is a prerequisite for labor productivity in agriculture and improved incomes for rural people. The policy implications of the location model appear to be most relevant for less developed regions of highly industrialized countries or lagging regions of the more rapidly growing LDCs. Agricultural development policies based on this model appear to be particularly inappropriate in those countries where the "pathological" growth of urban centers is a result of population pressures in rural areas running ahead of employment growth in urban areas.

15. The Diffusion Model (1941)

The diffusion of better husbandry practices was a major source of productivity growth even in pre-modern societies. The diffusion approach to agricultural development rests on the empirical observation of substantial differences in land and labor productivity among farmers and regions. The route to agricultural development, in this view, is through more effective dissemination of technical knowledge and a narrowing of the dispersion in productivity among farmers and among regions. The diffusion model of agricultural development has provided the major intellectual foundation for much of the research and extension effort in farm management and production economics since the emergence, in the last half of the nineteenth century, of

agricultural economics as a separate sub-discipline linking the agricultural sciences and economics. The development led to the establishment of active programs of farm management research and extension occurred at a time when experiment-station research was making only a modest contribution to agricultural productivity growth. A further contribution to the effective diffusion of known technology was provided by the research of rural sociologists in the diffusion process. The models were developed emphasizing the relationship between diffusion rates and the personality characteristics and educational accomplishments of farm operators. The insights into the dynamics of the diffusion process, when coupled with the observation of wide agricultural productivity gaps among developed and less developed countries and a presumption of inefficient resource allocation among "irrational tradition-bound" peasants, produced an extension bias in the choice of agricultural development strategy during the 1950s. The limitations of the diffusion model as a foundation for the design of agricultural development policies became increasingly apparent as technical assistance and community development programs, based explicitly or implicitly on the diffusion model, failed to generate either rapid modernization of traditional farms or rapid growth in agricultural output (Udemezue JC, Osegbue EG, 2018).

16. High - Payoff Input Model (1961)

The key to transforming a traditional and long-established agricultural sector into a productive source of economic growth is the investment designed to make modern, high-payoff inputs available to farmers in poor countries. Peasants in traditional agricultural systems were viewed as rational, efficient resource allocators. T. W. Schultz insisted that peasants in traditional societies remained poor because there were only limited technical and economic opportunities to which they could respond. The new, high-payoff inputs were classified according to three categories: (1) the capacity of public and private sector research institutions to produce new technical knowledge; (2) the capacity of the industrial sector to develop, produce, and market new technical inputs; and (3) the capacity of farmers to acquire new knowledge and use new inputs effectively. The enthusiasm with which the high-payoff input model has been accepted and translated into economic doctrine has been due in part to the proliferation of studies reporting high rates of return to public investment in agricultural research. The high returns associated with the adoption of the new varieties and the associated technical inputs and

management practices have led to rapid growth in investment in agricultural research and to the development and adoption of the new and more productive crop varieties among farmers in a number of countries in Asia, Africa, and Latin America (Udemezue JC, Osegbue EG, 2018).

17. Dr. B.R. Ambedkar's Theory of Agriculture Development (1918)

The agriculture theory of Dr. Ambedkar was based on his thinking developed in the paper of 1918 titled "Small Holdings in India and Their Remedies". He urged for the revolutionary changes in the agrarian sector as this sector was most agonized on the social and economic ground due to long-time exploitation since the existence of East Indian Company in India. Indian agriculture has been blighted by small land patches, drought, a depleting water table, declining productivity and lack of modernization. At the time when Dr. Ambedkar had propounded his theoretical line of notion, the agrarian division was perturbed by the same impediments. Besides this, in accordance with his ideology major obstacle in agriculture growth was the scattered and fragmented piece of land holdings and its continuance. He opined that the diminutive size of land distracts the agrarian resources from its accessibility and utilization in order to produce optimum yield. Dr. Ambedkar was the first economist who recognized the diminution of land as a principle hurdle in agrarian development in India. Indian small & marginal farmers have no access or modus to imply better technological sources in order to enhance agrarian productivity (K.M. Singh 2014). Moreover marginal & small farmers' poor socio-economic stature had also not allowed them to access and retrieve the better technology adoption as efficacious inputs in agriculture. Hence the consolidation of land holdings is the chief requirement to accentuate the agrarian productivity and production along with the small farmers' welfare approach. However, since the era of 1918 slow pace of agriculture is primarily causes by the diminutive size of land. Increasing compression of agriculture labour on land, the burden of taxation, poor role of state also cause serious retardation with the above solitary problem.

According to Dr. Ambedkar, the enormous pressure of the populace on agrarian land is the main cause of the subdivision of agrarian land in India. Dr. Ambedkar did not agree with the view that the law of inheritance was the chief cause of the subdivision of land. He attributed it mainly to the enormous pressure of the population on land. He held that 'when farming was the

only occupation to get a small piece of land was better than to have none (Dr. Ambedkar, 1918). Dr. Ambedkar thus went to the root of the problem. He argued; the grievance (of small holdings) reclines in the circumstances which is nothing but a premium on these small pieces of land. The premium is no doubt due to the large population depending solely on agriculture to earn out their livelihood. It is not, therefore, the law of inheritance that is the evil it is the high pressure (of the population) on land which brings it into operation. The people cultivate the small piece not because their standard of living is low but because it is the only profitable thing for them to do at present. If they had something more profitable to do they would never prefer the small piece. However, it does not imply that Dr. Ambedkar was opposed to enlargement and consolidation of holdings. He was only attempting to reveal that owing to the scarcity of alternative methods of subsistence; the agriculture sector was overfilled that create sustenance of enlarged and consolidated addressed holding at a particular size impossible (Dr. Ambedkar, 1918).

Dr. Ambedkar (1918) also identified the excessive dependence on the populace on agriculture and its consequences as well. He recounts that a large agriculture population with the lowest proportion of land in actual cultivation meant that a large part of the agricultural population was superfluous and idle. In other words, this idle labor was not performing any productive activity. Thus 35 years before Nurkse (1953), Dr. Ambedkar conversed about superfluous employment. In order to wipe out the compression of the additional workforce from agrarian division, Dr. Ambedkar has suggested the concept of Industrialization. He argued that industrialization will have cumulative effects. Firstly it will enable us to sponge off idle labor in non-agriculture channels of production. When productively employed idle labor will not only cease to live by predation but will earn its own maintenance and also give us a surplus. Secondly, it will destroy the premium on –land and reduce the pressure on it. Consistently the necessity of sub-division and fragmentation will be checked. Lastly, a declining pressure of population on land and increasing use of capital and capital goods will forcibly create an economic necessity of enlarging the holding (Dr. Ambedkar, 1918)).

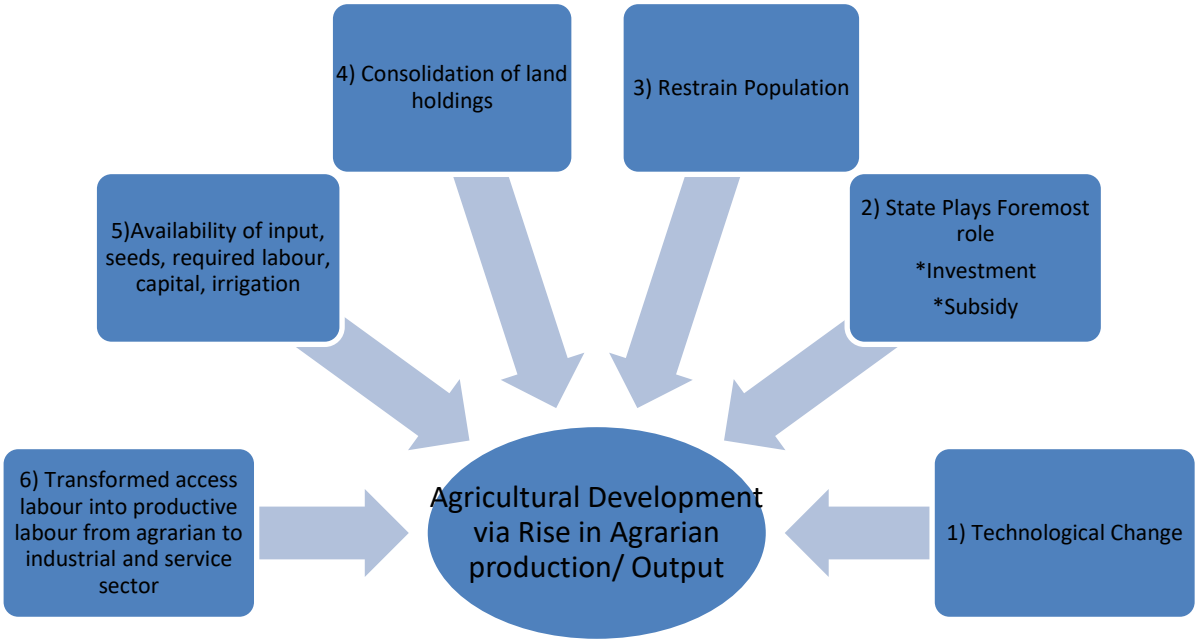
Eventually, these all economic propositions would be realized, if the state plays an important role in maintaining the governance for the benefit of the agrarian society. Dr. Ambedkar argued that agrarian performance can be made better off if the state governs it. The state always focuses on a welfare objective while administering any sector of the economy

whereas private bodies have an adjective to maximize their own profit only. Similarly, if the state does not regulate economic affairs, then private parties use their liberty in governing other wage earners by some inappropriate manners for instance increase in the hour of work and reduction in wages. Therefore, with the predominant role of state collectivized farming should be practiced in India. So, Dr. Ambedkar stated that agriculture was to be only a State Industry. He recommended that the State should acquire (along with the key and basic industries and insurance) all the agriculture land held by a private individual whether as owners tenants or mortgages and pay them compensation equal to the value of the land. Further, the State should divide the land acquired into farms of standard size and should let out the farms for cultivation to residents of the village on the following conditions.

1. The farm was to be cultivated as a collective farm according to the rules and directions issued by the Government.
2. The land was to be let out to villagers without distinction of caste or creed and in such manner that there would be no landlord, no tenant, and no landless laborer.
3. The state was obliged to finance the cultivation of collective farms by supplying draft animals, implements, and manure, Seeds, etc.
4. The tenants were to share among themselves the produce of the farm left after the payment of charges properly livable on the farm.

In other words, Dr. Ambedkar has provided an excellent way of resolving difficulty regarding surplus labour by the transformation of agriculture labour in the other sector- industry and services, collective farming approach and the dominant role of the state for the well-being of the entire primary sector i.e. agriculture. Further, he also emphasizes on the appropriate availability of inputs-labour, capital, seeds, fertilizers and equipment for maintaining the correct level of productivity and production should also be maintained by the state. Therefore Dr. Ambedkar's agriculture theory comprises four paramount standpoint mentions below in the figure.

Fig: 2.3 Comprehensive Model for Agricultural Development



Source: Ambedkar writing & speeches 1918-1936

Nevertheless, the process of agricultural growth itself has remained outside the concern of most development economists. Both technical change and institutional evolution have been treated as significant attributes to our Indian agrarian structure. The progressive integration of various economic propositions ultimately transforms into agrarian development, as suggested by Dr. Ambedkar. Though there is a cluster of various agricultural theories depends on different fundamental factors responsible for agricultural growth yet in the case of India the most viable, practical and manageable agrarian theory is of Dr. Ambedkar's Agrarian theory.

These all above influential and notable theories of agrarian development are dynamic in a sagacious perspective. But the most imperative theory that has the utmost spread effect is the agrarian theory of Dr. B.R. Ambedkar. This theory is the single and unified theoretical technique that can be corroborated as the best structural technique for the economic development of agriculture in India. Other analogous theories and techniques associated with agriculture

development & mechanization have been screening some certain rudiments as is discussed by Dr. Ambedkar in his theory.

W. A. Lewis developed a theory of economic development with an unlimited supply of labour. The economic development depends upon capital accumulation due to the unlimited supply of labour. An unlimited supply of labour exists in those countries where the population is so large relative to capital and natural resources like India. Lewis theory is similar to Dr. Ambedkar theoretical concept as he stresses that labour is an engine of development and this reminds us to Bentham's dictum that "labour is a real source of wealth". On the other hand, the subsistence sector is that the part of an economy which is not using reproducible capital. In India this sector is recognized as the agriculture sector. In the subsistence sector, the average productivity of labour is low and individuals are generally backward, illiterate, simple and unskilled. Lewis (1954) has talked about the superfluous labour supply, where Dr. Ambedkar has already discussed the same concept in 1918. In the capitalist sector, Lewis had not covered any type of differences between skilled and unskilled labour, but this distinct proposition was elaborated by Dr. Ambedkar. Besides this Lewis theory did not put forward the prime role of the state in order to regulate the agriculture sector. In the same way theory of Schultz (1964) also perceived some similar points from the verdicts of Dr. Ambedkar, by mainly emphasizing on investment obstruction and he remarked this obstruction as a transformation problem in agriculture. Similarly, Dr. Ambedkar also called attention to the procedure and practices of investment for the development of agriculture, but before Schultz in 1918. The concept of low propensity to save under agriculture was also highlighted by Schultz as pointed out by Dr. Ambedkar. On the other hand, Investment is a fundamental obstacle in agriculture and Investment can be upheld with the help of capital utilization in agriculture. Dr. Ambedkar suggested the best way of investment in human capital is in terms of education, this valid view was also perceived by Schultz. The Schultz conferred specific sort of equilibrium, in which agriculture gradually arrives over a long period of time and this phenomenon was also deliberated by Dr. Ambedkar as he said that if allocation of labour force will put forth adequately in agrarian, industrial sector; optimal productive output in each sector with an excess capacity would be accomplished and gradually ascertain economic equilibrium in the long run. The next theory of Jorgenson also flaunts some similar dimensions as put forwarded by Dr. Ambedkar. He

draws a sharp difference between the two abstractions regarding productive behavior of agricultural sector and allocation of labour to other trade and aid to trade, which in turn have an influence on the existence of surplus labour and to other operative divisions of the economy. This notion was adopted by D. W. Jorgenson in his theory of the development of a dual economy. He segregates the economy into two divisions-the manufacturing or contemporary sector, and the traditional or agrarian structure and it adduced asymmetry in the production relations of these two divisions. The agriculture sector is a function of land, labour alone and the manufacturing sector is of capital and labour alone, these two notions was moreover embellished by Dr. Ambedkar in his theoretical line of agrarian growth and development. As Ambedkar said the development of a dual economy relies not only on the existence of agricultural surplus in the agriculture sector but also depends on the technical conditions in the manufacturing sector, this fact was also favored by Jorgensen.

Furthermore, we have the Malthus theory of population that also revealed some essentials that are indistinguishably significant arguments mentioned by Dr. Ambedkar as population growth depends upon the supply of food per capita only. If the food supply increases more than the population, there exists an agrarian surplus and labour is free from the land and can be employed in the manufacturing sector. However, if there is no agriculture surplus, all labour remains on the land and the labour force available for employment in the manufacturing sector grows at the rate which is equal to the growth of the agricultural surplus. This wage differential determines the terms of trade between the manufacturing and agriculture sector and thereby the rate of investment in the manufacturing sector of an economy. However, Most extensively the major common feature between the theory of Malthus and Dr. Ambedkar is the natural and economic resources place a direct restriction on population size and 'positive' checks (famine and increased mortality) or preventative checks (postponement of marriage and 1imitation of family size) that work to reduce population growth and this modus of restraining population accentuates productivity of agrarian sector and reduces the burden of populace on it. This strategically was put forwarded by both economist Malthus (1798) and Dr. Ambedkar (1918). Dr. Ambedkar's theory, is one of the most significant theory in the area of agriculture development. Adjoining theory of Johnston-Mellor that also promote indistinct features in contrast with Dr. Ambedkar theory that emphasized on the production and extension of consumer goods, both in the

agricultural and non-agricultural sector and also stresses on creating employment opportunity for working force. In addition to this, the theory also explicates international trade and comparative advantage from agriculture-oriented trade and consequently directs the development of the agrarian division.

Johnston-Mellor theory (1974) remark three important features to agriculture structure these features are similar to the Dr. Ambedkar agrarian theoretical notion; concerning the agriculture development. The stages of agricultural development begin with Traditional agriculture and further bridging with the better quality of seeds and education to the farmers. This ideological phenomenon is purely the same as adopted by Dr. Ambedkar in 1918s. In addition to the next theory of Boserup's, this theory elucidates the wider range of parameters and criteria for the mechanization of agriculture and theory naturally refers to a wider range of agricultural tools (e.g. tractors), techniques (e.g. fallow patterns), and inputs (e.g. fertilizer). Boserup's theory of agriculture advancement also defined dependent linkage between population dynamics and agriculture technological development. Although she defined specific strategies used by the populace, particularly a growing population; in developing a mixture of some dominant stage concern with the population, growth of agriculture and food supplies. Similarly, as a population continues to grow it gradually makes transitions from shorter-fallow to annual cropping or annual cropping to multi-cropping more than once a year on all of its land. Thus, there is a coexistence of cultivation systems" such as exists in the world today and this continuum type of land use with optimum maintenance of soil fertility was also created in the theory of Dr. Ambedkar. The conservation model was also advanced on the basis of some prominent thought of Dr. Ambedkar as model emphasized the evolution of a sequence of increasingly complex land- and labor-intensive cropping systems, use of organic manures, and labor-intensive capital formation in the form of physical facilities to more effectively utilize land and water resources. This involves the introduction of more intensive use of new forage and green manure crops and an increase in the availability and use of animal manures. As Dr. Ambedkar always argued if we want to develop Indian agriculture production stature we must have to create a central point and that should be enough capable to supply better and superior quality of inputs to agriculture. The Diffusion model has also described one of the unsurpassed phenomenon set forth by Dr. Ambedkar that agriculture advancement would be easy if we

dispersed new technology, innovation and knowledge in the meadow of the agricultural sector. Hence, Dr. Ambedkar' theory depicts spread effect through sub-discipline linking the agricultural sciences and economics as explained in the diffusion model. This process of diffusion may be implemented by the state because the state has the supreme power to maintain appropriate governance with optimum management and allocation of agrarian inputs. Model emphasizing upon the relationship between diffusion rates, personality characteristics and educational accomplishments of farm operators. This kind of relationship was interpreted by Dr. Ambedkar during the year of 1918-1926 in his writings and speeches. At last, comparing with high pay-off model, this theory were classified into three categories: (a) the capacity of public and private sector research institutions to produce new technical knowledge; (b) the capacity of the industrial sector to develop, produce, and access new technical inputs; and (c) the capacity of farmers to acquire new knowledge and use new inputs effectively. These three well-built notions were precisely taken into account by Dr. Ambedkar in his agriculture development theory in 1918.

Conclusion

Principally the entire theoretical framework comprises the agricultural development theories and its comparison with Dr. Ambedkar's agrarian theory. With an amalgamation of various agriculture theories & models, agrarian development and its significance in the growth process cannot be deniable. All agrarian theories principally rely on some basic economic propositions that assist agrarian development. Thus, a comparison of Dr. Ambedkar's theoretical approach with other agricultural development theories divulges that the theoretical approach of Dr. Ambedkar is most suitable and appropriate in the present Indian agriculture scenario. It comprises of all essential instruments that trigger off agricultural advancement. Therefore, Dr. Ambedkar's comprehensive theoretical approach is well fitted in India on the basis of its practicality in the Indian context expounded in his model. Further, its empirical assessment is executed in subsequent chapters.

References

1. Abraham P., (2002). Ambedkar's Contribution for Economic Planning and Development-Its Relevance.
2. Amano, M. (1980). A neoclassical model of the dual economy with capital accumulation in agriculture. *The Review of Economic Studies*, *47*(5), 933-944.
3. Ambedkar, B. R. (1918). Small holdings in India and their remedies. *Journal of Indian Economic Society*, *1*, 1900-1945.
4. Ayodele, A. E. (2012). A critical analysis of diffusion of innovation theory
5. Barber, W. J. (1967). Urbanization and Economic Growth: The Cases of Two White Settler Territories. *The City in Modern Africa. New York: Frederick A. Praeger*, 91-126.
6. Blaug, M. (1962). Economic Theory in. *Retrospect. 3d ed. Cambridge: Cambridge*.
7. Boserup, E. (2005). *The conditions of agricultural growth: The economics of agrarian change under population pressure*. Transaction Publishers.
8. Bot, A., & Benites, J. (2001). *Conservation agriculture: case studies in Latin America and Africa* (No. 78). Food & Agriculture Org.
9. Derpsch, R., & Friedrich, T. (2009, February). Global overview of conservation agriculture no-till adoption. In *4th World Congress on Conservation Agriculture New Delhi, India* (pp. 4-7).
10. Dethier, J. J., & Effenberger, A. (2012). Agriculture and development: A brief review of the literature. *Economic Systems*, *36*(2), 175-205.
11. Dewett, K. K. (1966). *Modern Economic Theory (ME)*. S. Chand.
12. Ercolani, M. G., & Wei, Z. (2010). An empirical analysis of the Lewis-Ranis-Fei theory of dualistic economic development for China. *Discussion Papers*, 10-06.
13. Gadekar D. R., (2009). Socio economic thought of B.R. Ambedkar. *Ambedkar and Nation Building, 23-28.*
14. Ghatak, M., & Roy, S. (2007). Land reform and agricultural productivity in India: a review of the evidence. *Oxford Review of Economic Policy*, *23*(2), 251-269.
15. K. S. Thorat, (2009).Agriculture's thoughts on Economic Development and Planning. *Ambedkar and Nation Building*, 77-98.

16. Kilkenny, M. (1998). Transport costs, the new economic geography, and rural development. *Growth and Change*, *29*(3), 259-280.
17. Lanza, V. (2012). The classical approach to capital accumulation: Classical theory of economic growth.
18. Lekhi, R. K., & Singh, J. (1996). *Agricultural Economics: An Indian Perspective*. Kalayani Publishers.
19. Marquette, C. (1997). Turning but not toppling Malthus: Boserupian theory on population and the environment relationships.
20. McRoberts, N., & Franke, A. C. (2008). A diffusion model for the adoption of agricultural innovations in structured adopting populations (No. 61117).
21. Mellor, J. W. (1968). *The economics of agricultural development, John W. Mellor*.
22. Peters, W. (1977). "The Impact of Urban-Industrial Development on Agricultural Incomes and Productivity in Finland": Comment. *Land Economics*, *53*(2), 253-255.
23. Razack, A., Devadoss, S., & Holland, D. (2009). A general equilibrium analysis of production subsidy in a Harris-Todaro developing economy: an application to India. *Applied Economics*, *41*(21), 2767-2777.
24. Ruttan, V. W. (1978). The international agricultural research institute as a source of agricultural development. *Agricultural Administration*, *5*(4), 293-308.
25. Ruttan, V. W. (1985). Technical and institutional change in agricultural development: Two lectures. *Bulletin Number*, *85*, 1.
26. Ruttan, V. W., & Hayami, Y. (1972). *Strategies for agricultural development*. Food Research Institute, Stanford University.
27. Ruttan, V. W., & Hayami, Y. (2011). Induced innovation theory and agricultural development. *Can Economic Growth Be Sustained? The Collected Papers of Vernon W. Ruttan and Yujiro Hayami*, 10.
28. Tagar, H. K., & Shah, S. R. A. (2012). Agricultural Development: Meanings, Modes and Models (A Feasible Model for Sindh-pakistan). *International Journal of Innovative Research and Development, ISSN 2278–0211*, *1*(8), 54-75.
29. Thirlwal, A. P., (1989). *Growth and development: with special reference to developing economies*. Springer.

30. Timmer, C. P. (1988). The agricultural transformation. *Handbook of development economics*, *1*, 275-331.
31. Udemezu, J.C., Osegbue E.G. (2018). *Theories and Models of Agricultural Development.* The Annals of Reviews & Research. Juniper Publishers.
32. Wiggins, S., Farrington, J., Henley, G., Grist, N., & Locke, A. (2013). Agricultural development policy: a contemporary agenda. *Overseas Development Institute ODA, UK*.

Chapter-3

Dr. Ambedkar and Agricultural Production in India: A Technical Analysis

Introduction

A greater share of the population continues to depend on agriculture for its livelihood and given the slow pace of structural transformation. Slow growth in agricultural productivity means a slow improvement in the welfare and prosperity of those dependent on it, as evident in emerging trends, for example, excess family labour remaining on farms, widening the gap between agricultural and non-agricultural labour productivities, declining profitability on small farms. This need not be the case, as the experience of developing countries with very dissimilar factor endowments shows. China, with a larger share of the workforce in agriculture than India, and Brazil with a much lower share have both made remarkable progress in improving the standard of living of their agricultural population with significantly faster growth in agricultural productivity than India. In line with the strategic transference from food to income security, it is important to also recast the notion of productivity from a narrow nub on physical yields of staples or individual crops to a broader measure of whole-farm productivity, defined as the value per hectare, which is better aligned to farm incomes and welfare. The improved yields (across all crops and livestock) would naturally be an important part of this measure, but the attention to profitability also highlights the importance of diversification to maximize whole-farm productivity and profits. The economic dimension and degree of the output difficulty is reflected in the economic efficiency of production (related to the physical measures of technical change and technical efficiency through allocative efficiency), which exhibits that growth in farmer incomes has been well below what it could be with more effective use of inputs and a more economically rational allocation of resources. Indeed, Indian agriculture has been anguishing with some chief conundrum that needs to be sorted out in order to rejuvenate agrarian organization in an orbicular facet.

The conceptual outline had been suggested and evoked by Dr. Ambedkar in the year 1918 to 1944 was primarily relying on polygonal approach of an agrarian advancement in India.

This orbicular framework has been articulated with analyzing some elemental economic factors which are responsible for low productivity as well as the sluggish development of agriculture sector in India due to fragmented land holdings, dominance of unfavorable farming system, high dependency ratio of labour, less participation of state, poor labour absorbing capacity of the agriculture sector. Hence, this chapter has assessed the validation and extent of the practicality of the conceptual outline vindicated by Dr. Ambedkar for the agrarian economy of India. Dr. Ambedkar observed this phenomenon is 1918 that excess labor which acts as a dependency ratio of the population on agriculture, an increase in the marginal land holdings or high divisibility of land holdings. The minimal capital formation with the low investment is responsible for the regressive growth in the agriculture sector in India.

Since British colonial system agriculture sector was anguishing with the several critical and life-threatening issues concerning the wellbeing of farmers and their most precious agricultural resources. The land transfers and their allocation were first institutionalized with the British land settlements. Nevertheless, this institutionalization framed in the form of land revenue system. The legislation introduced in Ryotwari and Mahalwari areas during the 1850s has enabled money-lenders to recover debts on loans secured on land holdings. Since the revenue assessments were so high particularly in Ryotwari the indebtedness grew, and dispossession of land led to rapidly rising tenancy. As a result, rural society in the ryotwari and mahalwari system was polarized into landlords and rich peasants versus tenants and agricultural laborers. The distribution of land became highly unequal. In the zamindari system, the rural society was even more hierarchically divided between landlords, tenants with hereditary rights (raiyats), sub-tenants, sharecroppers and agricultural laborers. The land distribution was even more unequal than in *ryotwari* areas. Early tenancy legislation (Bengal Rent Act, 1859; Bengal Tenancy Act, 1855) established occupancy rights for raiyats in zamindari areas and attempted (with little success) to limit rents paid by sub-tenants and share croppers to 50 per cent of gross produce with a written agreement and 25 per cent with the oral agreement. In ryotwari areas, however, the tenancy was not officially recognized or regulated by the colonial regime and no action was taken to stem the flow of distress sales, dispossessions and evictions till the Bombay Tenancy Act, 1939.

Types of tenure system act according to the typology of the states and this affects the agricultural growth and production in India for the last decades. The data are also shown on the growth of agricultural production over the period 1970-94. The intention is not to suggest that the legacy of former land settlements has any direct causal relationship with contemporary agricultural performance. It does reveal, however, that former *ryotwari* and *mahalwari* areas of South and West India have tended to show higher rates of agricultural growth than have former *zamindari* areas of North and East India. There was a greater degree of exploitation of farmers in ryotwari and Mahalwari systems. Broadly speaking, three major types of land reform legislation have been enacted after independence, although not all of these have been enacted in all states like the abolition of intermediary tenures; regulation of the size of holdings (through ceiling-surplus redistribution and/or land consolidation); and the settlement and regulation of tenancy (Ray 1996, Appu 1997). Three broad types of land revenue systems were introduced to India under British rule (Baden-Powell 1892, Sharma 1992). The differences between these systems account for significant variations in the subsequent evolution of land tenure systems throughout rural India. Under the *zamindari* or 'permanent settlement' system, introduced in 1793, feudal lords (*zamindars*, *jagirdars*, etc) were declared proprietors of the land on condition of fixed revenue payments to the British regime. The peasants were transformed into tenant farmers, and the rents were collected by serried ranks of intermediaries below the level of *zamindars*. This system prevailed over most of North India, including present-day Uttar Pradesh (except Awadh and Agra), Bihar, West Bengal, most of Orissa, and Rajasthan (except Jaipur and Jodhpur), and covered around 57 per cent of the total area cultivated. The other major system was the *ryotwari* system, introduced in Madras in 1792 and in Bombay in 1817-18. In this case, individual cultivators (*ryots* or *raiyats*) were recognized as proprietors of their land with rights to sub-let, mortgage, and transfer their land by gift or sale. Their tenure of land was secure so long as revenue payments were made directly to the collectors of the colonial administration. The *ryotwari* system held sway over most of South India, including present-day Maharashtra, Karnataka, Tamil Nadu, Kerala, Andhra Pradesh, and most of Madhya Pradesh and Assam. The princely states of Jaipur and Jodhpur in Rajasthan also fell under *ryotwari* systems. The pockets of *zamindari*-type tenure existed within these *ryotwari* areas. The third type of system was the *mahalwari* system, in which revenue settlement was made with entire villages as collective units. The peasant farmers contributed shares of the total revenue demand for the village (*mahal*) in

proportion to their respective holdings. (Maitreesh Ghatakand Sanchari Roy, 2007). The major anguishing fact expressed here is that from 1793 till 1917 the farmers' exploitation had been continued with the higher magnitude. It indicates that farmers were surviving without the proper income generating source at that time. Even they were not rewarded for their daily field work in order to grow the crops. Furthermore, the cultivation of profit-making crops had been taken place as per the direction of Britishers but the entire profits were wiped-out by them only.

This miserable condition of farmers had been continued till 1917 when Gandhi had marked Chamaparan movement against the Indigo planters. During this hard-hitting and difficult time, Dr. Ambedkar was the first economist who had realized and apprehends the economic affliction of the farmers in the eighteenth century and it was remarkably expressed in his article published in 1918. The unfair-minded system created by the Britishers was not only the problem of that time, the land distribution and its gradually diminutive size was also the key problem of agriculture in the eighteenth century. The diminutive size of land holding will adversely affect the production and farmers' income creating capacity. This veracity was recognized by Dr. Ambedkar. There are the key points of his theoretical line of approach mentioned below.

Fragmented Land Holdings in India

The land is the foremost dominant economic resource as well as elemental input for the better output and revenue to the farmers in agrarian sector. In the unavailability of crucial factors, land agriculture sector would not be imaginable. The fragmentation of land holdings is the key factor that imposes a negative constraint on desirable productivity. The "Small holdings in India and their remedies" is Dr. Ambedkar's pivotal contribution to the theme of India's agrarian problem. This essay was published in 1918. Dr. Ambedkar discerned that agrarian farming is by far the most imperative among all the initial industries. Nonetheless, the hindrance facing by Indian agriculture was not only that the land holdings were small but they were also scattered. The small size and fragmentation of land holdings resulted in inefficient use of input resources by raising the cost of production, weakening of critical input- land, as it gets more uneven and fragmented by the law of inheritance which culminated in low agriculture productivity (B. L. Mungekar, 2004).

Dr. Ambedkar's argument on the problem of consolidation of land holdings gives an impression rather than a dialectical one that he is arguing the case for large holdings. He made a thorough discussion in Baroda Committee Report. It must be borne in mind that consolidation may obviate the evils of small holdings unless the consolidated holding is an economic that is enlarged holding. His discussion on the enlargement of holdings further gives an impression of that the large holdings are more viable than small holdings. Although a careful perusal shows that he is more interested in trying to seek methods by which productivity of small holdings can also be improved. Hence he observes that Prof. Jevons view of an economic holding from the standpoint of consumption rather than on production leads an error. According to Dr. Ambedkar consumption is not the correct standard to judge the economic character of holding but the production and output are the appropriate standards to judge the same. (C. Sivarama Krishna Rao, 1993).

The law of inheritance and the number of children in the agrarian family are the main factors of fragmentation in India. The civil procedure code makes it obligatory on the courts to refuse partition whenever it would reduce a land beyond the economic limits ascertained in advance. Besides this system of inheritance, there is one more thing that allows further liberty to do so as he like with the part of his estate provided he leaves sufficient for his heir to constitute what is called "pars legitima". Under this Germans have enacted a permissive law of "Anerbenrecht" designed to obviate the effects of the law of inheritance in causing unnecessary sub-division of land. In some aspects, it appreciates the proposals of the Baroda Committee (Prof. N. G. Pierson's Principles of economics, Vol.2, pp.286-90).

On the other hand, Dr Ambedkar opined that fragmented land holdings do not exist only due to law of inheritance whereas according to Prof. Jevons and Prof. Keating were following the opinions that the diminutive size of land holding is found due to poor standard of living of farmers that a higher standard of life set up and created will compel a large holdings because people with the high standard of life is likely to utilize immense holdings. According to Prof. Keating, the Sub division of land causes severe depreciation of the value of land. Dr. Ambedkar analytical line of attack is a little bit distinguishing from others. He opined that agriculture is not hampered solely by the law of inheritance even more active reason for the fragmented land is the incessant increasing compression of the population on the agrarian land. Although this labour as

a part of the population which is performing its function as an input in agriculture production. Yet the intensive increase in this factor surely will put negative constraints on the productivity of agriculture land. Especially, if this labour is the self-owned labour, this consequently leads to more diminutive size of land. Therefore, the diminutive size of land was directly derived by the increasing pressure of population that is eventually the repercussion of rapid population growth. An economic equation for our agrarian economy was expressed by Dr. Ambedkar in the Baroda Committee (Dr. B.R.Ambedkar, 1918).

In this range of thinking two equivalent working weapons are needed in the agrarian economy as one is to minimize the compression of populace and second is to prevent the land from its further diminution. In order to prevent the ongoing land fragmentation, there is a need to determine the specific and reasonable size of agriculture holdings. Moreover, the interesting point is that Dr. Ambedkar made a critical examination of the prevailing situation under agrarian system and was of the view that there can be no such things as the correct size of agriculture holdings. According to Dr. Ambedkar an efficient production consists of making every concerning factor of production contributes to its highest." He further stated that if agriculture is to be treated as an economic enterprise, there could be no such thing as a large or small land holding and certainly, it is not due to want of efficiency in utilizing whatever the peasant has. Dr. Ambedkar's answer rests in the inadequacy of other factors of production. The inefficiency of capital which is needed for acquiring "agricultural stock and implements" arises from lack of saving. (P. Abraham 2007). However, all these meagernesses are sequential and interrelated since lessen savings in agriculture is due to unstable and abortive inputs availability. He was striving to show that due to lack of alternative means of subsistence, the agriculture was overcrowded and made subsistence of enlarged and consolidated holdings at a particular size impossible.

In the segment of fragmented land holdings the concept of economic holding has its own significance as said by Dr. Ambedkar. He accorded that only large holdings cannot be the economic holdings but small holdings can also be pondered as an economic holdings. Thus small farms may be economic as well as large farms; for economic or uneconomic does not depend upon the size of land but on the ideal proportion of all the factors including land in the cultivation. He portrays that an economic holding consists of the optimum combination of "land,

capital and labour" etc. in a fraction such that an equivalent and symmetric contribution of each in conjunction with the rest is the highest. Thus, an economic holding is a matter of size of land and the adjustment of a piece of land to the necessary equipment for its efficient cultivation. Nevertheless, the implementation of the necessary equipment reveals the importance of technical farm supports usage and this support can be well accessed by the optimum size of agrarian land. Therefore, the size of land has its own significance in determining the agriculture production and its spread effect to the Indian farmers. If the big bunch of agrarian land will be gradually fragmented, the applicability of technology as an imperative input in agriculture will be a mere imagination and India will never be able to compete for the countries like U.S.A., China and Russia in terms of the production and qualitative yield. Therefore the land fragmentation is required to regulate in India.

As per his practical approach, for sustainable agriculture growth, there is a prime requirement of organizing agrarian division from top to grass-root echelon. It would be implacable only when the state comes forward and will operate this sector with an effective measure and good governance because in the absence of the second trait best outcome and output will not reach to individual or 0farmers. Dr. Ambedkar said that agriculture was to be a state industry and comes under the state subject. He recommended that the state should acquire (along with the key and basic industries and insurance) all the agricultural land held by a private individual whether as owner, tenants or mortgages and pay them compensation equal to the value of land . Further, the state should divide the land acquired into farms of standard size and should let out the farms for cultivation to residents of the village on the following set of status quo. A) The farm was to be harvested as a collective and unified farm according to the rules and directions issued by the government. B) The land was to give forth to the villagers without dissimilarity of caste or creed and in such a manner that there would be no landlord, no tenant and no landless labour. C) The state was obligated to finance the crop production (cultivation) of collective farms by supplying water, draft, animal, implements, manures and seeds. D) The tenants were to share among themselves the produce of the farm left after the payment of property charges leviable on the farm. The above-mentioned nub points are designed in order to strengthen and amalgamate the farming system in a collectivized manner. Hence, the collectivization of land would be possible only through the way of consolidated land under farming practices. Therefore, collective farming is a soundest remedial farming system which is

operated through consolidated land arrangements. Although under the collectivization it is entirely studied that origins and methods of the organization may shed light on the varying relationships between economics, politics and peasant collective consciousness in any country. Collective farming is an assortment of agrarian production and their assembly in which numerous farmers route their land holdings as a joint enterprise. This kind of communal farm management is often an agricultural cooperative in which fellow owners involve together in farm activities. The process of amassing the farmland is called the collectivization. In some countries like the Soviet Union, Eastern Bloc Countries, China, Vietnam and Ukraine the collective farming system was successful in increasing agricultural production.

The Consolidation of Land holding in India is difficult where the social system is dominant on the progress of agriculture division and it functioned as a stumbling block that created through the bad social system (Philip Oldenburg, 1990). To change the social system there is a need to modify and apply some rules and regulations on the wrong practices in agriculture that are liable for enlarging the fragmentation of land resource. The fragmented land holding was a core obstruction in development of Indian agriculture. So, Dr. Ambedkar had advocated collective farming as an effective remedial resolution. Nevertheless, the performa of communal farming would be possible only through a unified approach of consolidation of holdings. Moreover, the framework of collective farming could be successfully applied with the execution of consolidating agrarian land. Consolidation is not a single terminology that alone performs as an active tool for accentuating the condition of agrarian land in India at the time of independence. It is a group approach generated by public bodies and this notion was put forwarded in the form of land reforms. Land reforms are nothing but the combination of various spontaneous operations of socio-economic processes. Moreover, it equally expounds that the high diminution of agrarian land will hamper the agrarian production and performs in low yields. Therefore, the agrarian land will be ascertained at some certain optimum size, it will contribute to the more produce and as well as growth in the agriculture sector in India and this subsequently upsurges the farmers well being and reduces their misery further. Nevertheless to suggest an optimum size of land that can be considered as optimum one is the tough task. Here, the effort has been put in order to assess the optimum land size that is desirable from the perspective of agriculture production and technical adaption in India. Therefore this chapter examined the notion of Dr. Ambedkar with the support of secondary data by applying some econometric

model *i.e.* Autoregressive Regressive Moving Average (ARMA). The data has been gathered for the period of 1971-2015 to highlight the rationale between land size and productivity in order to analyze the relevance of Dr. Ambedkar.

Shah et al. (2014) analyzed the land distribution *i.e.* the growth and trend of area, production of major crops for the period of 1980-81 to 2011-12. The result shows that the area and production of maize crop were increased over time. On the other hand, the area under rice crop has decreased and production increased. Lastly, the Sugarcane area and production were also increased. Hossain and Hassan (2013) have evaluated the growth pattern of milk, meat and egg production in Bangladesh during 1991-92 to 2011-12. The cubic model was the best-fitted model. The model was further used for forecasting milk and egg production. It has been found that growth will be continuing in the year 2015 with 4.55 million tonnes of milk and 7544.67 million tonnes of egg production in Bangladesh. Jayadevan (1991) has studied instability in the wheat production in Madhya Pradesh. Instability analysis was carried out with a decomposition method in order to an accurate source of instability. The study resolves that area was the major factor for the increase in wheat production and changes in the yield variance. Bharti et al. (1992) have inspected the instability in production in Andhra Pradesh. It was revealed from the analysis that the contribution of area was more evident in the study and production was directly associated with the area. Talukder and Chile (2011) used a time-series data for 23 years to estimate and analyze the size of the population and food grain production. The findings suggested that the population for the next ten year will be inclined very similar to the observed period and higher trend in foodgrain production requirements for the same period. The pressure on land will further expand in the future. So the government should frame the policies effectively to reduce population growth.

Badmus & Ariyo (2011) have focused on forecasting the cultivated area and production of maize in Nigeria using ARIMA model. Data is gathered from the Central bank of Nigeria (CBN). The study finds that the projection is imperative as it helps to formulate policies with respect to relative production. The study concluded that the total cropped area has been decreased therefore total cropped area can be inclined in the future, if land reclaim and conservation measures are adopted in the future. Kumar and Parashar (2012) have studied the growth pattern in the area, production of food grain in Himachal Pradesh. The study revealed the

negative trends towards the area under all the foodgrain over the year. Besides, production registered a slightly positive trend except for some group of crops. The author suggests that remedial measures have to be taken in order to expand the operated area for cultivation, therefore, the area is the most important factor for inclining the production in the state in particular and in India in the general. Arunchalam and Balakrishnan (2012) put an effort in order to study the trends in the area, production of the wheat crop by the non-linear model. Area and production had been shown an increasing trend. The author also stresses that area of cultivation had played a significant role in determining the trend in production. Rajarathinam and Parmar (2011) made a study to analyze the study area and production trends of castor crop grown in the Anand district of middle Gujarat for the period of 1949 to 2007. The study revealed that the production in the surveyed area had increased due to the effect of an increase in area. Varghese (2004) made an attempt to scrutinize the trend in the area and production of cardamom in Kerala. He resolved that trends in area and production reveals up surging trend from 1979-80 onwards. He also laid stress upon area as an imperative factor in order to augment the production and further economies of scale.

In the light of the above-reviewed literature, it may be said that production may be genuinely influenced by the allocated area under operation for the production in India. The Area is the basic key factor that should always keep in the mind along with the other inputs application on agriculture. Nevertheless, in the case of area operated is divulging a disappointing picture. The area operated has been increasing under small holdings. On the other hand, large group holdings which are a combination of the operated area lying under the semi-medium, medium and large land holdings in India since 1971-72 and it is showing gradual declines in the operated area. Therefore the area operated under the small land holding is inclining which directly indicates that agriculture land in the present time moving towards the fragmentation. The fragmentation is the main obstruction that mitigating the land size and making the farmers incapable to take advantage of large and consolidate land holdings, especially marginal and small farmers. The trend of area operated under two groups given in the figure below has taken as the basis of the classification for the foodgrain production in India and further ARMA model executed for the two band of production i.e. small and large in order to examine the relevance of Dr. Ambedkar theory on collective farming and germane of the land reforms such as consolidation of land holdings in India.

Table 3.1 shows the number of operational farms in India for the last five decades. The distribution of the total farms is classified into five groups like marginal, small, semi-medium, medium and large operational farms. It is clear from the table that there is a continuous incline in the marginal operational farms as it reaches from 36200 thousand to 99858 thousand during the period of 1970-71-2015-16. In case of number of operational holdings under small farms, it has been up-surged from 13432 thousand to 25777 thousand during these five decades. Now coming to the third category of operational farms, the table reveals that semi-medium farms also have been inclined from 10681 thousand to 13776 thousand in the last five decades. Nevertheless, the slope of incline (figure 3.1) is relatively less as compared to the marginal and small farms in India. The scenario for the medium and large number of operational farms, there is a persistent decline in the number of farms as the medium category of farm shows the downfall from 7932 thousand to 5485 thousand during 1970-71 to 2015-16. Lastly, the large operational farms exhibit a decline in the number of operational farm from 2766 thousand to 831 thousand during the same period of five decades.

Table 3.2 exhibits the area operated under a different category of farms in India. The table shows that the area operated under marginal, small and semi-medium has been inclined during the period of 1970-71 to 2015-16. There is an incline in the area operated under marginal farm as it increases from 14599 (thousand ha) to 37960 (thousand ha) and small farm shows increase in the operated farms from 19282 (thousand ha) to 36435 (thousand ha). Similarly, semi-medium farms show the upsurge from 29999 (thousand ha) to 37168 (thousand ha) in the area operated. On the other hand, the slope for the medium and large farms area operated flaunts the different trends. There is a decline in the area operated for the medium and large categories of farms during these five decades. Medium operated farms exhibit the decrease from 48234 (thousand ha) to 31367 (thousand ha) while large farms show the decline from 50064 (thousand ha) to 14212 (thousand ha) in the area operated under these farms. It is evident that the pace of decline in the area operated for the large farm more steeper than the slope of the fall in the area operated for the medium farms (figure3.2).

Table 3.3 reveals a decline in the average size of farms under a different category of farms. The average size of marginal farms shows the decline in their average size from 0.4 ha to 0.38 ha during the period of 1970-71 to 2015-16. Similarly, the decline in the average size of small farms

has been observed from 1.44 ha. to 1.41 ha during the five decades. In addition to this, the average size of semi-medium farms has reduced from 2.81 ha to 2.7 ha and for the medium farms, it shows the decline from 6.08 ha to 5.72 ha during the period of 1970-71 to 2015-16. Now coming to the last category of *i.e.* large, it shows the decline in the average size from 18.1 ha to 17.1 ha during the period of 1970-71 to 2015-16. Overall there is a decline in the average size of total operational farms from 2.28 ha to 1.08 ha.

Table3.4 reveals the descriptive analysis for two re-categorized bands of holdings i.e. small & large band of holdings. The average area operated under the small land holding is 5510 thousand hectares whereas the average area operated under the large holdings is 106616 thousand hectares with the closer median value of the land holdings for both the groups. However, the standard deviation value for the small and large bands is lower. It implies that the mean value of the land bands is true to represent of area operated as it has the lower spread out or dispersion. Figure 3.4 explicates the scenario under two groups of operational land holdings in India. It is clear from the table that area of small holdings has been increasing over the last decades. In other words, there is gradual incline in the area operated under the small holdings while the total area operated under the large land holding has been declining.

Table 3.5 expounds the number of holdings under the two different land bands *i.e.* small and large. The average number of holdings under the small band is 88264.9 thousand and 22086.6 thousand. The number of holdings under the small band is relatively higher than the number of holdings operated under the large band. Standard deviation values expound that there is less dispersion or it implies that most of the number of holdings is closer to the average value of the NOH for two bands. Figure 3.5 clearly expounds the trajectory in a small and large number of holdings in India. It drifts clear that there is a sharp upsurge in the case of the small number of land holdings. On the contrary, in the case of a large number of holdings, there is an inclination has observed till the period of the 1980s and afterward, there is a decline in the number of holdings under the large land holdings in India.

Methodology:

This chapter purely analyzes the trend in the production of food grains in India. The data pertaining to the agricultural years 1971-72 to 2015-16 was used for model building and

forecasting. However, the model adjusted the sample by itself for the purpose of forecasting. The trend analysis and forecast of production for the two groups of holdings area has been done. As we know Agriculture Census has the classification of the area operated under the major five categories of land holdings. But for the simplification of the time series analysis, the five category of land holding area has been bifurcated into two major land bands. The first band combines the area of marginal (0-1ha.)&small holdings (1-2ha) and the second band combines the area of semi-medium (2-4ha), medium (4-10ha) and large (10 ha. above) land holdings. Here the basic proposition to classify the total area in two major band of the area has been taken as the literature also provide the evidences that the persistent decline in the operated area and gradually conversion of the land into marginal and small holdings is not appreciable for the agriculture and the population is dependent on agriculture as well. Therefore, whether the area is imperative for determining productivity or not has been inspected here. This rational practical approach has given the genesis to this time-series ARMA model. The approach exhibits that present agriculture food-grain production is the function of past agriculture food-grain production which is executed under the two different area bands. The total food grain production is similarly bifurcated as per the ratio of the area operated under each category of holdings. And subsequently form two broad groups of the production: a) small band area production b) large band area production. Therefore, a comparison has been done between small band area production and large band area production.

1. The basic steps followed in the execution of the model are- Identify smooth sequence using scatter chart, autocorrelation function, partial autocorrelation function, ADF, unit root Test.
2. Do smooth processing on non-stationary sequence such as differencing the data.
3. Establish the model according to the time-series model identification rules. If the partial correlation function of a smooth sequence is censored and the autocorrelation function is trailing, the sequence can be concluded for the AR model. If the partial correlation of a smooth sequence is trailing and the autocorrelation function is censored, it will be determined for MA model. And if both partial correlation function and autocorrelation function are trailing it will be the ARMA model for the sequence.
4. Estimate the parameters and justify that whether the statistical test is significant.
5. Diagnose whether the sequence is the white noise and predict with the model established.

The Autoregressive Moving Average (ARMA) Models:

ARMA model analyzes and forecasts equally spaced univariate time series data. An ARMA model predicts a value in a response to time series as a linear combination of its own past values. The ARMA approach was first popularized by Box and Jenkins, and ARMA models are often referred to as Box-Jenkins models. ARMA models were identified by finding the initial values for the orders of non-seasonal parameters. They were obtained by looking for significant spikes in autocorrelation and partial autocorrelation functions. At the identification stage, one or more models were tentatively chosen which seem to provide statistically adequate representations of the available data. Then precise estimates of parameters of the model were obtained by least squares. As the two groups of the food-grain production have been created with the help of the original data of the total production for the period of 1971-72 to 2015-16. Moreover, the basis of the bifurcation for the total production into two major groups has done as per the ratio of the operated area under various categories of land holdings in India.

Firstly, the stationary check of time series data was performed; Figure 3.6 graph plot and figure 3.7 Correlogram plots revealed that both the small and large food grain production group is non-stationary. Furthermore, the ADF Test has been performed to check that the data is significantly stationary or not. ADF test also expounds in table 3.6 & 3.7 that data is non-stationary. Therefore, the non-stationery time series data were made stationary by first-order differencing and best fit ARMA models were developed using the data from 1971 to 2016 and used to forecast the cultivable production in India for the next two years, that is, 2017-18, 2018-19. The integration process which shows the first-order differencing stationeries process extracted from the samples of 1971 to 2016. In other words, data are the time-variant for both the group of production of small and large group. The original data of production for small group initially reveals the upward trend. It implies that figure 3.6 does not hold the property of zero mean and constant variance. Furthermore, for detecting the stationary component in the data, the Correlogram of the agriculture production for small group and large group has been plotted (figure3.7). It also clearly indicates that data is non-stationary as the correlogram of Autocorrelation Function for both small and large group of production expounds the gradual decline against the lag length. On the other hand, partial autocorrelation drops immediately after

the first lag and most of the PACF (Partial Autocorrelation Function) after one lag are not statistically significant.

In order to remove the non-stationary pattern from the data, first order differencing on the data has been performed and figure 3.8 shows that the data become stationeries now. Furthermore, Augmented Dickey Fuller test has been chosen from the various types of unit root tests and exercised in order to bring the stationary in raw data of production taken in the study. ADF test after the first order differencing exhibits that data has become stationary. Table 3.8 reveals the significant value of the 't-Statistic' at the 5 percent level of significance for the small band production & large band production. ADF has been analyzed with the intercept and trend. Beside this the correlogram plots after the first differencing also reveals that both the set of data are stationeries now (table 3.9).

Estimating ARMA Models:

The autoregressive (p) moving Average (q) Parameters have been chosen on the basis of the significant spikes in the plots of ACF and PACF of the different time series. While identifying the best fit ARMA models, appropriate values of the coefficient of p, q was chosen, which have the p-value < 0.05 This rationale has been picked for the selection of the best coefficient value for our dependent variable i.e. small group production& the large group of production.

Above Table3.10 shows the estimation of the ARMA model for the small band production and it expounds the Best fit model of ARMA (0, 1) process. It exhibits the significant coefficient value and the estimation process also has the lowest AIC (Akaike Information Criterion) and SBIC (Schwarz Criterion) value. In addition to this sigma square and adjusted R Square is also relatively good for this model. Therefore, the ARMA (0, 1) is statistically significant form of the model. ARMA process (0, 1) stood at the significant coefficient value of -0.62*** with the lowest AIC & SBIC value criterion. Moreover, the comparison graph in figure 3.10 also shows that among the entire expected model the best fit model is observed with the (0, 1) × (0, 0) ARMA process.

Table 3.11 shows the estimation of the ARMA model for the large band production and it expounds the Best fit model of ARMA (1, 0) process as this estimation process has the lowest AIC (Akaike Information Criterion) and SBIC (Schwarz Criterion) value. In addition to this sigma square and adjusted R Square are also relatively good for this model. Therefore, the ARMA (1, 0) is statistically significant form of the model. ARMA (1, 0) process stood at the significant coefficient value of -0.57*** with the lowest AIC. The appropriate model has been judged primarily on the basis of four criterion such as the significant coefficient value, lowest AIC & SBIC value, lowest sigma^2 and highest Adjusted $R^{2.}$ Figure3.11 exhibits the various comparison graph of the best fit model for the large band production and ARMA (1, 0) × (0, 0) process has been found as the best fit model in the process of estimation.

Appropriate estimation directs towards the diagnostics procedure of the model. Therefore, the diagnostic process has been performed here. This diagnostic is an imperative part of the overall analysis, as it will flaunt that all true information of the variable and as well as it has been captured by our best fit model or not. Once an appropriate model is chosen, the Box-Jenkins methodology requires examining the residuals of the model to verify that the model is an adequate one for the series. For a good forecasting model, the residuals left over after the fitting model should be white noise. Figure 3.12 displays a plot of the standardized residuals. From the residual plot of the ARMA model, it was found that the ACF & PACF of residuals is small and lies within confidence limits which show that the residuals from the best model are white noise. In order to know this, the Correlogram of the residual has been plotted. Correlogram plots for the ACF & PACF in figure 3.12 (A) are the ideal Correlogram as all the lags for the residual have been lying under the 95 percent confidence interval or under the standard error bounds for small band production and as well as for the large band production. Therefore, it has verified that ARMA (0, 1) × (0, 0) MA1 process model is chosen as the best fit model for the forecasting of small band production and ARMA (1, 0) × (0, 0) AR1 process is chosen for the forecasting of large band production. The small band production and large band production can be expressed as:

Equation for (ARMA)

$$\hat{Y}_t = \mu + \beta_1 Y_{t-1} + \beta_1 e_{t-1} \quad \ldots\ldots\ldots\ldots (1)$$

On the basis of these above-mentioned equations, forecast value for the period of 2018-19 to 2020-2 has been computed. The working of the model is exercised for the period of 1971-72 to 2016-17 in figure 3.12 (B). The trend is further evaluated from 2018-19 to 2020-21on the basis of the value of coefficients computed for each band of production i.e. small and large. The figure for the actual, fitted value and for the residual for both the band of production is given below

Figure 3.13 (A) shows that the trend of actual and fitted value for the small band production are not deviating from each other and the computed value for the period of 2013-14 to 2015-16 are significantly near to the actual value of the production for small band. Therefore, the forecasted value of the foodgrain production for 2016 to 2018 has given below in table 3.12 and it shows that the pace of increase in small band production is relatively sluggish as compared to the large band production.

In addition to this, Figure3.13 (b) exhibits the actual value, fitted value and residual for the large band production. It shows that actual and fitted values are significantly overlapping each other which imply that they are significantly closer to each other. Residuals have also held the criteria of mean zero and minimum variance. Therefore, the predicted value for the period of 2013 to 2016 has been showing an inclining trend in figure 3.14 (A, B). The further forecasted value of the large band production on the basis of the best fit model for the period of 2018 to 2020 is given in the table (3.12). Hence, this is clear from the pattern of the prediction that large band production will be perceived to be relatively more in the upcoming time and Consequently, it gives the advantages to the farmers or stakeholders associated with the area of land more than two hectares.

Conclusion

The Area has been taken into consideration for the classification of the total foodgrain production into two different bands so the effect of the operated area on the two-production band i.e. small and large, cannot be eliminated from the Trend analysis. However, the production forecasting also has been found to be up-surging in case of large band of production with the grater magnitude as compared to the small band production. Higher the production higher the economies of scale can be achieved through the production process. Hence, the holding will be recognized as the economic holding with the area operated of more than two hectares as the

production trend for above the two-hectare land is relatively lesser flatter. ARMA model precisely explicates the trend and forecast for the foodgrain production executing under the two band production i.e. small band production and large band production. Therefore, Dr. Ambedkar's approach of the collective or joint farming through the consolidation of land that eventually stresses the enlargement of the agricultural land has observed to be pertinent in Indian context. This may be an appropriate line of approach which economically helps the marginal and small farmers of India in order to raise the production of small farms with 2 hectares of agricultural land. The consolidation or joint farming will expand the area without its unnecessary wastage in order to make fencing, the adjacent area will also be able to utilize efficiently. Moreover, the technological farm support with its adaption at the grater intensity would become possible for the marginal and small farmers. Therefore, the large area operated more than two hectares may be considered as an economic holding as it acts as to stimulate production and large-scale economies to the farmers too. Hence, Dr. Ambedkar theoretical line of approach is pertinent and has perceived to be practical in modern time. Even in 2015 NITI Aayog also making manifestation to raise the productivity and thinking for the collective farming in India that inculcate the seeds of profitability for the marginal and small farmers in particular.

References

1. Aayog, N. I. T. I. (2015). Raising agricultural productivity and making farming remunerative for farmers.
2. Aayog, N. I. T. I. (2016). Report of the Expert Committee on Land Leasing. *New Delhi*, *6*.
3. Abraham, P. (2002). Notes on Ambedkar's Water Resources Policies. *Economic and Political Weekly*, 4772-4774.
4. Brady, M. P., & Sohngen, B. (2008, July). Agricultural Productivity, Technological Change, and Deforestation: A Global Analysis. In *AAEA Annual Meeting, Orlando, FL* (pp. 27-29).
5. Chand, R., Prasanna, P. L., & Singh, A. (2011). Farm size and productivity: Understanding the strengths of smallholders and improving their livelihoods. *Economic and Political Weekly*, 5-11.
6. Balanagammal, D., Ranganathan, C. R., & Sundaresan, K. (2000). Forecasting of agricultural scenario in Tamilnadu: A time series analysis. *Journal of Indian Society of Agricultural Statistics*, *53*(3), 273-286.
7. Gautam, M., & Yu, B. (2015). Agricultural productivity growth and drivers: a comparative study of China and India. *China Agricultural Economic Review*, *7*(4), 573-600.
8. Goi, N. A. (2016). *Raising Agricultural Productivity and Making Farming Remunerative for Farmers* (No. id: 8429).
9. Granberg, L. (1986). Small production and state intervention in agriculture. *Acta Sociologica*, *29*(3), 243-253.
10. Mann, H. B. (1945). Nonparametric tests against trend. *Econometrica: Journal of the Econometric Society*, 245-259.
11. Haque, T. (2012). Impact of land leasing restrictions on agricultural efficiency and equity in India. *An unpublished paper*.
12. Ioffe, G., Nefedova, T., & Zaslavsky, I. (2004). From spatial continuity to fragmentation: the case of Russian farming. *Annals of the Association of American Geographers*, *94*(4), 913-943.
13. Suresh, K. K., & Priya, S. K. (2011). Forecasting sugarcane yield of Tamilnadu using ARIMA models. *Sugar Tech*, *13*(1), 23-26.

14. K. P. Chandran & Prajneshu,, "Nonparametric regression with jump points methodology for describing country's oilseed yield data," *Journal of the Indian Society of Agricultural Statistics*, vol. 59, no. 2, pp. 126–130, 2005.
15. Kadapatti, R. G., & Bagalkoti, S. T. (2014). Small Farms and Agricultural Productivity-A Macro Analysis. *International Journal of Social Science Studies*, *2*(3), 123-135.
16. Kannan, E., & Sundaram, S. (2011). *Analysis of trends in India's Agricultural Growth*. Institute for Social and Economic Change.
17. Maske, M., & Jain, B. C. (2013). Compound growth rate (CGR) of area, production and productivity of papaya in Raipur district of Chhattisgarh. *International Journal of Agriculture, Environment and Biotechnology*, *6*(1), 139-143.
18. Masterson, T. (2007). Productivity, technical efficiency, and farm size in Paraguayan agriculture.
19. Mathur, A. S., Das, S., & Sircar, S. (2006). Status of agriculture in India: trends and prospects. *Economic and political weekly*, 5327-5336.
20. Maynard, J. (1936). Collective Farming in the USSR. *The Slavonic and East European Review*, *15*(43), 47-69.
21. Mondal, P., & Basu, M. (2009). Adoption of precision agriculture technologies in India and in some developing countries: Scope, present status and strategies. *Progress in Natural Science*, *19*(6), 659-666.
22. N. Saeed, A. Saeed, M. Zakria, and T. M. Bajwa, "Forecasting of wheat production in Pakistan using ARIMA models," *International Journal of Agricultural Biology*, vol. 2, no. 4, pp. 352–353,2000.
23. O'Leary, G., & Watson, A. (1982). The production responsibility system and the future of collective farming. *The Australian Journal of Chinese Affairs*, (8), 1-34.
24. Balasubramanian, P., & Dhanavanthan, P. (2002). Seasonal modeling and forecasting of crop production. *Statistics and Applications*, *4*(2), 107-118.
25. P. K. Sen, "Estimates of the regression coefcient based on Kendall's tau," *Journal of American Statistical Association*, vol. 39, pp. 1379–1389, 1968.
26. Rajaraman, I., & Datta, A. (2003). Univariate forecasting of state-level agricultural production. *Economic and Political weekly*, 1800-1803.

27. Hirsch, R. M., & Slack, J. R. (1984). A nonparametric trend test for seasonal data with serial dependence. *Water Resources Research*, *20*(6), 727-732.
28. Rausser, G. C., Chalfant, J. A., Love, H. A., & Stamoulis, K. G. (1986). Macroeconomic linkages, taxes, and subsidies in the US agricultural sector. *American Journal of Agricultural Economics*, *68*(2), 399-412.
29. Russell, J. (1942). Collective Farming in Russia and the Ukraine. *Science (New York, NY)*, *96*(2481), 47.
30. Srivastava, S. C., Sharma, U. C., Singh, B. K., & Yadava, H. S. (2012). A profile of Garlic production in India: Facts, trends and opportunities. *International Journal of Agriculture, Environment and Biotechnology*, *5*(4), 477-482.
31. Sarika, M. I., & Chattopadhyay, C. (2011). Modelling and forecasting of pigeonpea (Cajanus cajan) production using autoregressive integrated moving average methodology. *Indian Journal of Agricultural Sciences*, *81*(6), 520-523.
32. SHARMA, L. (2015). DR. AMBEDKAR'S VISION ON INDIAN FARMING. *CLEAR International Journal of Research in Commerce & Management*, *6*(1).
33. Thapa, S. (2007). The relationship between farm size and productivity: empirical evidence from the Nepalese mid-hills.
34. V. K. Boken, "Forecasting spring wheat yield using time series analysis: a case study for the Canadian prairies," *Agronomy Journal*, vol. 92, no. 6, pp. 1047–1053, 2000.
35. Venkatasubramanian, K. (2000). Land reforms remain an unfinished business. *Planning Commission Discussion Paper. Government of India, New Delhi*.
36. Oldenburg, P. (1990). Land consolidation as land reform, in India. *World Development*, *18*(2), 183-195.

Tables and Figures

Table: 3.1 Number of Operational Farm (in '000)

Year	1970-71	1976-77	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2015-16
Marginal	36200	44523	50122	56147	63389	71179	75408	83694	92826	99858
Small	13432	14728	16072	17922	20092	21643	22695	23930	24779	25777
Semi-Medium	10681	11666	12455	13252	13923	14261	14021	14127	13896	13776
Medium	7932	8212	8068	7916	7580	7092	6577	6375	5875	5485
Large	2766	2440	2166	1918	1654	1404	1230	1096	973	831

Source: Agriculture Census 2015

Fig: 3.1 Number of Operational Farm (Holdings)

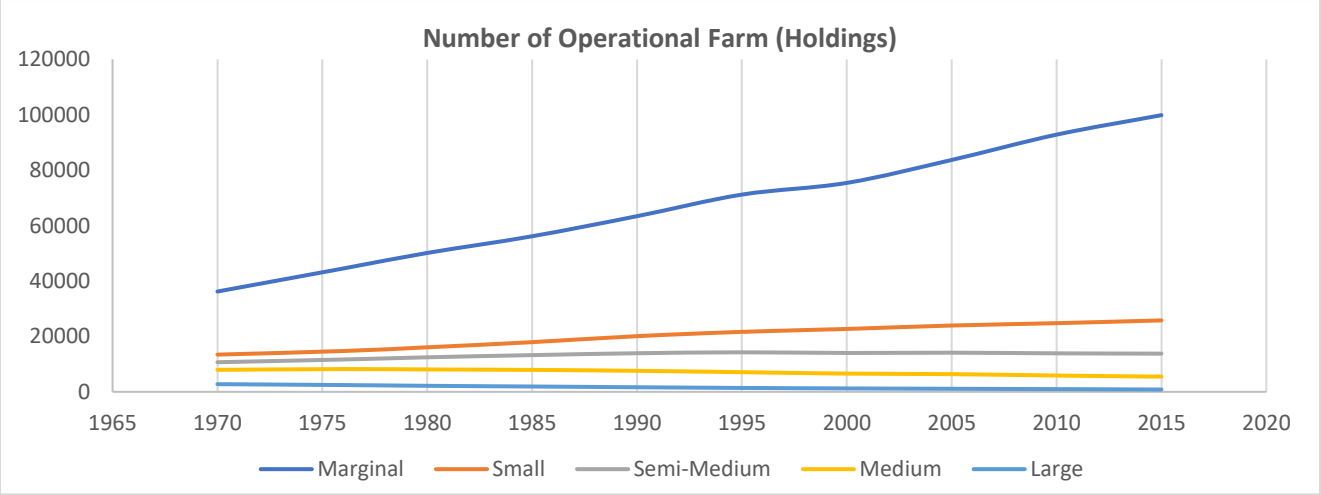


Table: 3.2 Area Operated by Operational Farms in India (in '000 ha.)

Year	1970-71	1976-77	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2015-16
Marginal	14599	17509	19735	22042	24894	28121	29814	32026	35908	37960
Small	19282	20905	23169	25708	28827	30722	32139	33101	35244	36435
Semi-Medium	29999	32428	34645	36666	38375	38953	38193	37898	37705	37168
Medium	48234	49628	48543	47144	44752	41398	38217	36583	33828	31367
Large	50064	42873	37705	33002	28659	24160	21072	18715	16907	14212

Source: Agriculture Census 2015

Fig: 3.2 Area Operated by Operational Farms in India

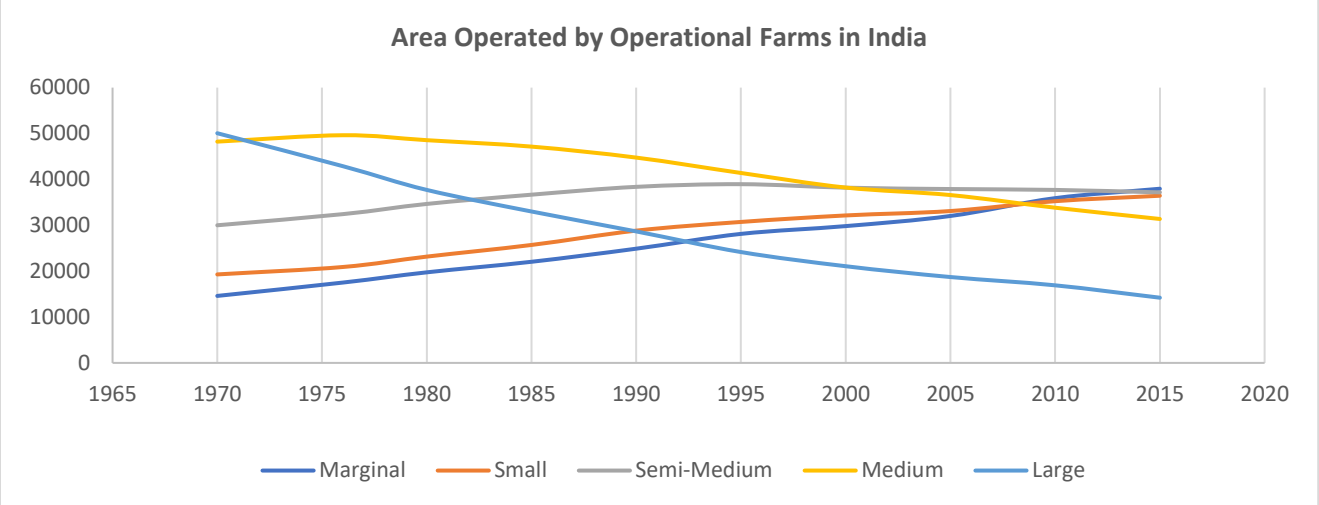


Table: 3.3 Average size of operational Farms (in ha.)

Farm size	1970-71	1976-77	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2015-16
Marginal	0.4	0.39	0.39	0.39	0.39	0.4	0.4	0.38	0.39	0.38
Small	1.44	1.42	1.44	1.43	1.43	1.42	1.42	1.38	1.42	1.41
Semi-Medium	2.81	2.78	2.78	2.77	2.76	2.73	2.72	2.68	2.71	2.7
Medium	6.08	6.04	6.02	5.96	5.9	5.84	5.81	5.74	5.76	5.72
Large	18.1	17.57	17.41	17.21	17.33	17.2	17.12	17.08	17.38	17.1
All Sizes	**2.28**	**2**	**1.84**	**1.69**	**1.55**	**1.41**	**1.33**	**1.23**	**1.15**	**1.08**

Source: Agriculture Census 2015

Fig: 3.3 Average size of operational Farms (Average in ha.)

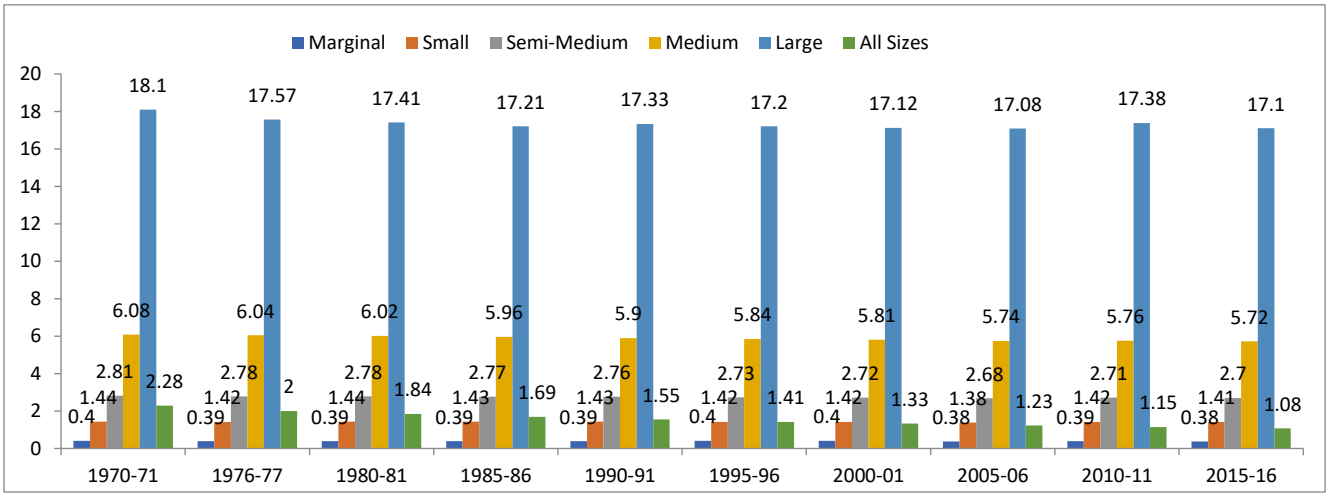
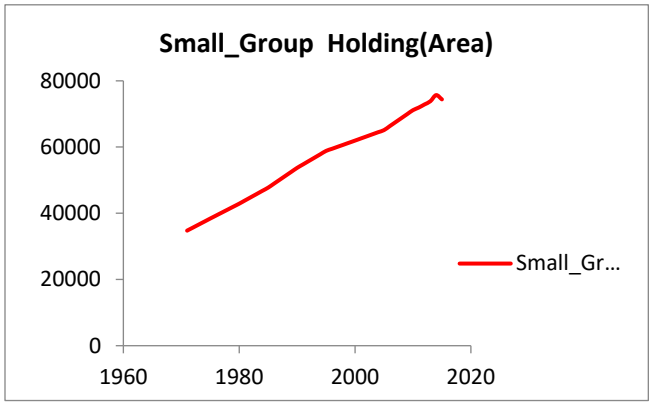


Table: 3.4 Descriptive Statistics of Area Operated under Two Group Holdings in India

Land Band	Mean	Median	Minimum	Maximum	Standard Deviation
Small_Area	55410.5	56794.2	34755.6	75692	12151.7
Large_Area	106616.5	107422.8	82747	127623.4	14047.4

Source: Agriculture Census 2015

Fig: 3.4 Area Operated Under Two Group of Holdings in India



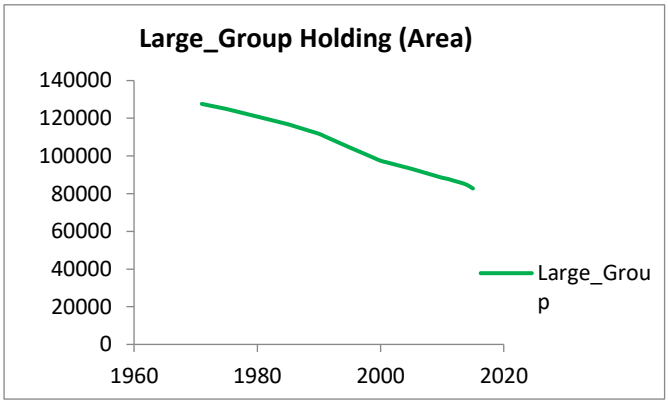
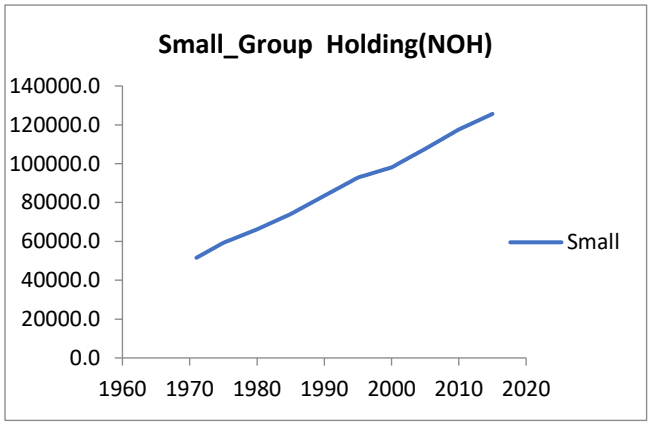


Table: 3.5 Number of Holdings Operated Under Two Group Holdings in India ('000)

Land Band	Mean	Median	Minimum	Maximum	Standard Deviation
Small_NOH	88264.9	89085.6	51555.8	125635	21939
Large_NOH	22086.6	22318	20092	23157	902.3

Source: Agriculture Census 2015

Fig: 3.5 Number of Holdings Operated Under Two Group Holdings in India



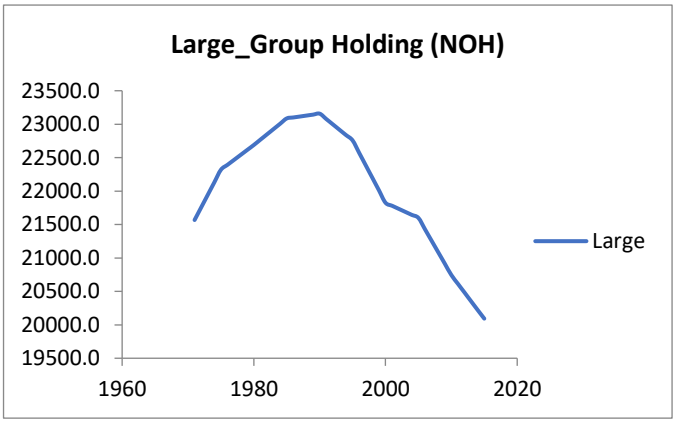
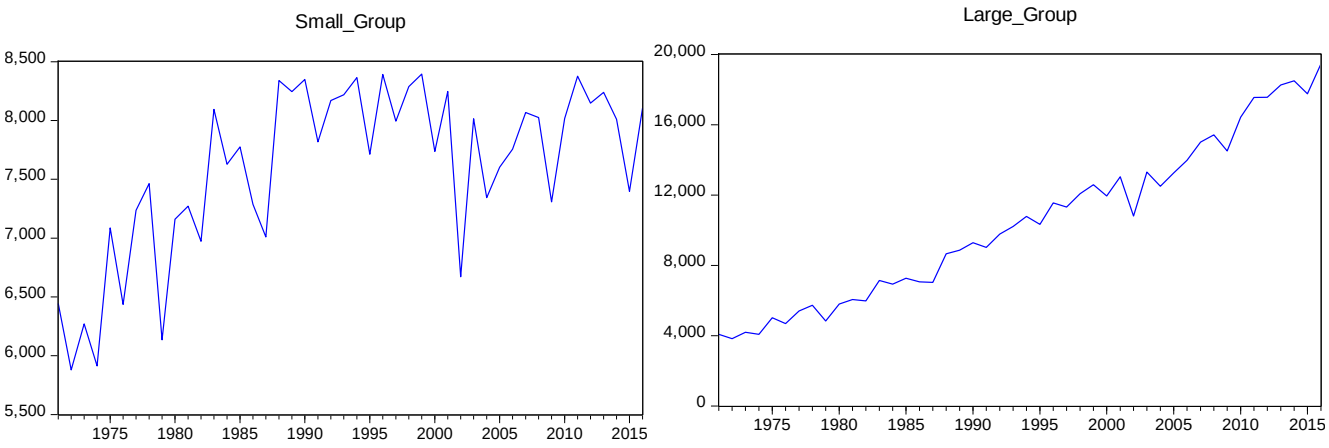


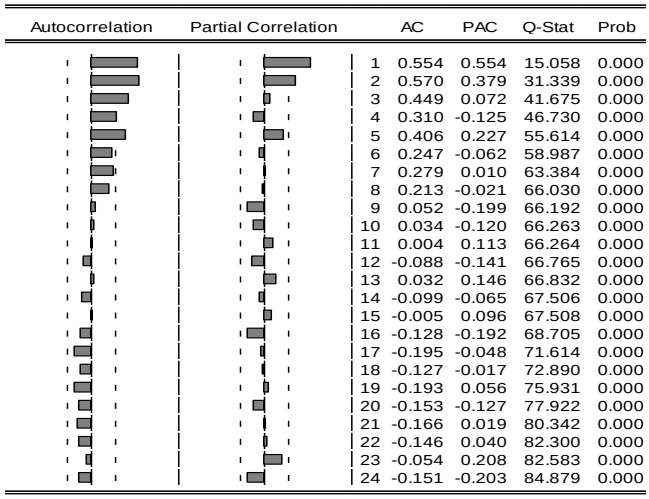
Fig: 3.6 Graph Plot for Small & Large Band



Source: Author Calculation

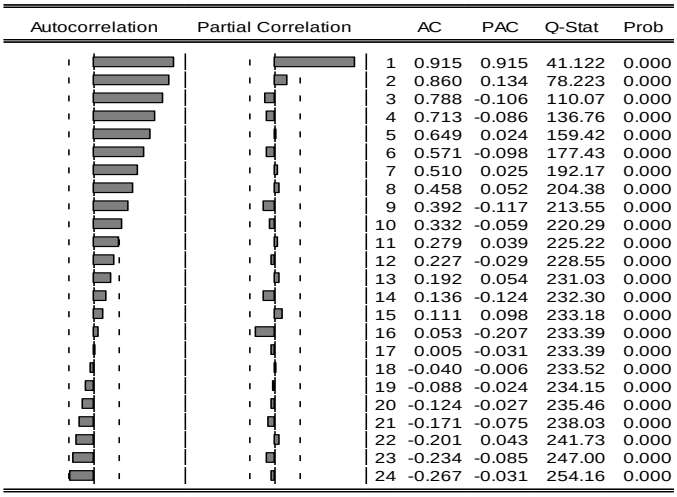
Fig: 3.7 Correlogram for Small & Large Band

(Small Group)



	AC	PAC	Q-Stat	Prob
1	0.554	0.554	15.058	0.000
2	0.570	0.379	31.339	0.000
3	0.449	0.072	41.675	0.000
4	0.310	-0.125	46.730	0.000
5	0.406	0.227	55.614	0.000
6	0.247	-0.062	58.987	0.000
7	0.279	0.010	63.384	0.000
8	0.213	-0.021	66.030	0.000
9	0.052	-0.199	66.192	0.000
10	0.034	-0.120	66.263	0.000
11	0.004	0.113	66.264	0.000
12	-0.088	-0.141	66.765	0.000
13	0.032	0.146	66.832	0.000
14	-0.099	-0.065	67.506	0.000
15	-0.005	0.096	67.508	0.000
16	-0.128	-0.192	68.705	0.000
17	-0.195	-0.048	71.614	0.000
18	-0.127	-0.017	72.890	0.000
19	-0.193	0.056	75.931	0.000
20	-0.153	-0.127	77.922	0.000
21	-0.166	0.019	80.342	0.000
22	-0.146	0.040	82.300	0.000
23	-0.054	0.208	82.583	0.000
24	-0.151	-0.203	84.879	0.000

(Large Group)



	AC	PAC	Q-Stat	Prob
1	0.915	0.915	41.122	0.000
2	0.860	0.134	78.223	0.000
3	0.788	-0.106	110.07	0.000
4	0.713	-0.086	136.76	0.000
5	0.649	0.024	159.42	0.000
6	0.571	-0.098	177.43	0.000
7	0.510	0.025	192.17	0.000
8	0.458	0.052	204.38	0.000
9	0.392	-0.117	213.55	0.000
10	0.332	-0.059	220.29	0.000
11	0.279	0.039	225.22	0.000
12	0.227	-0.029	228.55	0.000
13	0.192	0.054	231.03	0.000
14	0.136	-0.124	232.30	0.000
15	0.111	0.098	233.18	0.000
16	0.053	-0.207	233.39	0.000
17	0.005	-0.031	233.39	0.000
18	-0.040	-0.006	233.52	0.000
19	-0.088	-0.024	234.15	0.000
20	-0.124	-0.027	235.46	0.000
21	-0.171	-0.075	238.03	0.000
22	-0.201	0.043	241.73	0.000
23	-0.234	-0.085	247.00	0.000
24	-0.267	-0.031	254.16	0.000

Source: Author Calculation

Table: 3.6 Augmented Dickey Fuller for Small Band

Null Hypothesis: SMALL_GROUP has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.686636	0.0844
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMALL_GROUP(-1)	-0.320763	0.119392	-2.686636	0.0104
D(SMALL_GROUP(-1))	-0.446090	0.128745	-3.464915	0.0013
C	2501.415	910.5249	2.747224	0.0089

R-squared	0.449418	Mean dependent var	50.62054
Adjusted R-squared	0.422560	S.D. dependent var	655.9682
S.E. of regression	498.4666	Akaike info criterion	15.32670
Sum squared resid	10187226	Schwarz criterion	15.44835
Log likelihood	-334.1873	Hannan-Quinn criter.	15.37181
F-statistic	16.73334	Durbin-Watson stat	2.249705
Prob(F-statistic)	0.000005		

Table: 3.7 Augmented Dickey Fuller for Large Band

Null Hypothesis: LARGE_GROUP has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.836705	0.9936
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LARGE_GROUP(-1)	0.020874	0.024947	0.836705	0.4076
D(LARGE_GROUP(-1))	-0.621577	0.129856	-4.786652	0.0000
C	332.7592	276.1896	1.204822	0.2352

R-squared	0.358553	Mean dependent var	355.4022
Adjusted R-squared	0.327263	S.D. dependent var	860.7419
S.E. of regression	705.9853	Akaike info criterion	16.02281
Sum squared resid	20435027	Schwarz criterion	16.14446
Log likelihood	-349.5019	Hannan-Quinn criter.	16.06793
F-statistic	11.45898	Durbin-Watson stat	2.266580
Prob(F-statistic)	0.000111		

Fig: 3.8 Graph Plot for Small & Large Band

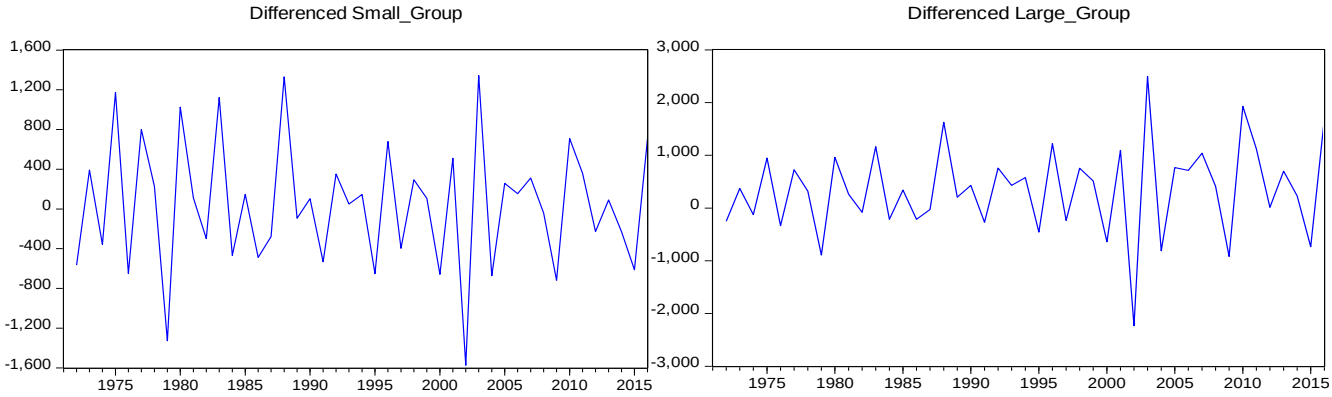


Fig: 3.9 Correlogram for Small & Large Band

(Small Group)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.581	-0.581	16.232	0.000
		2	0.170	-0.253	17.657	0.000
		3	-0.011	-0.055	17.664	0.001
		4	-0.214	-0.332	20.034	0.000
		5	0.261	-0.087	23.632	0.000
		6	-0.176	-0.083	25.303	0.000
		7	0.151	0.043	26.568	0.000
		8	0.012	0.159	26.577	0.001
		9	-0.116	0.079	27.363	0.001
		10	0.028	-0.072	27.411	0.002
		11	0.059	0.129	27.630	0.004
		12	-0.182	-0.158	29.742	0.003
		13	0.256	0.024	34.081	0.001
		14	-0.227	-0.121	37.589	0.001
		15	0.188	0.047	40.088	0.000
		16	-0.072	0.011	40.469	0.001
		17	-0.104	-0.033	41.283	0.001
		18	0.159	-0.035	43.260	0.001
		19	-0.115	0.096	44.332	0.001
		20	0.018	-0.105	44.358	0.001
		21	0.000	-0.130	44.358	0.002
		22	-0.104	-0.298	45.358	0.002
		23	0.242	0.100	50.965	0.001
		24	-0.134	0.078	52.771	0.001

(Large Group)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.569	-0.569	15.584	0.000
		2	0.196	-0.189	17.478	0.000
		3	-0.042	-0.026	17.568	0.001
		4	-0.088	-0.140	17.971	0.001
		5	0.176	0.077	19.606	0.001
		6	-0.166	-0.017	21.105	0.002
		7	0.226	0.186	23.944	0.001
		8	-0.147	0.103	25.175	0.001
		9	-0.009	-0.057	25.180	0.003
		10	-0.014	-0.145	25.193	0.005
		11	0.084	0.072	25.633	0.007
		12	-0.197	-0.246	28.123	0.005
		13	0.257	0.070	32.496	0.002
		14	-0.231	-0.092	36.121	0.001
		15	0.176	0.093	38.305	0.001
		16	-0.094	0.037	38.950	0.001
		17	-0.066	-0.045	39.283	0.002
		18	0.181	0.018	41.837	0.001
		19	-0.137	0.156	43.371	0.001
		20	0.073	-0.093	43.817	0.002
		21	-0.061	-0.042	44.148	0.002
		22	-0.028	-0.167	44.219	0.003
		23	0.180	0.221	47.322	0.002
		24	-0.096	0.143	48.245	0.002

Table: 3.8 Augmented Dickey Fuller for Small Band

Null Hypothesis: D(SMALL_GROUP) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.85289	0.0000
Test critical values:	1% level	-2.618579	
	5% level	-1.948495	
	10% level	-1.612135	

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SMALL_GROUP(-1))	-1.591896	0.123855	-12.85289	0.0000

R-squared	0.793335	Mean dependent var	28.94594
Adjusted R-squared	0.793335	S.D. dependent var	1169.671
S.E. of regression	531.7373	Akaike info criterion	15.41264
Sum squared resid	12158015	Schwarz criterion	15.45319
Log likelihood	-338.0781	Hannan-Quinn criter.	15.42768
Durbin-Watson stat	2.268863		

*MacKinnon (1996) one-sided p-values.

Table: 3.9 Augmented Dickey Fuller for Large Band

Null Hypothesis: D(LARGE_GROUP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.55846	0.0000
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LARGE_GROUP(-1))	-1.604309	0.127747	-12.55846	0.0000
C	543.3742	113.2506	4.797983	0.0000

R-squared	0.789700	Mean dependent var	44.34951
Adjusted R-squared	0.784693	S.D. dependent var	1516.039
S.E. of regression	703.4601	Akaike info criterion	15.99429
Sum squared resid	20783956	Schwarz criterion	16.07539
Log likelihood	-349.8743	Hannan-Quinn criter.	16.02436
F-statistic	157.7149	Durbin-Watson stat	2.214139
Prob(F-statistic)	0.000000		

*MacKinnon (1996) one-sided p-values.

Table: 3.10 Model Estimation for Small Band

Differenced Small Band Production	**ARMA**	**ARMA**	**ARMA**	**ARMA**
	(1 0)	(0,1)	(1,1,)	(1,4)
Significant Coefficients	1	1	1	1
Sigm^2	277530.4	270654.5	258123.5	272549.3
Adj. R^2	0.33	0.35	0.36	0.32
AIC	15.47	15.45	15.45	15.5
SBIC	15.55	15.53	15.57	15.63
Coefficient	-0.58***	-0.62***	-0.31	-0.57***
	(AR1)	(MA1)	(AR1)	(AR1)
			-0.44*	-0.12
			(MA1)	(MA4)
t-Statistic	-3.84	-4.5	-1.16(AR1)	-3.7
	(AR1)	(MA1)		(AR1)
			-1.99	-0.71(MA4)
			(MA1)	
Std. error	0.15	0.13	0.26	0.15
	(AR1)	(MA1)	(AR1)	(AR1)
			0.22	0.17
			(MA1)	(MA1)

Fig: 3.10 Best Fit Model for Small Band

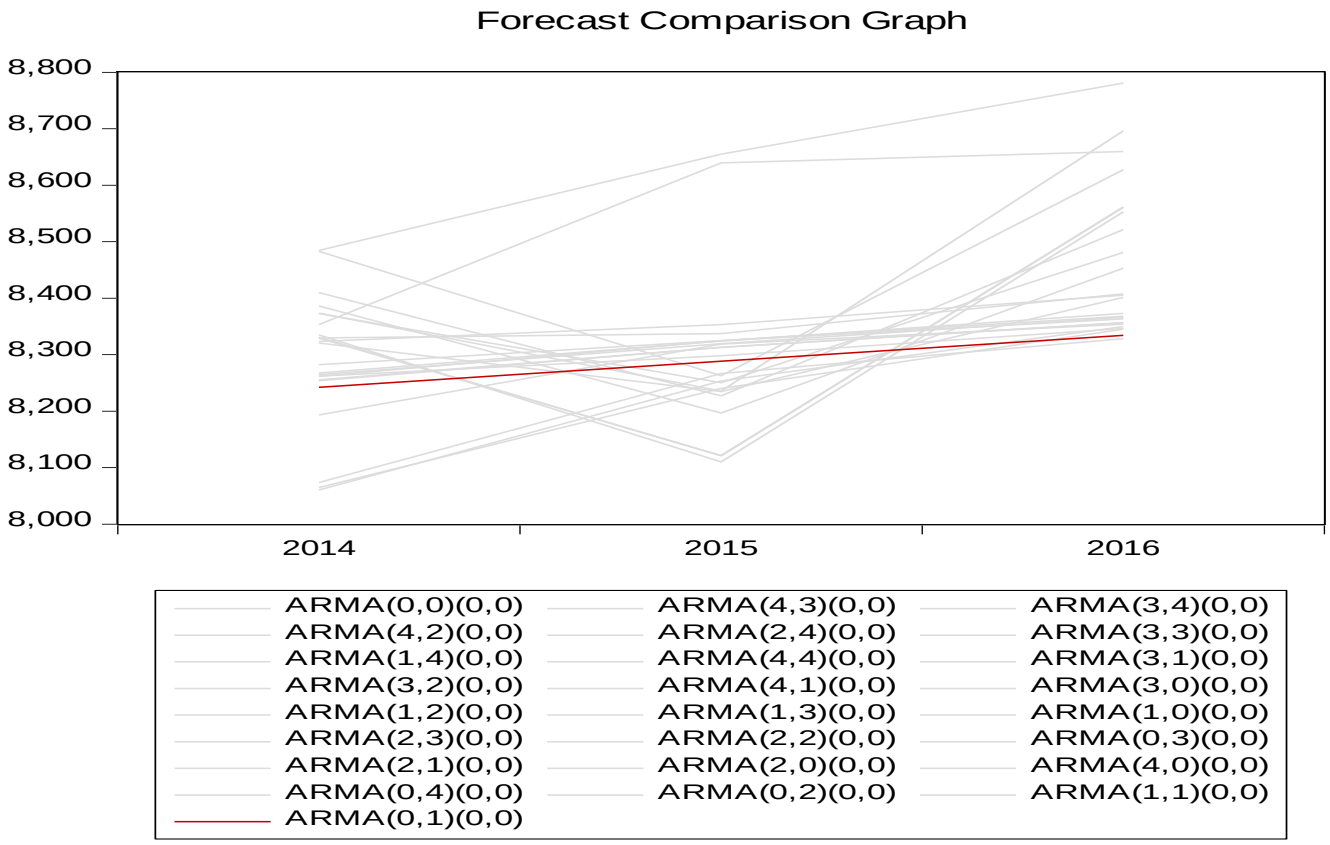


Table: 3.11 Estimation for Large Band

Differenced Large Band Production	ARMA (1 0)	ARMA (0 1)	ARMA (1 1)
Significant Coefficients	1	1	0
Sigma^2	456745.6	469997.2	443274.9
Adj. R^2	0.30	0.28	0.31
AIC	16.02	16.05	16.04
SBIC	16.14	16.17	16.20
Coefficient	-0.57*** (AR1)	-0.57*** (MA1)	-0.39 (AR1)
			-0.28 (MA1)
t-Statistic	-4.6 (AR1)	-4.04 (MA1)	-1.60 (AR1)
			-1.04 (MA1)
Std. error	0.12 (AR1)	0.14 (MA1)	0.24 (AR1)
			0.27 (MA1)

Fig: 3.11 Best Fit Model for Large Band

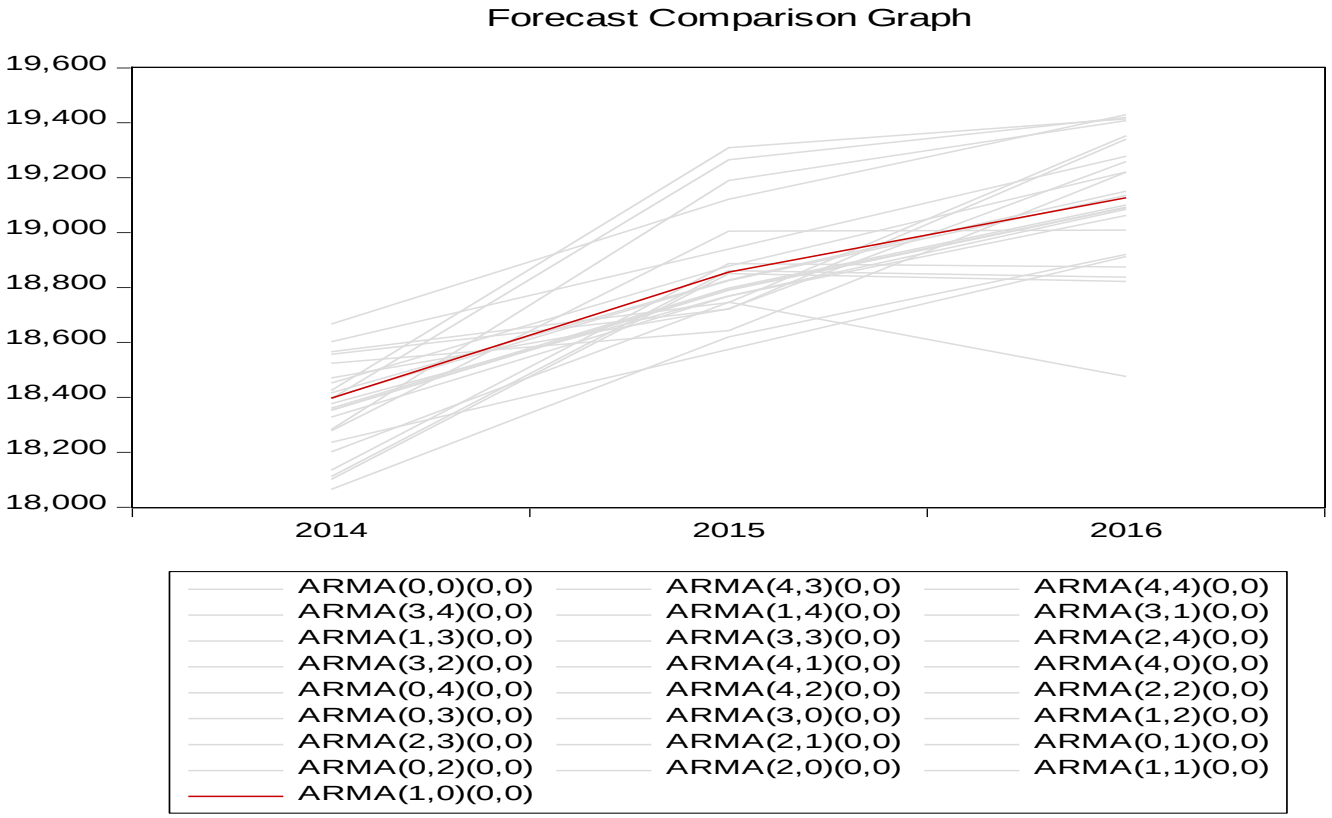


Fig: 3.12 Correlogram Re-Estimation after Best Fit Model

A. Small Band

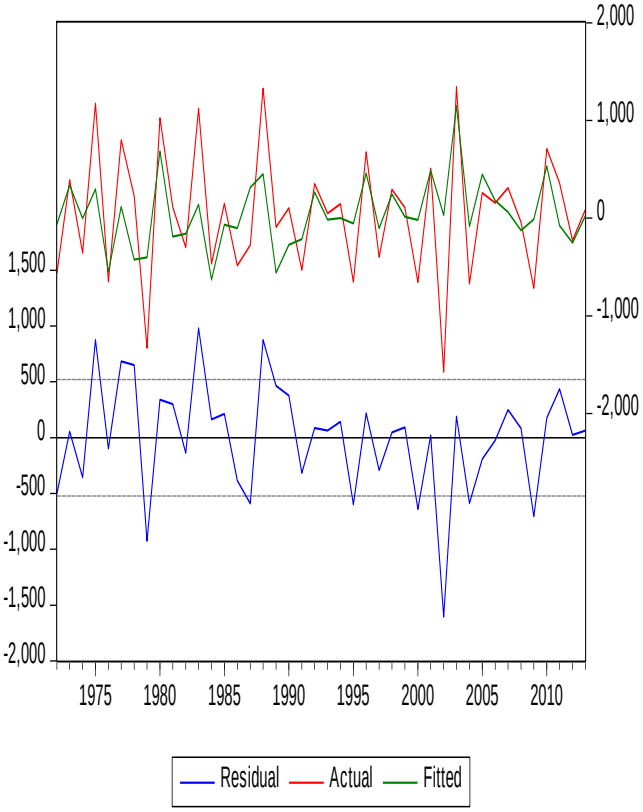
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.148	-0.148	0.9859	
		2	0.145	0.126	1.9585	0.162
		3	-0.002	0.037	1.9586	0.376
		4	-0.113	-0.132	2.5820	0.461
		5	0.241	0.216	5.4793	0.242
		6	-0.061	0.030	5.6678	0.340
		7	0.219	0.165	8.1956	0.224
		8	0.082	0.135	8.5654	0.285
		9	-0.123	-0.115	9.4192	0.308
		10	-0.041	-0.167	9.5183	0.391
		11	-0.028	0.026	9.5666	0.479
		12	-0.142	-0.220	10.815	0.459
		13	0.067	-0.052	11.104	0.520
		14	-0.122	-0.089	12.091	0.520
		15	0.096	0.066	12.717	0.549
		16	-0.060	-0.000	12.974	0.604
		17	-0.133	-0.009	14.289	0.577
		18	0.041	0.020	14.419	0.637
		19	-0.143	-0.004	16.058	0.589
		20	-0.121	-0.217	17.296	0.570
		21	-0.050	-0.095	17.520	0.619
		22	-0.060	-0.074	17.852	0.658
		23	0.193	0.190	21.470	0.492
		24	-0.153	-0.090	23.871	0.411

B. Large Band

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.099	-0.099	0.4399	
		2	-0.103	-0.114	0.9322	0.334
		3	-0.000	-0.023	0.9322	0.627
		4	0.014	-0.000	0.9416	0.815
		5	0.133	0.136	1.8314	0.767
		6	-0.160	-0.134	3.1421	0.678
		7	0.230	0.243	5.9284	0.431
		8	-0.037	-0.036	6.0030	0.539
		9	-0.193	-0.161	8.0799	0.426
		10	-0.039	-0.097	8.1674	0.517
		11	-0.028	-0.052	8.2145	0.608
		12	-0.054	-0.185	8.3969	0.677
		13	0.002	0.065	8.3970	0.753
		14	-0.029	-0.070	8.4510	0.813
		15	0.102	0.117	9.1602	0.821
		16	-0.047	0.042	9.3189	0.860
		17	-0.036	0.037	9.4130	0.895
		18	0.181	0.148	11.925	0.805
		19	-0.038	0.031	12.039	0.845
		20	-0.084	-0.179	12.628	0.857
		21	-0.068	-0.102	13.039	0.876
		22	0.089	-0.041	13.767	0.879
		23	0.261	0.238	20.376	0.560
		24	-0.102	0.035	21.446	0.554

Fig: 3.13 Actual, Fitted and Residual Plot

A. Small Band



B. Large Band

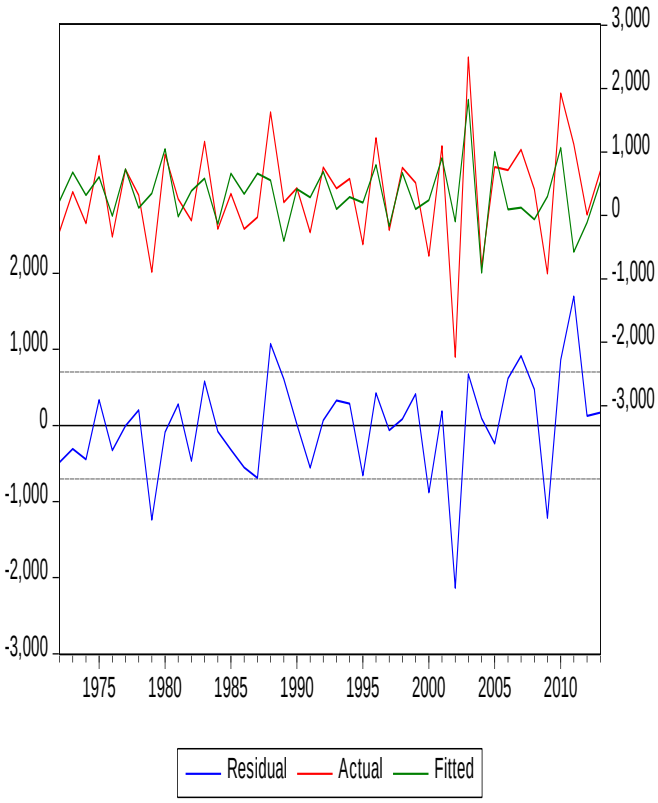
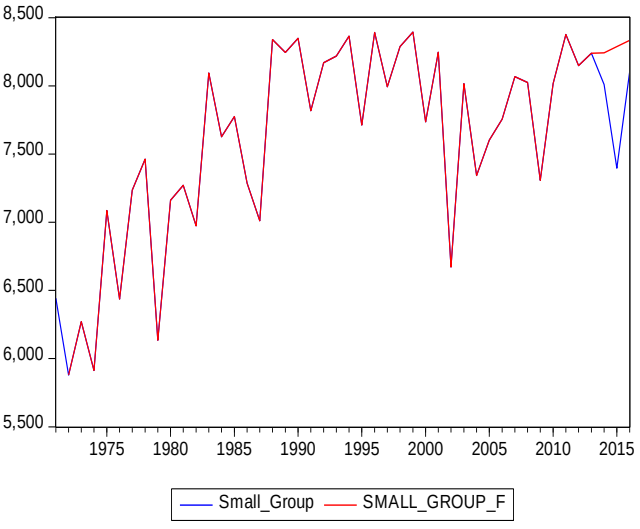


Fig: 3.14 Forecast Plot

A) Small Band



B. Large Band

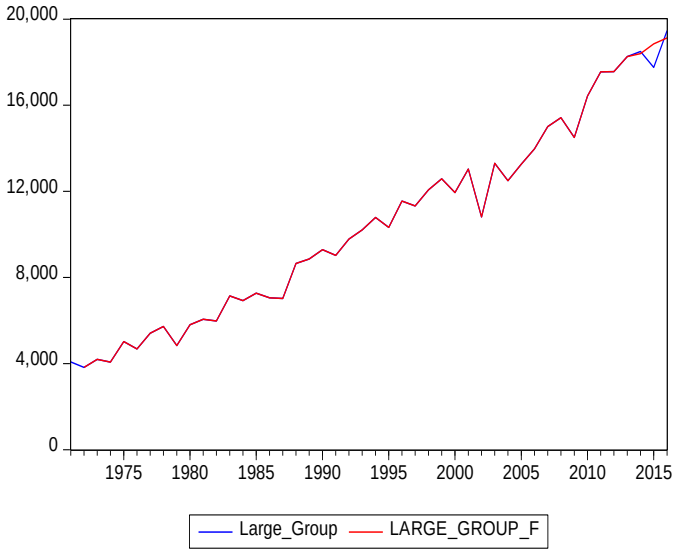


Table: 3.12 Band Wise Forecasted Values of Foodgrain Production

(In Million Tonnes)

Year	Small	Large	Total
2018	90.39062	218.5881	308.9787
2019	93.60559	228.1805	321.7861
2020	96.25197	237.0469	333.2989

Chapter-4
Profile of the Field Study Area

Uttar Pradesh is situated in northern India. Nepal is the International boundary of the state. The state is bordered by Rajasthan to West, Haryana and Delhi to the northwest, Uttarakhand to the north, Bihar to east, and Jharkhand to the southeast and Madhya Pradesh to the southwest. It covers 93,933 miles (243290 Km^2). This is the most populous state of India. It is the fifth-largest state of India. It accounts for 6.88 percent of the total area of the country. The population of the state was about 200 million as per the census of 2011, which accounted for 16.49 percent of the total population of India. Divisions namely Western (30 districts), Eastern (28 districts), Central (10 districts) and Bundelkhand (7 districts). At present, the state has 75 districts, 327 Tehsils, 822 blocks and 107452 revenue villages. There is another way of classification of Uttar Pradesh in terms of agro-climatic zones. The state is also divided into 9 agro-climatic zones- Low land Region, Western Plain Region, Central Western Region, South Western Region, Central Plain Region, Bundelkhand Region, North Eastern Plain Region, Eastern Plain Region and Vindhyachal Region. The largest Gangetic plain region is in the north it includes the Ganges, Yamuna, Doab and the Ghaghra plains. The smaller Vindhya Range and plateau region is in south. The bhabhar tract gives place to Low land area. The 5 low lands run parallel to the bhabhar in a thin strip. The entire alluvial plain is divided into three sub-regions i.e. the eastern tract consisting of 14 districts. The flood and drought are the common phenomena of this tract. The highest density of population is also found in this tract. On account of the highest density of population, the per capita availability of land is very low in comparison to other tracts of the state. The other two regions i.e. the central and western are comparatively much better and well developed to eastern and Bundelkhand regions. The irrigation facilities are also well developed in western and central regions. The cropping intensity, production and productivity of different crops of these two regions are also found much better in comparison to other regions of Uttar Pradesh. The state has more than 32 large and small rivers. The Ganges, Yamuna, Saraswati, Sarayu, Betwa and Ghaghara are larger rivers of the state. Lucknow is the

capital of Uttar Pradesh, Kanpur is the economic and industrial capital of the state. The Varanasi is famous for Banarsi sari and also famous for handicraft goods. Allahabad is the most important place for the Hindu religion due to the confluence of Ganga, Yamuna and Saraswati. Agra is also internationally well recognized for the Taj Mahal. Apart from these cities, Shravasti, Kushinagar, Chitrakoot, Jhansi, Meerut and Mathura are also important cities of the state. In recent years Ghaziabad and Noida are also emerging cities of the state. Agricultural and services industries are the most important activities of the state economy.

The agriculture sector continues to predominate and contributes a large share of the state output. Agriculture is the main source of livelihood for the majority of the population of U.P. More than 70 percent of the population of U.P. directly or indirectly depends on agriculture and allied sectors. The contribution of agriculture to total SDP was 24.11 percent at constant (1999-2000) prices for 2009-10. The GSDP from the agriculture and allied sector at constant (1999-2000) price was 602608 million in 1999-2000 which has gone up to Rs. 748134 million in 2009-10, thereby showing a 24.15 percent increase over the period. The GDP at current prices has been estimated at Rs. 862746 crores during 2013-14. The per capita income was estimated at Rs. 19233 at the constant price (2004-05) and Rs. 36250 at the current price. The NSDP was Rs. 403509 crores at 2004-05 prices against Rs. 760542 crores at the current price.

Soil Structure and Texture: Uttar Pradesh is the very broad state of India. Therefore, the soil texture varies from district to district. There are different kinds of soils across the state. There is a wide variation in the characteristics and properties of the soil in the state. However, on the basis of certain common features, the soil of the state is divided into following broad groups. Loam soil, Sandy loam, sandy soil, alluvial soil, rocky soil, stony soil, saline and alkaline clay loam, etc. The major Crops are the rice, wheat, bajra, barley and maize in the state. Out of the total Gross Cropped Area, 258.22 Lakh hectares during 2012-13 in U.P. wheat accounted for the highest share being 37.90 percent followed by 22.83 percent, 3.57 percent, 2.68 percent, 0.69 percent and 0.64 percent of rice, bajra, maize, jowar and barley respectively. Among the pulses gram, urad, arhar and moong are major pulses in U.P. Out of total GCA of 258.22 Lakh hectares during 2014-15 in U.P. The gram had occupied a maximum share of 2.38 percent followed by 2.11 percent, 1.30 percent and 0.32 percent of urad, arhar and moong respectively. Mustard / lahi, groundnut, sunflower, soybean are important oilseed crops of the state. The Gross Cropped

Area mustard had occupied maximum share being 3.05 percent followed by 0.34 percent and 1.63 percent of groundnut and other oilseeds respectively during the same period. The average production of wheat was 32.17 qtls per hectares in 2014-15 while the average production of barley, rice, bajra, maize and jowar was 28.25 qtls., 24.53 qtls., 19.52 qtls., 18.53 qtls., and 13.50 qtls, per hectare during 2012-13 in U.P. The average production of gram, arhar, moong and urd was 11.25 qtls., 13 10.47 qtls., 5.06 qtls. and 6.63 qtls., per hectare during 2014-15. The average production of mustard was 12.63 qtls. followed by 10.15 qtls. of groundnut per hectare during 2014-15 in U.P. (Ramendu Roy & Hasib Ahmad, 2015**)**

Land Ceiling Limit: After the abolition of Zamindari Act in Uttar Pradesh, the land ceiling limit had been fixed across the state. On the recommendation of Agrarian Reform Committee, the land ceiling limit had come into force in 1952 in Uttar Pradesh. The land ceiling limit in Uttar Pradesh was based on availability of irrigation facilities. The 18 acres land ceiling limit was fixed in irrigated land with two crops while 27 acres land ceiling limit was fixed in irrigated land with one crop. In the case of dry land regions, 45 acres of ceiling limit was fixed in Uttar Pradesh.

It is witnessed in the growth rate (Net State Domestic Product) analysis for agriculture sector across states varies from (-) 1.15 per cent in Kerala to 5.91 per cent in Chattisgarh. The states like Madhya Pradesh, Karnataka, Rajasthan, Jharkhand and Chattisgarh achieved more than 5 per cent annual growth rate in agriculture, and Gujarat, Tamil Nadu, Maharashtra and Andhra Pradesh, exceeded the national target of agriculture growth. Haryana, recorded close to 4 per cent annual growth in NSDP agriculture even with high level of productivity. In east India, both Assam and Bihar recorded more than 3 per cent annual growth. Uttar Pradesh and Odisha are still stuck in low growth trap. The state of Punjab comes at the bottom in the list of states which recorded positive growth in agriculture, with only 1.5 per cent annual growth. In the North West Himalayan region, agriculture growth rate in Jammu & Kashmir and Uttarakhand was around 2 per cent whereas agriculture was stagnant in the state of Himachal Pradesh. In West Bengal, agriculture sector was growing at about 2 per cent per annum. Agriculture sector was found to be shrinking in the state of Kerala (Ramesh Chand, 2014).

Overview of the state-wise Net State Domestic Product supports the observations for Uttar Pradesh growth rate (table 4.1) of agriculture sector. It shows that Uttar Pradesh is really stuck in the low growth trap. Table expounds the growth rate among the three-sector of Uttar Pradesh

economy from 1950- 51 to 2015-16. The sluggish growth rate has been observed especially under the agriculture sector followed by the industrial and service sector. The scenario was slightly different, till1997-98; the industrial sector with a growth rate of around 6.9 percent leading to the first place followed by the service sector growth rate of around 5.4 percent and agriculture sector growth rate of around 2.5 percent in Uttar Pradesh. Further, the growth rate in agriculture from 1998 to 2008 was around 1.9 percent whereas the tertiary and industrial sector has the growth rate of around 3.6 percent and 5.8 percent respectively. Lastly, during the 2009-2015 agriculture sector have the growth rate of around 2.1 percent while the growth rate of the industrial and service sectors is relatively higher than the agriculture sector of around 3.2 percent and 7.6 percent respectively. Hence this is clear from the table that the agriculture sector growth rate is slightly stagnant with the lower percentage share in the sectoral composition of Uttar Pradesh. The creeping pace of the agriculture sector has become a key feature of the agriculture economy. Being the second-largest economy in India, the agriculture growth of Uttar Pradesh is not bouncing at its full efficiency.

The number of operational holdings in Uttar Pradesh is inclining whereas the area operated under it has been decreasing. Table 4.2 exhibits that maximum operational holdings come under the marginal group followed by small, semi-medium, medium and large groups of holdings. The total number of holdings in 2015-16 is around 23822 thousand while in 2010 it was around 23325 thousand. Besides this, the area operated is deteriorated as it declines from 17622 thousand hectares to the 17450 thousand hectares in Uttar Pradesh. Uttar Pradesh is dominated by the number of marginal landholdings possessed area operated of less than one hectares, and this fact itself divulges the fragmentation of land scenario in Uttar Pradesh.

Regional Profile of Uttar Pradesh: More than 66 percent of the workforce in the state depends on agriculture as a means of livelihood. Again, while the nonagricultural sector contributed 64 percent to SDP, only 34 percent of the workforce could be accommodated by the non-agricultural sector of the state economy and this is precisely responsible for aggravating the rural-urban gap and regional disparities within the state (statistical abstract 2014). The Western Region has always occupied a better position as compared to the other regions due to the fact that in the region, the contribution of the primary sector in the Net District Domestic Product in the Western Region is better than that of other regions. The main cause of Western Region being

ahead is the contribution of the primary sector in Regional Domestic Income. In respect of total income, the Bundelkhand Region has the lowest position but in respect of per capita income, the Eastern Region has occupied the lowest level. Not only this, Bundelkhand Region has a higher per capita income than Eastern Region due to the lower population size in Bundelkhand Region even with the lowest level of total income as compared to the other regions (Statistical Diary, 2016).

The Eastern Region of Uttar Pradesh: Eastern region is a geographic region of northern India, which comprises the eastern end of Uttar Pradesh and the western end of Bihar. It is bounded by Nepal to the north, Indian state Bihar to the east, Bagelkhand region of Madhya Pradesh state to the south, the Awadh region of Uttar Pradesh to the west and the end of Lower Doab (the Kanpur-Fatehpur-Allahabad region) in Uttar Pradesh to its southwest. It lies on the Indo-Gangetic plain, and together with western Bihar is the most densely populated area in the world. The rich quality of its soil and the high earthworm density in the soil as opposed to adjoining districts of Uttar Pradesh makes the region favorable for agriculture. Most of the countryside is given to intensive agriculture. Bhojpuri is the predominant language or dialect in the region, in addition to Hindi, although Awadhi and Baghelkhandi are also spoken in the western and southern areas. As per the census 2011, the total population in this region is 9, 91,730. A large population, slow economic growth with creped agricultural mechanization put some serious obstruction in the advancement of this particular region of Uttar Pradesh. Furthermore, the region comprises of sugar mills have provided employment, but the unrest among laborers led to increasing unemployment, social and political discontent, and some further unrest also has persistence in the region.

The Western Region of Uttar Pradesh: Western Uttar Pradesh is a region in India that comprises the western districts of Uttar Pradesh state, including the areas of Rohilkhand and Braj. The region has some demographic, economic and cultural patterns that are distinct from other parts of Uttar Pradesh. Western Uttar Pradesh has experienced rapid economic growth, due to the successes of the Green Revolution. A major part of western Uttar Pradesh is a part of the National Capital Region of India. In the western districts of Uttar Pradesh viz. Saharanpur, Meerut, Muzaffarnagar, Bijnor, Moradabad, Pilibhit and Bareilly, the soil is typically the same. It is, generally, deep brown and loamy in some places, also mixed with sand.

The soil is shallow, gravely and full of stones – being generally acidic. Besides this, in the western plains (Saharanpur, Meerut and Muzaffarnagar) the soil is deeper and fertile. This texture of soil acts as prime natural assistance to the farmers in order to produce agriculture output. As per the 2011 Census, the total population of Western Uttar Pradesh is 71,217,132, out of which 72.29% is Hindu and 26.21% is Muslim.

The Central Region of Uttar Pradesh: Entire Uttar Pradesh is conveniently playing a suitable confluence for Agrarian production and growth. The third region is called as a central region of Uttar Pradesh. The region receives on an average 979 mm of rainfall; the climate ranges from dry sub-humid to semi-arid and the soil is alluvium calcareous sandy loam. About 62% of the land is cultivated and out of which 56% is irrigated area in this region. Moreover, that central region is the only region which has been going ahead in the manufacturing and service sector as well. As the Capital of Uttar Pradesh lies under this region so the distribution of resources in this region is used to be higher as compared to the remaining three regions of Uttar Pradesh western, eastern and Bundelkhand respectively. Industrial units for sugarcane, Jaggery, leather, handicrafts are well built-in some cities of central region (Nomita Kumar, 2014).

Bundelkhand Region of Uttar Pradesh: Bundelkhand rests between the Indo-Gangetic Plain to the north and the Vindhya Range to the south. It is a gently sloping upland, distinguished by barren hilly terrain with sparse vegetation, although it was historically forested. The plains of Bundelkhand are intersected by three mountain ranges, the Vindhya, Fauna, and Bander chains, has highest elevation not exceeding 600 meters above sea-level. Beyond these ranges, the country is further diversified by isolated hills rising abruptly from a common level, and presenting from their steep and nearly inaccessible scarps eligible sites for forts and strongholds of local kings. The general slope of the country is towards the northeast, as indicated by the course of the rivers which traverse or bound the territory, and finally discharge themselves into the Yamuna River. The principal rivers are the Sindh, Betwa, Shahzad River, Ken, Bagahin, Tons, Pahuj, Dhasan and Chambal. The Kali Sindh, rising in Malwa, marks the western frontier of Bundelkhand. The Yamuna and Ken are the only two navigable rivers. Notwithstanding a large number of streams, the depression of their channels and height of their banks renders them for the most part unsuitable for the purposes of irrigation, which is conducted by means of ponds and tanks. Rainwater has the capacity to cause heavy erosion of soil as it moves rapidly towards

the numerous rivers and streams (such as Ken, Betwa, Tons, Dhasan and Paisyuni) which merge ultimately into the Yamuna river. Monsoon conditions in Bundelkhand deteriorated rapidly, and villagers were hit by a triple whammy: first, the ripening winter wheat and gram crops were destroyed by untimely heavy rains and hailstorms from February to early April. Then, a drought destroyed the summer Kharif paddy and pulse crops.

The regional classification of Uttar Pradesh shows the diversified natural and agricultural conditions in UP. In order to opt the villages the village from each region of Uttar Pradesh, study has chosen one district from each region of U.P. Faizabad district has been selected from eastern region and Agra district has been chosen from western region whereas Unnao district has been taken as representative for central region of Uttar Pradesh and lastly Jalaun district has picked from Bundelkhand region. Now the background of each chosen district has been given below. Furthermore, one village has been picked from the each chosen districts.

Faizabad District: Faizabad district has a population of 2,468,371 which is equal to the nation of Kuwait or the US state of Nevada. District Faizabad is surrounded by district Ambedkar Nagar in the East, district Gonda & Basti in the North East, district Barabanki in the West & district Sultanpur in the South. The river Ghaghra forms the North-Eastern Boundary separating Faizabad from Gonda & Basti districts. Geographically it is situated in one of the most fertile tracts of Ganga and Jamuna Basins. The river Ghaghara forms the northeastern boundary. The population of the district is about 17.01 Lakh, thickly populated having about 845 population density against the population density of the state as 689 persons per sq km. The net sown area of the district is 1.32 Lakh ha and net irrigated area of 1.18 Lakh ha with the cropping intensity of 158%. Agriculture continues to be one of the most important occupations of the district. Wheat and paddy are the main crops of rabi and Kharif. Paddy covers about 72.85% area in Kharif and in Rabi wheat is grown in about 83.52% area. The productivity of rice is 24.7 q/ha and of wheat is 26.07 q/ha. The productivity of rice is higher than the state average. The district falls under Indo-Gangetic plains of Uttar Pradesh physiographically is considered under the eastern plain zone of the state. The soil structure of the district is composed of alluvial soil, the soil brought in by the rivers. Land in non-agriculture use is 15.32% which is a threat to culturable land because due to industrial and other developments most of the fertile land is going for this use. The

percentage of fallow land is higher which may be brought under cultivation with proper management (District Census Handbook Faizabad, 2011).

Agra District: Agra district situated in the South Western Dry Plain zone has a semi-arid climate and receives around 656 mm of average rainfall. Major crops of the district are potato, wheat, mustard seed, gram and barley in Rabi season and rice, bazra, jowar, arhar and vegetables in Kharif season. The climatic conditions of the district are congenial for the cultivation of fruit crops like aonla, citrus (Lime), mango, and medicinal plants like ashwagandha, lemongrass, guarpatha (Aloe vera), etc. The net sown area of the district is 2,87,294 ha constituting 72 percent of the net geographical area. The net irrigated area is 2, 36,376 ha, of which 90 percent and 8 percent are irrigated by wells/tube wells and canals respectively. The cropping intensity of the district works out to 145 %. *Agra* district is covered under Agri-Export Zone for potato and garlic. Contract farming is also practiced for garlic and potato cultivation. The districts have large numbers of cold stores, spread over fifteen blocks and ensure easy and close access to farmers for storing potato crop. The district, at present, possesses 140 cold stores with a storage capacity of 12.28 Lakh MT. As a supplementary to horticulture, the micro-irrigation component was introduced during 2005-06 for providing Drip/sprinkler systems to horticulture crops. Major food crops of the district are Wheat, Maize, Bajra and Barley. Major horticultural crops viz. Guava, Citrus (Lime), Ber and Aonla. These crops have favorable agro-climatic conditions in order to produce good quality crops. Animal husbandry is the second most important occupation in the district. Dairying is a popular activity in Agra district and also the main subsidiary occupation of the farmers and landless laborers in order to support their incomes (DCH Agra, 2011).

Unnao District: The district Unnao is situated about 45 Kms in the southwest direction of Lucknow the Capital of Uttar Pradesh. This district is one of the Six districts of Lucknow division, located in central plan agro-climatic zone. District Unnao is surrounded by district Lucknow in the East district Raibareli in the South, district Kanpur and Fatehpur in west and district Hardoi in the north. The river Ganga forms are western boundary separating from Kanpur and Fatehpur District. The district falls under Indo-Gangetic plains of Uttar Pradesh physiographically is considered under the eastern plain zone of the state. The District is famous for the bird century in Nawabganj. The Ganga and the Sai are the main rivers of the district the

former making its western and southern boundaries and the latter for the greater part of its course forming its northern & eastern boundaries. The Loni and the Morahi (Naurahi) are tributaries of the Ganga. About 66.25% area is culturable in the Unnao district whereas area under culturable waste other fallow is 15.34%. Land under open forest and miscellaneous plantation are 3.74 & 0.73% respectively. Land in non-agricultural use is 10.54% which is a threat factor culturable land because due to industrial and other developments most of the fertile land is going for this use about 2.66% of land is barren and unculturable land which may be used for pasture and plantation. In Unnao District about 93% of farmers had about 71% culturable land. The average holding of the farmers is 0.65 hectares. It is less than the state and national land holding average. The soils of the district are alluvial and are neutral to moderately alkaline to sodic. The pH of the soil ranges from 7.3 to 10.3. The nitrogen content is low to medium, phosphorus if very low-to-low while potash is medium. Most of the soils are deficient in zinc and sulfur content due to intensive cropping and follow up of continuous Paddy wheat/Mustard/Potato/Lentil-Mentha crop rotation. The soil type is predominantly loam, clay loam, sandy loam and sandy with low to medium fertility status. Most of the area is smooth and plain. Around 29.78% area is irrigated from canal and 70% from public tube wells (District Census Handbook Unnao, 2011).

Jalaun District: Jalaun district is named after the town of Jalaun, which was the former headquarters of a Maratha governor. The administrative headquarter of the district is at Orai. The districts of Etawah lies to north and Kanpur Dehat lies to the north and northeast, while Hamirpur District lies to the east and southeast, Jhansi lies to the southwest, and Bhind district of Madhya Pradesh lies to the west. Jalaun district is surrounded in all four directions by rivers Yamuna, Betwa, Pahuj and Dhasan. The total geographical area covered by the district is 4565 square kilometers. The district has an area of 4565 km², and a population of 1,455,859 (2001 census), with a population density of 319 persons per km². A total of 70.16% of the population in this district is below the poverty line. Out of the total geographical area, 73.65% of the land in this district is under cultivation and the net sown area is 3.5 Lakh hectares and 1.9 Lakh hectare area is irrigated. Moreover, Small and marginal farmers share over 74 percent of the total farm holdings. Agriculture is the main economic activity of farmers in the district. The three main cropping seasons in the district are Kharif, Rabi, Zaid. The main crops raised in the district include wheat, gram, pea, lentil, arhar, moong, Jowar and bajra. Cropping intensity of the district is very low because of the unavailability of assured irrigation, Therefore, majority of farmers are

unable to take more than one crop in a year. Around 85 percent of the area under rabi season and 15 percent under Kharif season is under cultivation. Roaring price of diesel and erratic power supply are major causes for very low utilization of irrigation facilities. Different types of soils like coarse-grained red soil, brown-colored sandy loam, black soil with clayey texture and sandy loam in Yamuna bed occur in this district. The major constraints being faced in the development of the district are the non-availability of essential inputs such as quality seeds, fertilizers, planting material, depletion of groundwater level, etc. apart from this basic infrastructure like power supply, proper road connectivity and poor marketing facilities are not available. In Jalaun district, dairy is the most important economic activity next to the agriculture sector. Small and marginal farmers dominate Jalaun district, which comprises more than 90% of the total population. The majority of them have the landholding of less than 1 ha in size. The district has gained prominence over the decades in the production of milk and with the ever-increasing demand for milk and milk products in the area; this district continues to remain an important source of supply (District Census Handbook Jalaun, 2011).

The present study had articulated to verify the study at the primary ground. The collection of Primary data has been determined in a proper well-structured manner. Furthermore, the study is confined to the Uttar Pradesh state, hence the sampling distribution is executed within the territory of this particular state form its every region. As UP is distributed in four major regions- eastern region, western region, central region and Bundelkhand. Each region consists of various districts and for the execution of primary study one district has preferred from each region. In the next step specific blocks from these selected districts have been opted in order to select villages for the survey. Finally, the chosen villages are Jansar from central region, Sithauli from eastern region, Charsoni from Bundelkhand region and Jonai from western region. The elected Sampling technique is a multi-stage random sampling technique that has elucidated below in an appropriate modus. A total of 80 samples have been picked from each selected village.

Profiles of the selected villages

District: Unnao

Sub District: Hasanganj

Tahseel: Nawabganj

Village: Jansar

The Jansar Village, with population of 4573 is Hasanganj sub district's 14th most populous village, located in the Hasanganj sub-district of Unnao district in the state Uttar Pradesh in India. The total geographical area of Jansar village is 8 km^2 and it is the 7th biggest village by area in the sub-district. The population density of the village is 585 persons per km^2. The nearest town of the village is Unnao and the distance from Jansar village to Unnao is 12 km. The village comes under Jansar panchayat. Hasanganj is the sub district head quarter and the distance from the village is 27 km. The district headquarter of the village is Unnao which is 21 km away. 0.74 square kilometer 9 percent of the total village's area is covered by forest.

The village is home to 4573 people, among them 2394 (52%) are male and 2179 (48%) are female. 72% of the whole population are from general caste, 28% are from schedule caste. Child aged under 6 years have a population of around 16%, among them, 50% are boys and 50% are girls. There are 971 households in the village and an average of 5 persons live in every family. As of 2011 census, there are 910 females per 1000 male in the village. The sex ratio in general caste is 920, in schedule caste is 884. There are 1005 girls under 6 years of age per 1000 boys of the same age in the village. Total 2068 people in the village are literate, among them 1308 are male and 760 are female. The literacy rate (children under 6 are excluded) of Jansar is 54%. 64% of males and 42% of female population are literate here. The Jansar village has 33% (1528) population engaged in either main or marginal works. Working population comprises 53% male and 12% female. Out of this 47% of total male populations are main (full time) workers and 6% are marginal (part-time) workers. For women, 5% of total female populations are the main worker and 7% are marginal workers.

District: Faizabad (Eastern Region)

Block: Rudauli Block/Tahseel

Sample Village: Sithauli Village

The Sithauli Village has a population of 2298 and is the Rudauli sub district's the 58th most populous village, located in Rudauli sub-district of Faizabad district in the state Uttar Pradesh in India. The total geographical area of Sithauli village is 3 km^2 and it is the 48th biggest village by area in the sub-district. The population density of the village is 674 persons per km^2. The population of the village has increased by 14.6% in the last 10 years. In 2001 census total

population here was 2105. The female population growth rate of the village is 2.1% which is -24.9% lower than the male population growth rate of 27%. The general caste population has increased by 24%; Schedule caste population has decreased by -5.7% and the child population has decreased by -21.9% in the village since the last census. As of 2011 census, there are 795 females per 1000 male in the village. The sex ratio in general caste is 785, in schedule caste is 826. There are 822 girls under 6 years of age per 1000 boys of the same age in the village. Overall sex ratio in the village has decreased by 194 females per 1000 males during the years from 2001 to 2011. The child sex ratio here has decreased by 169 girls per 1000 boys at the same time. A total of 1097 people in the village are literate, among them 750 are male and 347 are female. The literacy rate (children under 6 are excluded) of Sithauli is 56%. 68% of males and 40% of the female population are literate here. Overall literacy rate in the village has increased by 12%. Male literacy has gone up by 10% and the female literacy rate has gone up by 10%. Moreover, Sithauli village has 37% (846) population engaged in either main or marginal works. 55% male and 14% female population are working population. 51% of total male population is main (full time) workers and 4% are marginal (part-time) workers. For women, 12% of total female population is the main and 2% are marginal workers.

District: Jalaun (Bundelkhand Region)

Block: Mahewa Block

Sample Village: Charsoni Village

The Charsoni Village, with a population of 1300 is Kalpi sub district's 93rd least populous village, located in Kalpi sub-district of Jalaun district in the state Uttar Pradesh in India. The total geographical area of Charsoni village is 8 km^2 and it is the 44th biggest village by area in the sub-district. The population density of the village is 147 persons per km^2. The nearest town of the village is Jalaun and the distance from Charsoni village to Jalaun is 14 km. The village comes under Charsoni panchayat. Kalpi is the sub district head quarter and the distance from the village is 41 km. The district headquarter of the village is Jalaun which is 29 km away. 0.4 square kilometer (5%) of the total village's area is covered by forest. The village is home to 1124 people, among them 592 (53%) are male and 532 (47%) are female. 51% of the whole population are from general caste, 49% are from schedule caste. Child (aged under 6 years) population of Charsoni village is 16%, among them 43% are boys and 57% are girls. There are

184 households in the village and an average 6 persons live in every family. The Charsoni has 43% (484) population engaged in either main or marginal works. 56% male and 28% female population are working population. 35% of total male populations are main (full time) workers and 21% are marginal (part-time) workers. For women 7% of total female populations are main (full time) and 21% are marginal workers.

District: Agra

Sub District: Kheragarh

Tahseel: Saiyan

Village: Jonai

The Jonai is a Village in Kheragarh Sub District, Agra district and Uttar Pradesh State. Jonai Tehsil is Saiyan. Jonai Village Total population is 3180 and the number of houses is 461. Female Population is 45.7 %. Jonai village has a higher literacy rate compared to Uttar Pradesh. In 2011, literacy rate of Jonai village was 83.63 % compared to 67.68 % of Uttar Pradesh. In Jonai Male literacy stands at 92.85 % while female literacy rate was 72.74 %. . As per the census, 2011 total working population of the village is 26 %. The population predominantly depends on agriculture and dairy product formation. The total irrigated area in this village is 340.5 hectares from Boreholes/Tube wells 340.5 hectares is the Source of irrigation. Health Facility and availability of Doctors, medications are absent in this village. Along with this, In Jonai village out of the total population, 836 were engaged in work activities. 86.12 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 13.88 % were involved in Marginal activity providing a livelihood for less than 6 months. Of 836 workers engaged in Main Work, 243 were cultivators (owner or co-owner) while 316 was Agricultural laborer (Census 2011).

Conclusion

This chapter elaborated selected areas & villages in order to carry out the primary data analysis. This Chapter describes the profile of the study area from the socio-economic and geographic point of view. Moreover, the Determination of appropriate research areas is also an imperative aspect for research work. Hence this chapter tries to articulate the profile of randomly chosen areas from Uttar Pradesh in order to exhibit the way of generalization on the basis of it,

the study will justify the predetermined objectives of the study. Sampling Structure and design are framed in such a manner that it will reduce the bias in the entire chain of collection & process to the analyzation of Primary Data. Therefore, the chosen sampling technique that functioned here is multi-stage random sampling. The chosen village represents their respective Region of the state Uttar Pradesh. The subsequent chapter will scrutinize agrarian functioning for the four picked four villages as well as analyze the validation of the Agril-oriented concept of Dr. B. R. Ambedkar propounded in the year 1918 for the betterment and comprehensive development of Agrarian division and its active player *i.e.* farmers. The distinction between marginal, small, semi medium and medium farmers have been analyzed in terms of their agriculture production, inputs availability, other sources of occupation and the most important economic aspect of operated land and number of fragmented holdings in the villages.

References

1. (C-DAP) UNNAO District Planning Committee *Comprehensive District Agriculture Plan.*
2. Aayog, N. I. T. I. (2017). Three Year Action Agenda 2017-18 to 2019-20. *India: NITI Aayog, GoI, nd), http://niti. gov. in/writereaddata/files/coop/ActionPlan.*
3. Babu, S. C., Joshi, P. K., Glendenning, C. J., Asenso-Okyere, K., & Rasheed Sulaiman, V. (2013). The State of Agricultural Extension Reforms in India: Strategic Priorities and Policy Options. *Agricultural Economics Research Review*, *26*(2).
4. Chand, R., Garg, S., & Pandey, L. (2009). Regional variations in agricultural productivity: a district level study. *Publ. NCAP, DPS Marg, Pusa, New Delhi–110012, India*, 1-115.
5. Chaturvedi, S. (2015). Comparing Western UP and Bundelkhand. *Economic and Political Weekly*.
6. Kumar, N. P. (2010). Uttar Pradesh's Manufacturing Sector State, Structure and Performance. *Internet article. Accessed on*, *30*(10), 2014. Kumar, N. P. (2010). Uttar Pradesh's Manufacturing Sector State, Structure and Performance. *Internet article. Accessed on*, *30*(10), 2014.
7. Pal, S., & Byerlee, D. (2006). India: the funding and organization of agricultural R&D—evolution and emerging policy issues. *Agricultural R&D in the Developing World: Too Little, Too Late?*, 155.
8. Raman, R., & Kumari, R. (2013). Performance of Agriculture in Uttar Pradesh-A District-level Analysis. *Journal of Global Economy (ISSN Print-0975-3931, Online-2278-1277)*, *9*(1).
9. Roy, R. (2013). *Assessment of Pre and Post Harvest Losses in Wheat and Paddy Crops in Uttar Pradesh*. Research Report Agro-Economic Research Centre University of Allahabad.
10. Sanwal, M. (1987). The implementation of decentralization: A case study of district planning in Agra District, Uttar Pradesh, India. *Public Administration and Development*, *7*(4), 383-397.
11. Shukla, A., & Srinivasan, R. (2005). Uttar Pradesh Housing and Development Board: A Journey Towards Becoming A World-Class Organization. *Asian Journal of Management Cases*, *2*(1), 87-109.
12. Singh, P. (2014). Population and agro climatic zones in India: an analytical analysis. *Procedia-Social and Behavioral Sciences*, *120*, 268-278.

13. Chand, R. (2014). Dissecting Agricultural Performance since Mid 1990s. *Yojana*,10-15.

Tables and Figures

Table: 4.1 Growth rate among the sectoral composition of Uttar Pradesh

Period		Main Sectors			State Income %
		Primary %	Secondary %	Tertiary %	
1	1950-51 to 1970-71	1.5	3.5	2.8	2.2
2	1970-71 to 1980-81	2	5	3.6	3
3	1980-81 to 1990-91	3.2	9.6	6.4	5
4	1980-81 to 1997-98	2.5	6.9	5.4	4
5	1998-81 to 2008-09	1.9	3.6	5.8	5
6	2009-10 to 2015-16	2.1	3.2	7.6	4.9

Source: Planning Commission of Uttar Pradesh

Table: 4.2 Number and area of operational holdings in Uttar Pradesh

(Number in '000)
(Area in '000 ha.)

Size Group of Land	2010-11		2015-16		% Variation	
	Number	Area	Number	Area	Number	Area
Marginal	18532	7171	19100	7298	3.06	1.78
Small	3035	4243	3008	4175	-0.89	-1.62
Semi-medium	1334	3629	1314	3560	-1.54	-1.91
Medium	398	2199	377	2075	-5.4	-5.65
Large	25	380	23	343	-9.48	-9.63

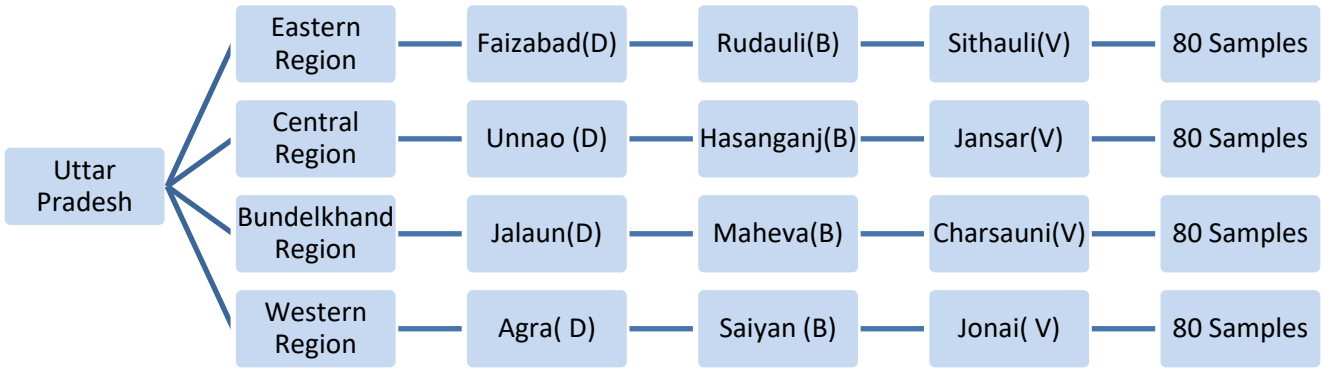
Source: Census 2015

Table: 4.3 List of Districts in Different Economic Regions of Uttar Pradesh

Regions	Districts
Western Region	Agra, Mainpuri, Firozabad, Aligarh, Kanshiramnagar, Bareilly, Badaun, Bulandshar, Etah, Etawah, Farrukhabad, Mathura, Meerut, Ghaziabad, Muradabad, Pilibhit, Rampur, Muzaffarnagar, Saharanpur, Bijnor, Shahjhanpur, Begpath, Gautam Buddha Nagar, Hathras, J.B. Nagar, Kannauj, Auriya.
Central Region	Barabanki, Fatehpur, Hardoi, Kanpur Nagar, Kanpur Dehat, Khiri, Lucknow, Raibareilly, Sitapur, Unnao.
Eastern Region	Allahabad, Kaushambi, Azamgarh, Maunath Bhanjan, Ballia, Bahraich, Basti. Siddharthnagar, Deoria, Faizabad, Ghazipur, Gonda, Gorakhpur, Mahrajganj, Jaunpur, Mirzapur, Sonbhadra, Pratapgarh, Sultanpur. Varanasi, Balrampur. Shravasti, Chandauli, Sant Ravidas Nagar, Kushinagar, Sant Kabir Nagar, Ambedkarnagar.
Bundelkhand Region	Jhansi, Jalaun, Hamirpur, Mohabba, Banda, Chtrakut, Lalitpur

Source: Steering Committee, GOI (2014)

Fig: 4.1 Sampling Design



*D=District, B=Block, V=Village

Chapter-5

Economic Analysis of Potential of Farmers for Agrarian Development in Uttar Pradesh

Introduction:

In Uttar Pradesh state, the agriculture sector continues to predominate and contributes a large share of the state output. Agriculture is the main source of livelihood to the majority of the population and more than 70 percent of the population, directly or indirectly, depends on agriculture and allied sectors. The contribution of agriculture in the Gross State Domestic Product (GSDP) was 24.11 percent at constant (1999-2000) prices for 2010-11. Therefore, evaluations of agricultural activities have an immense value from the welfare & sustainability aspect of farmers and the state as well. However, the development of the agrarian sector depends on availability as well as economizing the usage from each set of various inputs (Land, Labour, Fertilizer, Seed & Equipment) required for farming. But before going into depth analysis, some descriptive inference is important to be drawn out. Therefore, on the same line, the present chapter evaluates the performance of agricultural activities in Uttar Pradesh from the welfare aspect of both farmers & state.

The welfare of farmers should be the best judge and evaluated by the usage and availability of inputs, income from farming as well as from other allied sources and the diversification of agrarian activities among farmers. While the state welfare may be assessed through the cost and benefit incurred and obtained in providing the necessary inputs and infrastructure of the agrarian sector. Therefore, the whole primary study has been divided into two major parts. The former part directly deals with the farmer's welfare in the Uttar Pradesh state. While the later involved the assessment of efficiency of various states policy measures running for the agrarian upliftment in the Uttar Pradesh. Moreover, the help of appropriates

statistical techniques and methods have been taken to assess the welfare of farmers and state, as per the need & requirement of the study.

For this purpose, primary data was collected from each region of Uttar Pradesh this large state is bifurcated chiefly into four regions such as western, eastern, central &Bundelkhand regions. One village has chosen from each region & 80 samples have been collected from each village. Formerly, the study deals with the agrarian activities of farmers and the measurement of their welfare in terms of agricultural production, income and subset of farm income. Overall the comprehensive analysis has been presented in terms of general socio-economic profile, farmers' distress, sustainability Ratio, Lorenz Curve, Land fragmentation Index, farm wise returns on investment, farm wise total income & savings analysis, farmers participation in the agricultural program and basic amenities availed by the farmers.

Figure 5.1 explains the sampling structure and the distribution of data from the surveyed area in Uttar Pradesh. Uttar Pradesh State is catalogued mainly into four agro-ecological or economic region, therefore one village picked from each economic region of Uttar Pradesh. For instance, Jonai village which comes under the Agra district is chosen from the western economic region of UP and in a similar way Sithauli village from the Faizabad District selected under the eastern region of the state. On the other hand, from the Bundelkhand region, Charsoni village is picked under the Jalaun District and at last Jansar village from the Unnao district is picked from the central economic region of Uttar Pradesh. This sample collection procedure is followed by a multistage random sampling method. Therefore, the cataloging of the surveyed area is justified itself and zero chance of acquiring data purposively. Furthermore, the equal sample size of 80 is determined from each village followed by different economic regions of UP. Hence, from each village 80 samples have been collected and in totality this resultant with the total sample size of 320.

Table 5.1& figure 5.2 describes the religion-wise distribution of total observations in four chosen villages. Table explicates that the Hindu religion has the majority of the observations in the surveyed area. The first village explains that out of 80 samples 73 are Hindus which comprises 91.25percent of total samples and the remaining 8.75 percent of respondents belong to Muslims religion in the Jansar village. Similarly, in Sithauli village 83.75 percent of total samples belong

to the Hindu religion class and 16.25 percent belong to the Muslim religion. Now coming to the third village Charsoni, it expounds that 87.5 percent of the respondents come under the Hindu religion whereas 12.5 percent of respondents observed under the Muslim religion class. Lastly, the Jonai village exhibits that 77 households belong to the Hindu religion out of 80 samples that show around 96.25 percent of farmers are Hindu whereas the remaining 3.75 percent fall under the Muslim religion.

Table 5.2& figure 5.3 depicts caste wise distribution of the households in four selected villages. The table shows that a major proportion of the respondents fall under the category of scheduled caste. Firstly, the Jansar Village explicates that 51respondents out of total samples comprise of SC households which is around 63.75 percent of total samples & the remaining 11.25 percent belong to the General while 25 percent belong to OBC community. On the other hand, in Sithauli village 8.75 percent of respondents belong to general, 30 percent belong to OBC &61.25 percent belong to SC community. Moreover, third village Charsoni reveals that out of 80 samples 11.25 percent belong to General, 22.5 percent fall under OBC and 66.25 percent belong to SC community. At last, the Jonai Village flaunts little bit different picture as majority of total samples, comprises of around 70 percent have been coming under OBC Community and 23.75 percent belongs to General community. Further, the remaining 6.25 percent farmers belong to SC community. Hence, total samples from the different villages explicating that first three villages have the majority of SC community farmers except for the last village Jonai which exhibits the majority of OBC community. The overall table shows that 49.3 percent respondents are from the SC community followed by 36.8 percent from the OBC community and 13.7 percent fall under the general category.

Table 5.3& figure 5.4describethe distribution of households in terms of their castes & religion. The Jansar village reveals that under the Hindu religion, 11.25 percent of farmers belong to the General community, 16.25 percent belong to OBC and 63.75 percent belong to SC Community as out of total samples, 51 samples fall under SC category. Further, households belong to the Muslim religion is only 8.75 percent coming under the OBC community in Jansar village. Second village Sithauli exhibits that 7.5 percent of households belong to the General community while 18.75 percent belong to OBC and 57.5 percent belong to SC community under the Hindu religion. On the other hand, Muslims are mainly belonging to OBC community (11.25%)

followed by SC (3.75%) and General Community (1.25%) respectively. Now coming to the third village, it clarifies that around11.25 percent households from Hindu religion belong to General community followed by 10 percent from OBC community and 66.25 percent belong to SC Community while under the Muslims religion only OBC (12.5%) households have been traced in the Charsoni village. Lastly, the Jonai village expounds a distinct scenario as 6.25 percent households are detected from SC community and 23.75 percent farmers from general community while the majority of 66.25 percent of households belong to OBC community under the class of Hindu religion this village. Households belong to Muslim religion in Jonai village have found only under the OBC community (3.75%). Therefore, under the Hindu religion dominance of SC community (48.43%) followed by OBC (27.81%) and General community (13.4%) have been traced. Muslim community farmers have found to be relatively lesser as under the OBC community the highest percent of Muslim farmers stood at around 9.1 percent followed by SC (0.94%) and General (0.31%) respectively.

Table 5.4 & figure 5.5 describes the distribution of farmers as per the various categories of farms. It is clear from the observations that the majority of farmers in Jansar village are Marginal farmers (93.75%) who owned marginal farms and the remaining 6.25 percent farmers comes under small category of farms. On the other hand, 97.5 percent farmers from Sithauli village belong to marginal category farm while 2.5 percent farmers are coming under the class of semi-medium farms from Sithauli village. Now coming to the third village Charsoni, it shows that total 80 samples belong to the marginal category of farms it implies that all the farmers from Charsoni village are marginal farmers. The Charsoni and lastly Jonai village reveals that 53.75 percent farmers from Jonai are small farmers followed by medium (25%) and semi-medium farmers (21.25%). Therefore, this is reflected from the table that overall 72.8 percent of farmers traced are the marginal farmers followed by small (13.4%), semi-medium (7.5%) and medium (6.25%) farmers respectively. Hence this clarifies from the surveyed area that maximum numbers of farmers with the 233 observations are coming under marginal category of farms while 43 farmers out of total samples are possessing small farms. On the other hand, semi-medium farms cover 24 farmers & the remaining 20 farmers experiencing medium farms. Besides this classification of farmers under the four categories of farms follows the real characteristics of Uttar Pradesh Agriculture.

Table 5.5 & figure 5.6 expound the distress among farmers in the surveyed area regarding the continuation of traditional occupation of farming. Here the distressed farmer is one, who has suffered repeated income/ psychological shocks due to failure of investment, weather, crop production or markets, and which has crippled his ability to meet his financial and other family obligations; and feels humiliated by the castigations of the lenders and, in the absence of coping mechanisms, contemplates/takes the extreme step of voluntarily ending his life" (Sardara Singh Johl, 2006).

The results are very surprising in all four villages. Table 5.5 & figure 5.6 shows that the proportion of the farmers from all four selected villages for continuing agricultural occupation are relatively lower as compared to the farmers who do not want to continue farming. The table reveals that 41.25 percent farmers from Jonai village are willing to continue farming in the future, followed by the Jansar (38.75%), Charsoni (33.75%) and Sithauli (26.25%) respectively. The highest percent of farmers are not willing to continue agriculture in the future have been found from the Sithauli village followed by Charsoni (66.25%), Jansar (61.25%) and Jonai (58.7%) village respectively. Furthermore, the reasons for continuing or non-continuing the agriculture occupation has been asked to the farmers. Firstly, the reasons given by the farmers for continuing agriculture have been explained here. Figure 5.7 shows that around 32.5 percent farmers from Jansar village will continue this occupation as there is less opportunity available within the agriculture sector for them whereas 22.5 percent farmers from Sithauli village also responded in favor of continuing this occupation due to minimal scope within the agriculture sector, hence eventually relying on agriculture solely. Further, a similar response has been detected from Charsoni where the majority of 26.25 percent farmers state that there is less opportunity in this sector so it is difficult to depart from it. The table also reveals that 'no other options for generating livelihood' is the responsible factor behind forcing the farmers to continue the traditional occupation. Figure 5.7 exhibits that from the Jonai village around 8.75 percent farmers admit that they are not skilled and trained for additional technical know-how, therefore they are depending on agriculture for their survival and they will continue this occupation in the future too. Last reason for continuing farming is the 'satisfactory income' and figure shows that 32.5 percent farmers from the Jonai village have been earning satisfactory income and favorably want to continue their traditional occupation followed by 7.5 percent farmers from Charsoni, 6.25 percent farmers from Jansar and 3.75 percent farmers from Sithauli village.

Figure 5.8 expounds the reason specified for non-continuing traditional occupation farming is the sluggish job, Low profitability and irregular income. Agriculture has been found as a sluggish job that conceals high risk and high physical labor. It reflects in the response of the farmers that around 26.25% of farmers from Jonai village are not willing to carry out this occupation in the future as it demands high physical labor with less return and more risk throughout the crop season. Similarly, 18.75 percent farmers from Charsoni village have responded that agriculture is a sluggish job and the same kind of response followed by 11.25 percent farmers from Sithauli and 7.5 percent farmers from Jansar village. Further, 8.75 percent farmers from Jansar village are not willing to continue this traditional occupation farming as they have found it low profitable area and 7.5 percent farmers of Sithauli village are also agreed with this kind of perception, which is build upon the basis of their past experience gain through agriculture operations. Similarly, around 6.25 percent farmers from Charsoni village have found agriculture as a low profitable area followed by 1.25 percent from Jonai village respectively. The last responsible factor for non-continuation of farming is "irregular Income" and 45 percent of farmers from Jansar village believe that agriculture is not profitable at all because it is not generating sufficient income to them. In the same way, Sithauli village also flaunting the same datum that 55 percent of farmers found agriculture as an 'irregular income-generating occupation'. Likewise, the Charsoni and Jonai village also explicating that around 41.25 percent & 31.25 percent farmers out of the total samples determined agriculture as an 'irregular income generation activity' in the selected villages. The figure shows that around 7.5 percent farmers from both the Jansar and Sithauli village have found agriculture as a source of irregular income and 6.25 percent farmers from Charsoni village states that agriculture offers them irregular income. Further, the responses from Jonai village for irregular income (1.25%) have found to be relatively very low which explicates that farmers from Jonai village have satisfaction with their occupation as it provides them acceptable income. Therefore, the overall figure exhibits the perception of the farmers for their occupation in agriculture which reflects the substantial distress among them as only a few farmers satisfy with their occupation and remaining have just put the effort in order to cope-up with their occupation for the source of livelihood. Further, the table clarifies that overall 43.3 percent farmers earn irregular income and 15.9 percent farmers have found agriculture as a sluggish job while 5.9 percent stated agriculture as a low profitable occupation.

Table 5.6 elaborates village wise socio-economic profile of respondents picked from each economic region of Uttar Pradesh. The socio-economic profile consists of mainly five indicators such as age, education, type of family, Activity status and Occupation. The first indicator of the socio-economic profile clears that the maximum mean age of 54 years have been observed in the Jonai village from the western region of Uttar Pradesh whereas the minimum mean age of 47 years has been perceived from Charsoni village of the Bundelkhand region. Further, two remaining villages; Jansar & Sithauli have flaunted the mean age around 49 years. Moreover, this first indicator of socio-economic profile clearly reflects the reality that individuals from the chosen village are engaged in agriculture operation for the last long time. Second of the socio-economic detail explicates that most of the respondents encountered in the survey are male for instance 97.5 percent of respondents are male from Jonai village followed by Jansar (93.7%), Sithauli (91.25%) and Charsoni (87.5%) respectively. The lesser percentage of female respondents have traced in the selected villages. The highest majority of the female farmer respondents have been observed from Charsoni village (12.5%) followed by Sithauli (8.75%), Jansar (6.25%) and Jonai village (2.5%) respectively. Now coming to the third socio-economic indicator, education which expounds that the majority of the respondent from the picked villages are illiterate. It shows those 87.5percent of respondents are illiterate in Jansar village whereas Sithauli village shows the majority of illiterate respondents by 85 percent. However, illiteracy rate around 86.25 percent has found for the respondents of Charsoni village whereas for Jonai village it stands at 72.5 percent which is also mounting. This datum reflects that the majority of the respondents in the surveyed area are illiterate as the overall percentage of the illiterate respondents stood at around 82 percent. It resultant in the fall of further scope to get engage in other occupations on the basis of education in order to earn a reasonable income. Moreover, 2.5 percent of respondents from Jansar Village comes under the group of below high school and 10 percent respondents from Sithauli village also fall in this same group. On the other hand, 6.25 percent of Charsoni &16.25 percent respondents from Jonai village are educated below the high school level. The third classification of education is “high school level” and small proportion of the respondents have been observed under it. The table reveals that around 10 percent respondents from Jansar village educated up to high school standards, followed by Jonai village (8.7%), Charsoni (7.5%) and Sithauli (3.75%) respectively. But the most disappointing fact is that no respondent has been observed who got an education above the high school level. The

table shows that only 1.25 percent farmers from Sithauli and Jonai village have education up to the secondary level and only 1.25 percent farmer from Jonai village has obtained higher education. Fourth indicator of the socio-economic profile is the type of family structure is owned by households and table expounds that majority of households from all the four villages followed joint family structure, for instance, 62.5percent form Jansar village belongs to joint family and remaining 37.5 percent have been following nuclear family whereas 75 percent respondents are from Sithauli village solely belongs to joint family and only 25 percent respondents come under nuclear family system. Now coming to Charsoni village, 76.25 percent of respondents are detected under the joint family system and only 23.75 percent have been coming under the nuclear family system in the village. The last village Jonai explicates that 58.75 percent of respondents follow the joint family system and 41.25 percent of respondents fall under the nuclear family system. Overall, the third indicator elucidates the reality that how the joint family system has been driving the rural society and the nuclear family system still is not prevailing in the villages to a lesser extent. The fifth indicator of socio-economic detail is the 'Activity Status' of the respondents. The table shows that activity status is classified into 6 categories namely student, domestic wok, retired, employed & house maker. It is clearly evident from the table that around 96.25 percent respondents come under the fifth subgroup of activity status *i.e.* Employed and only 1.25 percent of respondents are house maker while 2.5 percent are domestic workers from the Jansar village. Thus, a major section of the respondents is employed in this village. Similarly, around 97.5 percent respondents are employed and 2.5 percent are domestic workers have noted from the village Sithauli. Further, in third village Charsoni around 90 percent of respondents are employed while 5 percent are house makers and 3.75 percent are domestic workers. Lastly, the Jonai village reveals that 83.75 percent respondents are employed whereas 11.25 percent are domestic workers and 2.5 percent are retired and the remaining 1.25 percent is house makers and students in Jonai village. At last, the sixth indicator of socio-economic detail is occupation. The occupation of respondents is divided into 6 subheads. The table depicts that in Jansar village almost 96.25 percent of respondents fall under the subhead of farming while 2 percent of respondents are in services and 1.25 percent in rural labor. The Sithauli village also reveals the same kind of picture that around 95 percent of respondents are working as farmers and only 1.25 percent of the respondents are engaged in services. Moreover, the same proportion of the respondents falls under rural labor (1.25%) and urban labor (1.25%)

as well. Third village Charsoni clears that all the respondents from this village earn their livelihood by their prime occupation farming. Now in the village Jonai 95 percent of the respondents belong to prime occupation of farming and 2.5 percent of the respondents primarily working as rural labor. Besides this 1.25 percent of households are primarily working as urban labor and the remaining 1.25 percent respondents fall in sub-head of occupation *i.e.* 'other'. Hence, the overall table shows that a major proportion of the respondents around 96.5 percent has traced with the prime occupation farming in the selected villages.

Table5.7 describes the ancestral occupation of the respondents. The table reflects that in all four picked villages, ancestors' occupation as farming had been perceived. It indicates that since the long-time households' ancestors have been working as peasants. Engagement of the ancestors in other occupation have not found in the chosen village for some last decades. Further, the present scenario of occupation and further diversion in it will be analyzed in the subsequent part of the chapter.

Figure 5.9 expounds farm wise sustainability and the un-sustainability rate for carrying the agriculture occupation in the future. It is demonstrated by the formulae given below.

$$\text{Sustaining Rate} = \left(\frac{\text{Willingness to Continue in Agriculture}}{\text{Total Samples of each Village}}\right) \text{X100}$$

$$\text{Unsustaining Rate} = \left(\frac{\text{Unwillingness to Continue in Agriculture}}{\text{Total Samples of each village}}\right) \text{X100}$$

This rate indicates clearly that how the farmers' disinterest has risen in agriculture occupation as time passes. The intensity to depend on agriculture occupation has been gradually declining. Figure 5.9 elaborates farm wise Sustaining or un-sustaining Rate for continuing agriculture operation in the future for classified farm size i.e. marginal, small, semi-medium and medium farms. The first farm category is marginal farmers, under which 68.24percent un-sustainability rate has been detected while the sustainability rate stands at 31.76 percent. This datum implies that marginal farmers in the chosen villages are not willing to continue agriculture operation in the future which acts as a causal factor to explain the un-sustaining rate among the marginal

farms. This un-sustaining rate inclines more when it comes to the second farm category *i.e.* small farms. In case of small farmers un-sustaining rate stands at 81.4 percent while sustaining rate observed at 18.6 percent. It implies that farmers owing small farms are more unstable in order to continue this occupation in future. Now coming to the third category of farm *i.e.* Semi-medium, flaunts equal ratio for sustaining & un-sustaining rate in agriculture occupation. Lastly, the sustaining & un-sustaining rate has been estimated for the medium category of farm and the figure demonstrates the highest sustaining rate with 90 percent has been observed for the medium farm. Therefore the medium farms have been detected with the 10 percent un-sustaining rate only. The overall table implies that medium farms are having greater scope from the farmers' perspective and sustainable income perspective for carrying this occupation. Therefore, this table reflects the belief of farmers for continuing agriculture occupation with their full consent in the future. The above interpretation is important from the point of view of agriculture occupation and for its dependent economic player i.e. farmers.

Table 5.8 explains village wise Land statistics in the surveyed area. Land statistics is an important interpretation in evaluating agriculture activity stature. The first village exhibits a maximum range of fragmentation up to five numbers of parcels where the mean of the total land stood at 0.67 hectares with the median value of 0.50 hectares. There is enough variation in the parcel size as the total land is ranged from 0.09 hectares to 3.89 hectares. A noteworthy fact evident here is that the number of parcels increases, the average parcel size sharply falls. The average size of the total land in Sithauli village is 0.52 hectare with the median value of 0.45 hectare and farmers' land shows the maximum division of land into four numbers of Parcels. Furthermore, the highest number of parcels detected is three because the majority of farmers interviewed in the survey are marginal farmers. Furthermore, total land is ranged between the land sizes of 0.09 hectares to 2.27 hectares. Now coming to the third village Charsoni where the average of the total land observed with 0.48 hectares with a closer mean value of 0.46 hectares. However, there is a lesser discrepancy in the total land distribution as the standard deviation (0.2ha) is lesser than the mean value of the land. Moreover, total land is ranged between 0.091 hectares to 0.996 hectares, it shows that the majority of farmers are marginal farmers from this village. Likewise, Sithauli village, in Charsoni village; the land fragmentation is captured and the maximum number of parcels traced are three. Thus it is clear from the table that farmers have tiny parcels of the land. Lastly, the Jonai village from the western region flaunts a different

picture, the highest average value of total land around 3.37 hectares have noticed from this village. Lower standard deviation value clears the lesser discrepancy in the land distribution in Jonai. However, the total land is ranged between 1 ha to 9.75 ha which is the highest range of land among all the selected villages.

Table 5.9 elaborates farm wise land statistics in the surveyed area. The first group of farmers which consists of marginal farms reveals that the average size of total land under this category of farm stood at 0.48 hectares with a closer mean value of 0.452 hectares. Furthermore, under the marginal category of land fragmentation has been traced into a maximum of five numbers of parcels. The average size of parcels from the range of land fragmentation lf1 to land fragmentation lf3 (0.28 ha, 0.17ha and 0.3 ha.) is different and gradually declined as number of parcels has been increasing. The total land under the marginal farms is tiny(0.09ha to 1ha), so it is not encountered with the high variations in total land distribution. On the other hand, small farms' land analysis reveals that average size total land stands at 1.41 hectares with a closer median value of 1.357 hectares. Moreover, land fragmentation in a maximum of five numbers of parcels (0.61ha, 0.48ha, 0.62ha, 0.11ha, and 0.05 ha) has been observed among small farms. Now coming to the semi-medium category of farms, average size of the total land is 3.170 hectares. Semi-medium farms show a maximum six numbers of parcels, it implies land under this category is fragmented into 6 pieces. The table shows that as we move from land fragmentation lf1 parcels to land fragmentation lf6th parcels, the average land size gradually declines. Lastly, the medium farmland distribution is shown in the table. It is clear from the table that the medium category of farms is bigger in size as the farm size lying between the range of 4.12 hectares to 9.75 hectares in the surveyed area. Despite having a comparatively large size land, land fragmentation comprises four numbers of parcels. Another interesting fact here is that the medium farms are fragmented but their average size of parcels is relatively greater in contrast with another category of farms which pushes it to perform well in agrarian operations. The average parcel size is highly tiny in the case of marginal & small farms which have been generally said to be a barrier in agrarian production and consequently affecting farmers' income-generating capacity. On the contrary, semi-medium & medium farms reveal a slightly large average parcel size. Therefore the differences in the total land possess and its further fragmentation will reflect in the total farm production & productivity and cost as well.

Table & Figure 5.10 expounds village wise fragmented land issues. The table describes whether the farmers have a problem with the fragmented land or not. A noteworthy fact witnessed from the village Jansar that around 66.25 percent of farmers have a problem with land fragmentation while 33.75 percent farmers confirm that they do not have any problem with land fragmentation. The table exhibits that 55 percent farmers from Sithauli village have found land fragmentation a serious obstruction in agriculture whereas 45 percent of farmers are neutral with the land fragmentation. Now coming to the third village Charsoni where 63.7 percent farmers face the problem of the fragmented land while 36 percent farmers are neutral with the fragmentation. At last, in the Jonai village all the farmers (100%) have found land fragmentation as an obstruction in agricultural operations. Hence, overall it may clearly reflect in the responses of the farmers that they have serious problems with fragmentation as 71.25 farmers out of total respondents have stated that land fragmentation affects their agricultural operations and causes further enduring. Further the responses of farmers have gathered regarding their willingness to participate in land consolidation. The responses are positive in all the chosen villages as 65 percent of farmers in Jansar village reveal their consent for land consolidation while 26 percent are not in favor of consolidation. Likewise, in Sithauli village 68.75 percent of farmers are in favor of land consolidation while 28.75 percent farmers are not in favor of consolidation of the fragmented land. Third village Charsoni expounds the fact that 73.75 percent of total farmers advocate land consolidation whereas 26.25 percent are not willing to participate in land consolidation. Lastly, around 85 percent of farmers in the Jonai village express their consent in favor of land consolidation while 6.25 percent are not willing to participate in land consolidation of fragmented land. Therefore, overall the table reveals that the majority of farmers (73.13%) opined to land consolidation for the advancement of their agriculture operations in the future.

Table 5.11 and figure 5.11 demonstrates the farm wise land issues confronted by the farmers. It clearly expounds from the table that around 70 percent of marginal farmers have problems with the fragmented land while around 97 percent of small farmers have struggled with their scattered agricultural land. Further, in the case of semi-medium farmers around 91percent of farmers have responded that diminution of the land acts as an obstruction in the agriculture operations. Similarly, around 85 percent medium farmers clearly stated that they have a problem with the fragmented land. Besides this, the responses for “no problem with the fragmentation” have observed to be very low for all classes of farmers such as marginal, small, Semi-medium and

Medium farmers. As the majority of the farmers have stated that they have a problem with fragmented land so as a result of it, farmers express their willingness to participate in land consolidation in future. Table explicates that around 70 percent of marginal farmers are willing to participate in land consolidation while 97 percent of small farmers are willing to participate in land consolidation. However, in case of semi-medium farmers, around 45 percent of farmers have the willingness to participate in land consolidation while in case of medium farmers, 85 percent of farmers are willing to participate in land consolidation in the villages.

Figure 5.12 demonstrates the farm wise Lorenz curve in order to measure the inequality of land distribution. The Lorenz Curve (the actual distribution of income curve) is a graphical distribution of wealth developed by Max Lorenz in 1906. Here the Lorenz curve draws land distribution and captures the inequality among the different categories of farms. The line at the 45º angle shows perfectly equal income distribution, while the other line shows the actual distribution of income. The further away from the diagonal, the more unequal the size of the distribution of Land. Figure 5.12 (a, b, c, d) shows the scatter plot for the Lorenz curve for all four categories of farms. It has been observed in the figure that the highest unequal distribution of land persisting in the marginal category of farm relatively to the small, semi- medium and medium farms. Moreover, the Gini coefficient (table5.12) value for four categories of farm reveals that the marginal farms with the 0.24 Gini coefficients have the highest inequality as compared to the small, semi-medium and medium farm with 0.12, 0 .1 and 0.12 respectively. However, when it comes to the inequality in general for all the farms, the Lorenz curve shows greater inequality with the Gini coefficient value 0.58. Therefore, it may be perceived from the above analysis that unequal distribution of land has been still persisting in the villages and especially in case of marginal farms.

In order to make more depth analysis and to capture the real scenario of land fragmentation in the surveyed area, land fragmentation index has been estimated. In the context of declination of arable land, to raise land productivity is urged to improve the food production volume. In India, the land fragmentation is an obstacle in optimizing the land-use efficiency, McPherson (1982) remarked that when a number of non-contiguous owned or leased farms (or `plots') of land are farmed as a single production unit, land fragmentation exists. This implies that the parcels of a farm are spatially separated. Schultz (1953) defines fragmentation as an

inappropriate distribution of the existing stock of agricultural land. He points out that a fragmented farm is a farm consisting of two or more plots of land located apart from the one parcel is not become suitable to operate the particular farm. Schultz realizes land fragmentation is a cause of inefficiency. In addition to this, Dovring et al. (1960) regard land fragmentation as the division of land into a great number of distinct plots at the time when he analyzes land reform in Europe. He laid stresses that the French used two constructs for land fragmentation in their consolidation operation. The first construct referred to a piece of land owned by a single person and surrounded by the property of others and second was a plot located apart from the consolidation operation(McPherson, 1982). Another definition was propounded by Papageorgiou (1956), who laid stresses on the role of distance in fragmentation. He defines the fragmentation as a farm consists of several scattered plots over a wide area. Agarwal (1971), defines land fragmentation as a diminution in the average size of farm holdings; an increase in the scattering of each farmer's land with a decrease in the size of the individual plots in a farm holding.

The land fragmentation has been a prominent feature in several countries since the last 17th century in the world (Tan, 2005). The existence of fragmented landholdings is regarded as an important feature of less developed agricultural systems (VanHung et al., 2007; Hristov, 2009). It considered to be a major problem to agrarian development, because it deters agricultural mechanization, causes inefficiencies in production, and involves large costs to relieve its ill-effects (Najafi, 2003; Thomas, 2006; Thapa, 2007; Tan et al., 2008). In view, of these considerations, numerous land consolidation and land reform policies have been implemented to reduce fragmentation in India. The fragmentation of landholdings reflects in the deficient uses of input land. In turn, land fragmentation could lead to sub-optimal usage of factor inputs and thus to lower overall returns to land. The factors contributing to this could be a loss of time due to extra travel. The wasted space along borders and fencing, unequal monitoring, and the inability to use certain types of machinery such as harvesters and other mechanized techniques of the production.

Problems Associated with Fragmentation

The main problems associated with land fragmentation are outlined as follows: the distance between parcels and the farmstead; many boundary lines; small size and irregular shape of

parcels; and lack of access. In particular, when parcels are spatially dispersed, travel time and hence costs in moving labor, machines, etc. from one parcel to another, are increased (Bentley, W. 1987; Karouzis, G. 1977; Burton, S. 1988). A subsequent drawback is that the parcels of land at a greater distance are cultivated less intensely. Many case studies have verified the repercussion of this obstruction for instance (Thompson K.,1963; Karouzis, G. 1971) for Greek farms, for Cypriot landholdings, and Blaikie, P. (1971) for four Indian villages explicates fragmentation relation with the productivity. He evident that land fragmentation involves a complicated edge network among parcels (hedges, stone walls, ditches, etc.) which cause land wastage as a part of a holding remains uncultivated at the margins of the parcels, particularly for small parcels. Moreover, the cost of fencing and neighboring conflicts between landowners increases due to this problem. Furthermore, the small size and irregular shape of parcels is another dominant problem associated with land fragmentation. The use of modern machinery is difficult or maybe impossible to apply in tiny parcels and may require an excessive amount of manual work in the corners and along the boundaries (Bentley, W., 1987; Burton, S., 1988; Karouzis, G.,1980) specifically, irregular parcel shape prevents the proper cultivation of land. Moreover, the implementation of soil conservation work becomes tough, the construction costs get higher and more fencing is needed. As a result of these problems, productivity decreases and hence the income of farmers also declines. It is generally accepted that all the above disquiet conceptions associated with land fragmentation usually act as an obstacle on the route of agricultural development. At present, this situation, which is even more intense because of the high land fragmentation, agricultural market competition and emerges of the high industrialization of the agricultural sector reduces farmers' net income considerably. Even though causes of land fragmentation may vary from country to country and from region to region, it tends to agree that the four main factors triggering this situation in the Indian context are the law of inheritance; population growth; land markets; and historical/cultural perspectives. It is accepted that inheritance is the primary cause of land fragmentation. Inheritance laws applied in most countries facilitate or demand the subdivision of holdings into equal parts among all heirs or in some countries among only sons. This custom has deep historical roots in old-world countries' laws where the equal distribution of patrimony among heirs was a requirement (King, R., & Burton, S. 1982). It results in the continuous process of land fragmentation and land parcels get smaller and smallest as they have been dispensed to successive generations (Mearns,

R., & Sinha, S. 1999). There is empirical evidence that inheritance is the prominent factor for land fragmentation in many places such as in medieval England (Houston, J. M., 1968), in the Netherlands (Vanderpol, P. R.,1956). This strong relationship between inheritance and land fragmentation has also been demonstrated in a Portuguese study (Silva 1983). It stated that land fragmentation is expected to impose negative effects on agriculture(Tan et al., 2008; Demetriou et al., 2013). Apart from the above statement (Dr. Ambedkar, 1918) had realized the impingement of land fragmentation on agriculture and as well as for its economic player i.e. farmers. He addressed the deterrent impact of fragmentation in the long-gestation period in context of India. This diminutive size of holdings is said to be greatly harmful to Indian Agriculture. The evils of smallholdings no doubt are many. But it would have been no slight mitigation of them if the smallholdings were compact holdings. Unfortunately, they are not. A holding of a farmer though compact for purposes of revenue is for purposes of tillage composed of various small strips of land scattered all over the village and interspersed by those belonging to others (Ambedkar, 1918).

Therefore, the main objective here is to investigate the land fragmentation in the study area and to realize this objective the Simmons index approach is adopted. Simmons [1964] signifies an index of land fragmentation that brings into account the number of parcels in a farm and relative size of each parcel. He computed the index by devising the following formula:

$$FI = \frac{\sum_{i=1}^{n} ai^2}{A^2}$$

where:

FI – Fragmentation Index,

n – Number of parcels on a farm,

a – Size of a parcel,

A – Total size of a farm.

If Land Fragmentation Index equals 1, it means that a farm consists of only one parcel and if the value is close to 0; it indicates a higher degree of fragmentation. Index classifies its value into the five group very high (0.01-0.33), high (0.34-0.66), medium (0.67-1). However,

land fragmentation assessed on the basis of chosen four villages and farms cataloging into various categories as well. The results from the data are presented in the tables given below. An examination of all the tables linked with the fragmentation reveals interesting facts. The land fragmentation index explicates the diminution of total land into various parcels or plots of the farmers. Therefore, majorly it shows the distribution of parcels of each holding in the chosen villages. It also flaunts the degree of the land fragmentation under various categories of farms such as marginal, small, medium, semi-medium and medium.

Table & figure 5.13 describes the village wise land fragmentation index cultivated land. In the Jansar village, 76.25 percent of farms have come under the low range of fragmentation index (.67-1.00) whereas 20 percent of farms fall under the medium range of fragmentation index (0.34-0.66) and the remaining 3.75 percent of farms come under high range of fragmentation (.01-0.33) Index. In Sithauli village maximum farms with 82.5 percent come under the range of low fragmentation index on the other hand 16.25 percent of farms fall under medium range of index and 1.25 percent of the farm lies in the high range of fragmentation index. Now coming to the third village Charsoni from the Bundelkhand region, it explicates the similar picture that maximum farms around 80 percent have been observed in the low fragmentation range of index while 16.255 percent farm fall in the medium range of index and remaining 3.75 percent comes under the high range of fragmentation index. At last the Jonai village divulges the discern picture in contrast with the above mentioned three villages. In Jonai village 32.5 percent farms have been perceived under high range of fragmentation index whereas 31.25 percent farms have shown medium fragmentation index and 36.25 percent farms fall under the low range of index respectively. The least proportion of the farms has been observed in the low range of index as compared to first three villages. Jansar, Sithauli and Charsoni village have been expounding the majority of marginal farmers and this is a very true fact that marginal farmers possessed little amount of land for agriculture operation. Therefore, due to the lesser volume of land traced from first three villages i.e. Jansar, Sithauli and Charsoni are not showing a high degree of fragmentation index. On the other hand, Jonai village has a majority of small, semi medium and medium farmers as data explicate. Hence, these farmers possessed enough size of land and consequently, this is the responsible factor for flaunting the majority of the farms come under high & medium range of fragmentation Index in the village. Hence it may be concluded that the fragmentation is associated with the absolute size of holdings.

Table & figure 5.14 depicts farm wise land fragmentation index. Marginal farms exhibit that 81 percent of farms come under the low range of index (0.01-0.33) whereas 16.31 percent of marginal farms fall under the medium range of fragmentation index (0.34-0.66) and the remaining 2.5 percent of farms observe under the high range of fragmentation index (0.67-1.00). Therefore, it is clear that the majority of marginal farms have been appearing in the low range of fragmentation index and the main reason behind that; these farms have a highly lesser volume of land. So, like the average size of land getting shrink then it would be difficult to find a high fragmentation index for these kinds of tiny marginal farms. Nevertheless, as we move from marginal farms to small farms, around 37 percent of farms from this group fall under high range of fragmentation index. This also explicates that with the shift from marginal to small farms, degree of fragmentation inclined for these farms the samples as 32.5 percent of this farms lies in the medium fragmentation index. Further, it shows that around 30.2 percent of farms fall under the low range of index under the small category of farm. In case of semi medium farms around 50 percent of farms appear in the medium range of index, which is similar to the small farms but the degree of fragmentation gets high when it comes to semi-medium farms. However, 37.5 percent of the total semi medium farms are lying under the high range of fragmentation index and 12.5 percent of farms come under the low range of the index. Besides these true datum, medium farm is the exception which explicating a different picture of land fragmentation index. Data shows that the majority of medium farms with 75 percent belong to the low range of fragmentation index whereas 15 percent of farms come under medium range of index and only 10 percent of the medium farms belong to the high range of fragmentation index. This interesting fact flaunts that the medium farms may carry their agrarian operations on the consolidated piece of land or the less fragmentation land that directly associated with raising productivity and revealing the minimum wastage of land.

The land fragmentation clears that fragmentation has still a dominant feature of agriculture in chosen villages. The fragmentation hampers the production and profitability which crates due to differences in the operated farm size by different segments of farmers. Hence, after the computation of the Land Fragmentation Index, return on investment is computed for the crops produced in surveyed areas. Farmers' income-generating capacity or economic incentives area highly important factors as their livelihood and standard of living depend upon this factor. Any occupation operated for creating certain income from it & the point of generating reasonable

income from cultivation seems critical, specifically when it comes to marginal and small farms. The marginal farmers owned lesser quantum of land (0ha to 1 hectare) hence the application of a set of inputs in order to receive the maximum return from it is a difficult task for these farmers. Therefore, the return on investment per hectare has been calculated village wise as well as farm wise.

Table & figure 5.15 describes the village wise 'Return on Investment' computed here for the four selected villages. The highest Gross yield (33quintal/ha) is observed in the Jonai village of the western region while the second-highest gross yield (30 quintals/ha) is observed in Charsoni village from Bundelkhand region. Moreover, the Jansar village reveals gross yield (quintal/ha) of around 28 quintals/ha. Similarly, Sithauli village from the eastern region is reflecting a gross yield about 27 quintals/ha in this village. On the other hand, Charsoni village observed with the gross yield of around 30 quintals/ha and lastly, Jonai village shows gross yield of 33 quintals/ha. Secondly, the variation in the gross production from one village to another is elucidated from the table as Jansar village exhibits the gross production of around 31,315Rs/ha and on the other hand Jonai village from western region explicates highest gross production in rupee term (41,146 Rs/ ha). Inferences are drawn on the basis of the inputs costs of various factors clear the differences in the cost of production from village to village. 1stReturn on Investment explained in terms of the division of the 'net benefit1' by the 'total cost. It explicates the Highest Return on Investment of around 44.7 percent have observed from Jonai village and lowest Return on Investment of around 16.6 percent have observed from Jansar village of the eastern region. However, Sithauli (18.1 percent) & Charsoni village (16.6 percent) are somewhere in the middle of Jansar& Jonai village in terms of Return on Investment per hectare for the wheat crop. But this depiction entirely gets change when the total cost 2 (Imputed Rent for Self Owned Labor, Rs/ha) deducted from gross production (Rs.). Therefore, result shows that Return on Investment2 becomes negative for all four picked villages. Consequently, 'net beneift2'also become negative. Figure 5.15 shows the 'net benefit 2' for the Charsoni village is stood at -29 percent followed by Sithauli village (-27 percent), Jansar Village (-27 percent) and Jonai village (-17 percent).

Table& Figure 5.16 explicates farm wise return on investment for wheat crops. In order to compute return on investment, an essential set of cost and benefits indicators is determined such as Gross Yield (Quintal/ha), Gross Production (Rs/ha) are the indicators of benefit. Furthermore,

the set of inputs captured to interpret the cost indicator for instance irrigation, fertilizers, seeds, pesticides, equipment, hired labor, Imputed rent or self-owned labor. The unit for the entire input variable is same i.e. Rs/ha. Return on investment value helps in computing the value of net return to the farmers cultivating crops. Here the return on investment is employed to make a comparison between the four kinds of operated farms in terms of their farm size. Return on investment value is more inferential as it shows the net return per Rs. 100 investments**.** The table exhibits the gross yield per hectare has found to be minimal with 28 quintals/ha in marginal holdings followed by 23 quintal yield under small landholdings. On the other hand, the gross yield of semi-medium holdings is 41 quintals/ha& highest gross yield has observed for medium size holdings which stood at 42 quintals per hectare. The table flaunts that 'return on investment 1'is positive for all category of farms but when imputed rent value of self-owned labor is deducted from 'net benefit 1', it arrives at the negative return on investment for all group of farms. The table demonstrates that 'net benefit 1' for wheat crop, under medium category of farm is 19492.70 Rs./ha which is relatively high as compared to the net benefit of marginal farms (4787.67 Rs./ha), small farms (4966.74 Rs/ha) and semi-medium farms (16512.7 Rs./ha) respectively. Furthermore, after the deduction of imputed rent of self-owned labor, 'net benefit 2'becomes negative for each category of holding. Despite of this, 'Net benefit 2' for the medium farms (-53765.6 Rs./ha) and semi- medium farms (-76162.29 Rs./ha) are relatively lesser negative as compared to marginal farm (-102518.48Rs/ha) and small farms (-68805.35 Rs/ha) net benefit 2. If we see the 'return on investment1', table clears that Return on Investment for marginal and small farm stood at around 18.06 percent 19.48 percent as compared to ROI of semi-medium (51.16%) and medium farms (62.25%) return on investment respectively. Figure 5.16 shows the percentage distribution of 'net benefit 1' among the four farms group. The figure demonstrates that a maximum net benefit of around 43 percent has been observed for the medium farms followed by semi-medium farms (36 percent), small farms(11 percent) and marginal farms(10percent) respectively. However after the adjustment of imputed rent of self-owned labor 'net benefit 2' becomes negative for all the farms but it is relatively lesser negative for the medium farms by-18 percent followed by small farms (23percent), semi medium farms (-25 percent) and marginal farms(-34 percent) respectively.

Table &Figure 5.17interprets the return on investment for the rice crop among the four selected villages. Gross yield for rice crop is distinct from village to village. Table clears that the gross

yield in the first three villages is almost similar and stood at around 30(Quintal/ha) due to the likewise farming conditions and area constraints. On the other hand, the maximum gross yield of around 41 (Quintal/ha) is obtained by Jonai village. Similarly, the gross production of farmers among all the villages is varying from 25350 Rs. to 50101Rs. per hectare. Maximum 'Return on investment 1'of around 81 percent has been observed in Jonai village and minimum 'Return on investment 1'of around 53 percent has been estimated for the Jansar village. But as the imputed rent of self-owned labor is adjusted in the return on investmet1, the average net 'Return on investment 2' appears as a negative for all the villages as table depicts. Imputed rent for self-owned labor is high in Charsoni and Jonai. Figure 5.17 shows the percentage distribution of 'net benefit 1' among the four villages for the crop rice. The figure demonstrates that maximum 'net benefit1' of around 42 percent has been observed by the Jonai village followed by Charsoni (25 percent), Sithauli (17 percent) and Jansar (16 percent) respectively. However after the adjustment of' imputed rent of self-owned labor' cost; 'net benefit 2' becomes negative for all villages but it is relatively very minimal for Jonai by-1 percent followed by Charsoni (-20percent), Jansar (-38 percent) and Sithauli (-41 percent) respectively. It may be resolved that Jonai village has the highest net benefit after adjustment of the imputed value of self-owned labor.

In addition to the above village wise analysis, farm wise return on investment is computed for the crop rice**.** Table & figure5.18 reveals that the highest gross yield of around 42 quintals/ha has been observed for semi medium farms. The second-highest gross yield of around 41 quintals/ha has found for Medium farms followed by small farms (31 quintals/ha) and marginal farms (30 quintals/ha) respectively. Figure 5.17 depicts that the highest net benefit of around 37 percent is accruing to the Medium farms and 30 percent to the Semi-medium farms. Whereas, the net benefit of around 19 percent is accruing to the small farms and 14 percent is accruing to the marginal farms. Further, after adjustment of imputed value for self-owned labor in the gross production (Rs/ha) net benefit2 turns to negative for three farms such as marginal (-65 percent), small (-20 percent) and semi-medium farms (-10 percent) respectively. Lastly, 'Return on Investment 2' of around 41 percent have found to be the highest and positive for medium farms followed by Semi-medium (-35 percent), small farms (-62 percent) and marginal farms (-88 percent) respectively.

Table& figure 5.19shed light on the Return on Investment for millet crops produced in the villages. It is clear from the table that the gross yield for the millet has found relatively low as compared to the gross yield for the crop wheat & rice. The highest Gross production is observed for the Jonai village followed by Jansar, Charsoni &Sithauli village in the table. The total costs incurred in the production process are found to be maximum in Jonai village followed by Charsoni, Sithauli and Jansar village. Moreover highest 'Return on Investment 1' of around 53 percent is accruing to the Jonai village whereas 46 percent returns are accruing to the Sithauli village. Further, the 'Return on Investment 1' of around 43 percent is accruing to the Jansar village and minimum 'Return on Investment 1' of around 22 percent is accruing to Charsoni village. The table reflects that Imputed rent for self-owned labor is eventually burdened the 'total cost1' and resultant in contributing to the 'negative net benefit 2'. Therefore, the 'Return on Investment 2' becomes negative for all the chosen villages. This inferential point illuminates the existence of disguised unemployment in agriculture. Figure 5.19 exhibits the highest negative 'net benefit2' of around -43 percent for Sithauli village, followed by Jansar (-32 percent), Charsoni (-17 percent) and Jonai village (-10 percent) respectively.

Table 5.20 divulges farm wise return on investment per hectare for millet crop. Farm wise gross production reveals that medium farms have the highest average gross production around 27442Rs./ha whereas the marginal farms exhibit the minimum average gross production of around 14492.93 Rs./ha. Similarly, this inference also reflects in the computation of 'Return on Investment1'. The highest 'Return on investment1' of around 69 percent is accruing to the medium farms whereas the semi-medium farms are accruing the 'Return on investment1' of around 54 percent for the production of millet crop. Moreover, small farms are accruing the 'Return on investment1' of around 43 percent& marginal farms have found with the lowest Return on Investment of around 23 percent by millet production. Further, when the imputed rent for self-owned labor adjusted in the total cost, the 'Return on investment2' turned to a negative value for all the farms. However, it is low for medium farms by -1 percent and appears to be highest with the value of -86 percent in case of marginal farms per hectare.

Therefore, Return on Investment analysis for the crop wheat, rice and millet signify that net benefit for the semi- medium, medium farm have traced to be relatively high as compared to marginal & small farm net benefit from agriculture operation. It implies that the semi-medium

and medium farms perform relatively better in terms of gross yield; Production and return on Investment and consequently it raise the profitability of farmers.

Table& Figure 5.21 reveals the sources of marketing agricultural produce opt by the farmers in different villages. There are four sources of selling namely Intermediate, Mandi, Direct/ Final Consumers and any other selling of agricultural produce of Wheat, Rice and Millet. The analysis for the crop of wheat is as follows. Around 91.25 percent of the farmers sell their agricultural produce through intermediaries and only 8.75 percent of farmers are dependent on mandis to sell their agricultural produce. As far as the direct selling of the farmer produce to final consumers is concerned, no farms are involved in such a means of selling the agricultural produce. Similarly in the Sithauli village, a major proportion of the farmers i.e. 96.25 percent prefer intermediaries for selling their produce and only 3 percent are selling their produce through mandis so no farmer is selling produce under the categories of Direct/Final consumers. Charsoni village shows that 95percent of farmers use intermediate sources of selling their produce while only 5 percent are selling their produce in Mandis. There is a slight difference in the scenario of Jonai village 58.75 percent of farmers use intermediate sources of selling their agricultural produce and 41.25 percent prefer to sell their produce in mandis. Therefore, the overall table shows that around 85.75 percent farmers sell their produce to intermediaries and 14.69 percent of farmers use mandis for selling the agricultural produce wheat.

The table shows the source of selling rice, around 77.5 percent of farmers use intermediate as a source of selling while only 22.5 percent are selling through mandis in the Jansar village. The table states that no farmer is involved in selling produce directly to the final consumers or through any other source. In the Sithauli village, around 85 percent of farmers prefer to sell agricultural produce through intermediate whereas only 15 percent farmers sell their produce through mandis in the market. In the case of Charsoni village, around 86.25 percent of farmers are using intermediate sources to sell rice whereas 13.75 percent sell their produce through mandis. For the Jonai village, 47.5 percent farmer sells their produce through Intermediaries and almost 52.5 percent of farmers sell their produce through mandis. Therefore overall it may be point-out that the majority of the farmers with 74.06% sell their produce through intermediaries and 25.94 percent farmers sell their produce in mandis. It also implies that mandis are not a prevalent source for selling agricultural produce in the selected villages.

Now coming to the last crop millet, the table shows that it is cultivated by lesser proportion of farmers in all the villages. The table explains that 17.5 percent of farmers sell their produce through intermediaries while 7.5 percent of farmers sell their agricultural produce in mandis and the remaining 75 percent of farmers did not engage in the production of millet crops in Jansar village. The table shows that 15 percent of farmers sell their produce through intermediaries while for 5 percent of farmers, the source of selling agricultural produce is mandis and the rest of 80 percent do not involve in the cultivation of millet crops from Sithauli village. Now coming to the third village Charsoni, table depicts that 13.75 percent of farmers sell their produce through intermediaries and the same proportion of the farmers around 13.75 percent sell their agricultural produce in the nearest mandis. Besides 72.5 percent, farmers are not engaged in the millet cropping from Charsoni village. Lastly, the Jonai village reveals that 81.25 percent farmers fall under the NA category and 7.5 percent sell their agricultural produce through intermediaries while 10 percent of farmers prefer mandis to sell their produce and only 1 percent of farmers sell their produce directly to the final consumers. Therefore the table shows that the intermediaries are the key source of selling agricultural produce followed by mandis (9.6%) and direct selling to consumers (0.31%) in the selected villages for the crop millet.

Table & figure 5.22 describes the sources of selling agricultural produce for the crop wheat; opt by different groups of farmers such as marginal, small, semi-medium and medium. Table expounds farm wise preferable source of selling of agricultural produce. The first category of the farm; marginal explicates that the majority of the farmers around 94.85 percent sell their produce to intermediaries and the remaining 5.15 percent sell their produce in mandis. The majority of the farmers do not prefer to trade their produce in Mandi as it is time taking and not fulfilling the needs of liquid money at immediate. In case of small farms,69.7 percent of farmers trade their produce to intermediaries whereas only 30.23 percent of farmers sell their produce in mandis. Hence, the proportion of the farmers are selling their produce in mandis is relatively lesser in case of marginal and small farmers. Now coming to the semi medium farmers these farmers are selling agricultural produce with the two major selling sources; one is intermediate and the second is Mandi. Around 50 percent semi-medium farmers visit mandi to sell their agricultural produce while remaining 50 percent of farmers prefer intermediaries for selling the agricultural produce. Lastly, coming to the medium farmers and table clears that medium farmers are also selling their agricultural produce to Mandi followed by intermediaries (50%) and direct final consumers (50%).

In case of second-crop rice, 83.26 percent of marginal farmers sell their produce through intermediaries while 16.74 percent of farmers sell their agricultural produce in mandis. The table shows that 67.44 percent of small farmers prefer intermediaries while 32.56 percent of farmers visit mandis in order to sell their produce. Now coming to the semi-medium farmers around 54.17 percent of farmers sell their produce through intermediaries and 45.83 percent visit mandis to sell their agricultural produce. Lastly, around 95 percent of medium farmers trade their produce in mandis and 5 percent trade their produce through intermediaries. Overall the table laid stresses that the majority of the farmers (74.06%) sell their produce through intermediaries and 25.94 percent sell their agricultural produce in mandis. In case of the last crop millet; farmers engaged in the production of the millet, sell their produce through intermediaries (13.44%) and 9.06 percent farmers sell their produce in mandis. Table clears that 77.19 farmers are not engaged in the production of millet, less proportion of the farmers around 22.81percent are only engaged in the production of millet from all classes of farms.

Table& figure 5.23 shows village wise Investment in agricultural equipment & tools. This investment data has been gathered for the investment proceeding for the last four years from the survey. The investment in agriculture also reflects the technical engagement of farmers in agriculture. Besides the fact, the table clearly explicates that there is no effective investment traced in the chosen village as the number of farmers investing their money in equipment such as rotavator, thresher, and tractor have found to be very minimal in the villages. Jonai village is the village where around 10 percent of farmers invested their money in purchasing tractor followed by Charsoni village (1.25%). A negligible investment in the rotavator has been found as only 1.25 percent of farms from Jansar village, 1.25 percent of farmers from Charsoni village and 2.5 percent from Jonai village invested their money in rotavator. In addition to this, investment in thresher has been observed from Jonai villages as only 5 percent of farmers from this village invest their money in purchasing of threshers. Therefore this is evident that the majority of the farmers are depending upon custom hiring for their regular agricultural operation as 98.7 percent of farmers from Jansar village depend upon custom hiring whereas 100 percent of farmers from Sithauli village depend upon custom hiring. On the other hand, 97.5 percent of farmers from Charsoni village and 82.5 percent of farmers from Jonai village depends upon custom hiring.

In addition to this, table & figure 5.24 reveals farm wise investment in agricultural equipment & tools. This is clear from the table that around 35 percent of farmers from the medium farms invested their money in tractor purchasing followed by small farmers of around 2.33 percent and marginal farmers of around 0.43 percent respectively. Investment in rotavator (10 percent) and thresher (20 percent) has been done by the medium farmers followed by marginal farmers with a very minimal proportion. Therefore this is evident from the table that the majority of the farmers are depending upon custom hiring for their regular agricultural operation as 98.7 percent of marginal farmers and 97.6 percent of small farmers are depending upon custom hiring. On the other hand, 100 percent of semi-medium farmers and only 30 percent of medium farmers are depending upon custom hiring.

Table & figure 5.25 clear that the majority of the farmers from each village have not taken agricultural Loans. This is clear from the table that 30percent of farmers from Charsoni village have taken the loan. Moreover, the majority of farmers have taken a loan from commercial banks followed by Regional Rural Bank and informal sources with 12.5 percent, 10 percent, 6.25 percent respectively. The second village in availing loan facility is Jonai village where 26 percent of farmers have taken the loan. Further, around 15 percent of farmers avail loan from RRBs followed by commercial bank (5 percent), co-operative bank (5 percent) and informal sources (1.25 percent). Similarly, observation depicted from Sithauli village where 21 percent of farmers are availing loan facilities from the various sources. Around 13.7 percent of farmers have taken loan from R.R.B's followed by commercial banks, informal sources and co-operative banks with 3.75 percent, 2.5 percent and 1.25 percent respectively. At last, Jansar village exhibits a lesser proportion of farmers avail loans. Only 16.25 percent of farmers from the village have taken the loan, 8.7 percent of farmers are availing loans from RRBs, followed by a commercial bank and informal sources with 5 percent and 2.5 percent respectively. Conclusively, it may be said that farmers from all four villages avail loan from the different sources and overall farmers have taken a loan from RRBs, few farmers still rely on informal sources for availing the loan.

Together, table & figure 5.26 expounds farm wise proportion of farmers availing loan facility for agriculture purposes. It expounds that around 23.18 percent of marginal farmers are availing loans from different sources. The majority of the farmers around 11.6 percent have taken a loan from R.R.Bs followed by commercial banks (7.3 percent) and informal sources (3.86 percent)

respectively. On the other hand, in the category of small farmers; 20.9 percent avail loan on the name of agriculture as 11.6 percent farmers have taken loan from R.R.Bs followed by the commercial bank, cooperative & informal sources with 4.6 percent, 2.33 percent respectively. Furthermore, semi-medium farmers obtain loans mainly from R.R.Bs (12.5 percent) followed by commercial banks (4.1percent) and cooperative banks (4.1 percent) respectively. Lastly, around 35 percent of the medium farms avail loans for agricultural purposes in the Jonai village. Further, around 20 percent of farmers have taken from R.R.Bs followed by co-operative banks (10 percent) and commercial banks (5 percent) respectively.

Table & figure 5.27 shows the pattern of loan utilization for various consumption purposes traced from the four selected villages. This is a matter of grief that the amount taken for the agricultural loan has not been utilized for the same purpose, it has just used to fulfill the routine consumption need of the farmers such as Construction, education, Machine & equipment, medical treatment, social ceremony, etc. The table clearly says that around 6.25 percent of farmers from Jansar village utilize loans for agriculture & allied head, while 2.5 percent of farmers utilize this loan for construction purposes, 3.75 percent for medical treatment purpose and 1.25 percent for education. The table shows that from Sithauli village, around 7.5 percent of farmers utilize loan for agriculture & allied head whereas 7.5 percent uses their loan for construction purposes followed by medical treatment (3.7 percent), social ceremony (1.25 percent), and purchase of machine and equipment (1.25 percent) respectively. Now coming to the third village, it shows that 12.5 percent farmers employ the loan for agriculture & allied purposes whereas 5 percent use the loan for construction purposes followed by medical treatment (6.25 percent) and social ceremony (5 percent). Lastly, the Jonai village shows that around 8.75 percent of farmers utilize the amount of loan for agriculture and allied purposes while 3.75 percent use this loan for medical purposes and the remaining 1.25 percent farmers use this loan for purchasing of machines and equipment.

Table & figure 5.28 expounds farm wise, utilization of loans under various overheads. This is clear from the table & graph that the utilization of loans is varying from one farm to another farm. Table flaunts that marginal farmers utilize the loan for different purposes such as for agriculture & allied (9 percent), construction (5.12percent), education (0.43 percent) machine & equipment (0.43 percent), medical treatment (4.6percent), social ceremony (3 percent).Now

coming to the small category of farmers where the farmers have taken the loan for meeting their agriculture & allied expenditure by 6.9 percent. Further, the loan has utilized for construction purposes by 2.33 percent, medical treatment by 4.6 percent and social ceremony by 6.98 percent farmers respectively. Next category of farmers is semi-medium farmers and this group of farmers spends their agriculture loan mainly on social ceremony by 8.3 percent farmers followed by expenditure on medical treatment (4.7percent), construction (4.7percent) and agriculture & allied (4.7percent) respectively. The last category of farmers is the medium farmers and it has been observed that around 15 percent of medium farmers utilize agricultural loans for agriculture & allied purposes while 10 percent utilize the loan for construction purposes. Moreover, 5 percent of farmers utilize the loan for purchasing machines & equipment and similarly 5 percent of farmers incurring expenditure on social ceremony. The overall table exhibits that the majority of the farmers among all the farm sizes utilize their loan for agriculture and allied purposes and as well as in order to fulfill their additional regular expenditure too.

Further analysis of the farmer's incomes requires familiarity with the used terminology. In this context the saving & expenditure attributes, income from the other sources are defined below:

Income from Livestock- This is the income a household earns from the sale of various products like milk, eggs and live animals. The total value of this income source is calculated as the total value of milk, eggs, live animals, wool, fish, honey, hides, bones, manure and so on. The costs incurred will include the cost of animal 'seeds', animal feeds, veterinary charges, interest, lease rent, labor charges and other expenses. The total costs are subtracted from the total value to obtain net income from animals.

Income from Nonfarm Activity- This is the income that the household earns by engaging in nonfarm businesses. Information related to expenses, output and net receipt of nonfarm businesses engaged by households was collected. Under this head of income, households have found to be self-employed, utilizing their skills to earn income.

Income from Wages and Salary- This is the income derived by various household members employed in labor outside their household –either in other's fields or in nonfarm enterprises. They may be casual labor or regular labor.

Table 5.29 divulges the annual Income of the households from sources other than agriculture that is aggregate of IFS1 & IFS2 and these are the occupational activities, carried out by the respondent family members as a unit. These two occupational activities are further classified and computed into three sources of income namely livestock, nonfarm & wage &salary group. Income from Livestock comprises dairy animal and poultry farming income such as earning from the sale of milk, sale of livestock itself, etc. On the other hand, income from non-farm activity mainly includes the self-employed group of households. In other words, it includes income other than agriculture income, livestock and wages & salary. At last, wage & salary comprise of casual labor, regular labor and regular payment based employees. Analysis reveals that Jansar village expounds the highest mean income of Rs.77250 obtained from 'non-farm activity' followed by income earned from 'wages & salary' (Rs.47,987)and 'livestock' (Rs.46274) under the IFS1. Further, the pattern of income earned under the IFS2 is similar to IFS1, as it also explains that the highest mean income Rs.40,000 obtained from 'non-farm activity' followed by income earned from 'wages & salary' (Rs.36,000) and 'livestock' (Rs.16,000) In addition to this, Sithauli village shows that under the IFS1; highest annual mean income of around Rs. 62708 is obtained from 'non-farm activity' followed by 'livestock' (Rs.45314) and 'Wages& salary' of Rs.40829.On the other hand, IFS2 for Sithauli village exhibits that maximum mean income around Rs.36250 earned from 'non-farm activity' followed by 'Wages& salary' of (Rs. 32750) and 'livestock' (Rs.12300). Now coming to the Charsoni village and it expounds the highest annual mean income of around Rs.49478obtained by households from the 'Non-farm activity' followed by 'wage & salary' (Rs.46757) and 'livestock' (Rs.43433) under the IFS1. In addition to this, IFS2 reveals that the highest mean income is earned from 'wages & salary' (Rs.29550.) followed by 'livestock' (Rs.12300). Lastly, the Jonai village exhibits that the highest annual mean income under the IFS1 is earned from 'non-farm income' (Rs.1, 82,095) followed by 'wages & salary' (Rs.1, 21,683) and 'livestock' (Rs.56,763) whereas under the IFS2 highest income of around 136000Rs. obtained from 'wages & salary' followed by 'livestock' Rs. 26750.

Table 5.30 shows a slightly different perspective as it depicts farm wise income earned by households from other sources. This is clear from the table that the marginal farmers obtain relatively lesser income through IFS1 & IFS2. Marginal farmers earn the highest mean income aroundRs.51370under the IFS1 from 'nonfarm activity' followed by 'wages & salary'

(42415Rs.) and 'livestock' (Rs.44933). In addition to this, marginal farmers obtain the highest mean income from 'nonfarm activity' (Rs.37500) followed by 'wages & salary' (Rs.31689) and 'livestock' (Rs.14203) under IFS2. However, the table clears that IFS1 is greater than IFS2.

The second category of the farmer is small farmers, and the mean income for the 'Non-farm activity' is highest (Rs.60,000) followed by 'livestock' (Rs.53685)and 'wages &Salary' (Rs.52,052). Moreover, IFS2 shows that small farmers have earned an income around Rs. 26250 from 'livestock'. Now coming to the semi-medium farmers, and it shows that farmers obtain highest mean income from the 'wages & salary' (Rs.247500) followed by 'non-farm activity' (Rs.132214) and livestock (Rs.71433) under the IFS1 while IFS2 exhibits that farmers earn highest mean income of around Rs.168000 from 'wages & salary' and Rs.34500 earn from livestock. Lastly the table reveals the income under IFS1 and IFS2 earned by medium farmers. Table expounds that under the IFS1, the highest mean income of around Rs.324000 earn from 'wages & salary' followed by 'non-farm activity'(Rs.257,500) and 'livestock' (Rs.60,250). Further, the IFS2 segment of income exhibits that medium farmers earn income from wages and salaries only. Hence, it may be concluded from the above analysis, that major sources of income other than agriculture for the marginal and small farmers are non-farm activity but in case of semi-medium and medium farmers, the highest income is earned from wages and salary. It is evident from the table that Highest mean income other than agriculture is obtained by semi-medium and medium farmers in the selected villages.

Table 5.31 exhibits village wise total household income of respondents from agriculture sources as well as from sources other than agriculture and the Net Savings. The analysis shows that village Jansar has the total mean productivity of 32 quintals per hectare with the average net agriculture income Rs.8422 from both the seasonal crops. Besides this, the average NIFOS is stood at Rs.35469 per annum and the total average income of the households is around Rs.43891 per annum. However, the total household expenditure is found to be higher than total income, consequently, the saving of the households have found to be negative (Rs. -2992). In addition to this, second village Sithauli is also showing the same kind of results, as the majority of the farmers are marginal farmers, therefore the total agricultural productivity of the households in this village also observed to be low at 22 (quintal/per hectare) whereas the net mean agriculture income stood at Rs.3413. The noteworthy fact to be mention here is that farmers' survival is

become possible due to the net income earned from other sources and the average "Net Income from Other Sources" (NIFOS) is stood at Rs.34461The average total income of the households from Sithauli village is stood at Rs. 37873 As the total income is to be low, so after adjusting the average annual household expenditure, annual saving of the households have detected to be negative (Rs.- 6863). Due to this, they still have been anguishing with poverty and less income-generating capacity. The Charsoni village explicates that the average total productivity of the farmers have found to be 23 (quintal per hectare) and the average net agriculture income stood at Rs.2347. The table shows that the average NIFOS of households is Rs.31354.5. Table points out that average total income (Rs. 33702) is smaller than average household expenditure per annum, consequently, the average saving of the households is stood at Rs. - 8032. per annum. Lastly, the Jonai village exhibits the highest average total productivity of around 226(quintal per hectare) among all four selected villages. The average net agriculture income for this village has found to be Rs.177848 and the average NIFOS of the households stood at Rs.71753. Hence this village observed to have the highest average total income of around Rs.249601. Therefore, the average savings of the households also noted to be highest and positive with Rs.153753.

After the village wise elaboration of the average income & expenditure scenario, this above table depicts land holdings wise the average income & expenditure of the households. Table 5.32 shows four classes of farms; marginal, small, semi-medium and medium. The first observing fact seems in the table is that total productivity inclines as the class of farmers move from marginal to medium farmers. Datum reveals the differences in the marginal and medium farms total productivity where the marginal farm total productivity stood at 22 (quintal/hectare) and total productivity of medium farm stood at 528 (quintal/hectare). The average total income of the marginal farms, which comprises agriculture income (Rs.18211) & (NIFOS) Net income from other sources (Rs.31657), seems to be relatively low as compared to another category of farms. Moreover, after adjusting "Average Household Expenditure" (AHE) with the total Income, the mean saving of marginal farms are observed to be negative with Rs.9854. The computation of the average saving for small farmers is equally pitiable and surprising. The total productivity of the small farm observed at 78 (quintal/hectare) with the average agriculture income of around Rs.40153. Further, the average net income from other sources of the small farmers stood at Rs.39920. The total income of the small farmers is relatively high as compared to marginal farmers and it stood at Rs.80072. However, they have traced with a very little amount of average

saving with Rs.7525. The third farm category of semi-medium shows that the total average productivity of the farmers is observed at 221 (quintal per hectare). The mean agriculture income (Rs.15363) and average net income from another source (Rs.79882) are slightly high as compared to marginal and small farms' total income. Hence, consequently, annual saving is also relatively higher for semi-medium farmers. Lastly, the table exhibits the estimation of the average income & saving for the medium farms. Medium farmers are earning the highest income through agriculture source as the total productivity for the medium farms stood at 528 (quintals per hectare). The total income of the medium farmers comprises of net agricultural income (Rs. 474645) & net income from other sources (Rs.141655) therefore the total income stood at Rs.616299. On the other hand, total household average expenditure stood at Rs.139749 and saving incurred by the medium farmers stood at Rs.476506. Hence, it can be interpreted from the above table that the medium farms are better off than marginal, small & semi-medium farms, as they have the larger land size so the income & large scale of economies are privileged by them. On the contrary, marginal & small farmers are found to be worsen-off in terms of total incurred Income & savings too. It may be concluded that farm size is highly significant in order to generate better income capacity and to create adequate savings for future agricultural production.

Participation of Farmers in Agricultural Programs

Agricultural policies are designed and implemented by a complex system of institutions. The states have the constitutional responsibility for many aspects of agriculture, but the central government plays an important role by developing national approaches to policy and providing the necessary funds for implementation at the state level. It examines the reach of various Policies designed for the betterment of the crop production and extension of agriculture from the perspective of the farmers. There are three departments in the Ministry of Agriculture and Farmers Welfare viz. Department of Agriculture, Cooperation and Farmers Welfare; Department of Agricultural Research and Education and Department of Animal Husbandry, Dairying and Fisheries. But with the change in central government in the year 2014, the schemes of the ministry were also reorganized, consolidated and mixed with new schemes. This section examines the Scheme running under Krishionnati Yojana. This umbrella covers all high flying schemes of Department of Agriculture, Cooperation and Farmers Welfare which related to crop cultivation, soil quality expansion, marketing extension, improvement in production, etc."Green

Revolution – Krishonnati Yojana" is an Umbrella Scheme in agriculture sector that has been implemented since 2016-17 by clubbing several schemes/missions under one umbrella scheme. This Yojana covers some set of Missions such as Mission for Integrated Development of Horticulture (MIDH), National Mission for Sustainable Agriculture (NMSA), Sub-Mission on Agriculture Extension (SMAE), Sub-Mission on Seeds and Planting Material (SMSP), Sub-Mission on Agricultural Mechanization (SMAM), etc. Sub Mission on Plant Protection and Plan Quarantine (SMPPQ). In order to assess the access of farmers to the agricultural policy, some set of questions have been directly asked the farmers and their responses are explained here. Agriculture policy is highly imperative for agricultural advancement in general and farmers in particular. Various modifications, new policy initiatives and its implementation have been taking place from time to time at regular intervals in India. From tilling of the soil to the sowing and harvesting of the crop, farmers have been confronting a lot of practical difficulty in agricultural operations. Therefore the schemes have been purely designed in order to facilitate the farmers. Nevertheless, how much farmers are deriving benefit from agricultural policy and schemes, this interrogation has been entertained below.

Table 5.33 & figure 5.29 explicates the diverse magnitude of the soil fertility problem faced by farmers in the surveyed area. This problem has analyzed village wise as well as farm wise and it is evident in the table that 95 percent of farmers from the Jansar village, have “very high” soil fertility problem, similarly from the Sithauli village 98 percent from this village are found the “high” soil fertility problem that affects the quality of agricultural produce. On the other hand, 42 percent of farmers from Charsoni village have been reported a “high” soil fertility problem and 58 percent farmers have found with the “very high” soil fertility problem. Lastly, the Jonai village reveals that out of 80 samples, 37 percent of farmers have suffered from “low” soil fertility problems, 20 percent of farmers have “modest” soil fertility problems and remaining 43 percent of farmers have responded to “high” soil fertility problem. In addition to this if we analyze this problem in terms of farm size that marginal farmers have stood at the top as their cultivation is afflicted by very high soil fertility problems. Figure 5.34 shows that around 85 percent of the marginal farmers have encountered the “very high” soil fertility problem and the remaining 15 percent responded to have a “high” soil fertility problem. In case of small farms around 88 percent of farmers have been observed with the ‘high” soil fertility problem while rest 15 percent is perceived with the modest fertility problem. If we considered semi medium

farmers, it has been evident that 58 percent of farmers facing "modest" fertility problem whereas 42 percent farmers are reporting "low" soil fertility problems. Lastly in case of medium farms, all farmers have been encountered the "low" soil fertility problem. It may be concluded that the marginal & small farms have been confronted with the relatively more soil fertility problem as compared to the semi-medium & medium farms. This may affect the quality and quantity of the crop produce of the marginal & small farmers.

Table 5.35& figure 5.31 reveals the village wise obtainment of the soil health card. The distribution of the soil health card is executed under the National Mission for sustainable agriculture (NMSA). The analysis shows that maximum soil health cardholder has been observed form the village Jonai with the highest majority of 53 percent followed by Charsoni, Jansar and Sithauli village with the majority of 33 percent, 28 percent and 21 percent of the cardholders respectively. Jonai village is the only where around 42 farmers out of total samples from the village have soil health card which flaunts the highest number of soil health cardholders while Sithauli village exhibits only 17 farmers out of total samples obtain soil health card and stood with the lowest number of the soil health cardholders. Therefore, this is clear from the table that most of the farmers from first three villages don't possess soil health card. Furthermore, the situation is evident in these villages more pathetic, as farmers are not even aware of any kind of this scheme.

In addition to this analysis of the soil health cardholder have been presented farm wise in table 5.36 & figure 5.32. This is clear from the table that 65 marginal farmers out of 233 marginal farmers are obtaining soil health cards. It implies only 28 percent of marginal farmers are obtaining soil health cards. On the other hand, in case of small farmers, 30 farmers out of 43 small farmers have obtained soil health cards. Figure 5.34 also depicting that 70 percent of small farmers attain soil health cards while in case of semi-medium farmers 50 percent of them are obtaining soil health cards and the remaining 30 percent and 50 percent of the farmers from these farm size do not have soil health cards. Lastly, from the medium category of farmers, no farmers obtain soil health cards. As the earlier table 5.34 reveals no farmers from the medium category is confronting with the soil fertility problem, hence it may be the reason that no one attains soil health card under this class of the farmers. Nevertheless, marginal farmers are those farmers who have been anguishing with soil fertility problems and on the other hand also not obtaining soil

health cards as only 28 percent of marginal farmers are obtaining soil health cards. This finding fact reflects the poor quality and quantity of their crop produce in the villages.

Table 5.37 and figure 5.33 shows village wise number of farmers utilizing various schemes running under PMFBY, such as Agriculture & Allied insurance (A&AI), Agriculture Tractor Insurance (ATI), Agriculture Pump set Insurance (API) and Weather Based Crop Insurance (WBI). The table shows that no farmers from Charsoni village have any kind of crop & equipment insurance while 2 farmers from Sithauli village, 5 farmers from Jansar village and 58 farmers from Jonai village have availed Agriculture & Allied Insurance. Moreover, 13 farmers from the Jonai village have Agriculture tractor insurance while 9 farmers have weather-based crop insurance. The table shows that Jonai village farmers are using this Yojana in a better way as compared to the farmers from the rest of the villages. Figure 5.33 divulges that Jonai village is the village where around 73 percent of farmers have insurance under Agriculture & Allied insurance scheme (A&AI) while 16 percent of them have insurance under Agriculture Tractor Insurance scheme (ATI), and 11 percent of farmers have insurance under Weather Based Crop Insurance Scheme. The majority of the farmers from the first three villages don't have insurance under any scheme running under PMFBY as 94 percent of farmers from Jansar, 98 percent of farmers from Sithauli and 100 percent farmers are without any kind of agricultural insurance.

Table 5.38 & Figure 5.34 shows the farm wise engagement of the farmers under the various scheme of PMFBY. Table clears that among four categories of farmers, the insurance scheme is mostly utilized by semi-medium & medium category of farmers for the agriculture & Allied Insurance Scheme. Figure 5.34 expounds that under A&AI scheme maximum percent of farmers with the insurance are found under semi-medium & medium category of farmers. 75 percent of farmers from the semi-medium farmers are attaining the insurance under A&AI followed by medium, small and marginal farmers with 65 percent, 49 percent and 6 percent respectively. The figure clearly reflects that the marginal farmers are not utilizing various schemes functioning under PMFBY as 94 percent of them don't have insurance under any scheme. The small farmers are still ahead to the marginal farmers as 49 percent of them insured their crops under A&AI and 21 percent have weather-based crop insurance (WBI) as well. There may be an issue of awareness regarding the various insurance schemes running under PMFBY and possession of lesser land size also demoralizes them to go for insurance.

Table 5.39 reveals the village wise farmers availing the facility of godown and cold storage. This is clear from the table that except Jonai village no farmers from the villages are utilizing godown and cold-storage facilities. It implies that the farmers are using their own mode of keeping agricultural produce till the selling of it. Figure 5.35also divulges that only 34 percent of farmers from Jonai village using godown facilities while from the remaining village 100 percent of farmers are not utilizing these facilities. On the other hand, table 5.40 exhibits the farm wise status of the facility of godowns and cold storage usage. This is clear from the table that farmers under semi-medium and medium categories are availing the facility of godowns and cold storage. Figure 5.36 shows that 70 percent of medium farmers and 54 percent of semi-medium farmers are availing the facility of godowns and cold storage. No farmers have been observed in the marginal and small categories, who are availing this facility.

Table 5.41 & figure 5.37 describes the village wise farmers receiving assistance for horticulture crops under MIDH (Mission for Integrated Development of Horticulture) & for organic farming under (PKVY) (Paramparagat Krishi Vikas Yojana). Table clears that no farmers from any chosen village are getting any kind of assistance for post-harvest management, technology Investment and expert services for horticulture crop and for cluster formation, conversion of land into organic farming and establishment of Vermi-compost for organic farming. Moreover, the matter of sorrow is that the farmers even are not aware of the existence of such kind of schemes even. This purely indicates the scenario of asymmetric information. In addition to this table 5.42 & figure 5.38 shows farm wise farmer availing the assistance facility for horticulture crop & organic farming, the result is the same. The total samples of the village are classified into four categories of farmers and no farmer with the assistance facility is observed in the village. Hence, consequently, no farmers are found under any class of holdings also. It is clear from the table that the farmers may not be aware of these assistance facilities and still engaged in traditional crop production. Therefore, the participation of farmers in these agricultural practices is negligible.

Table 5.43 & figure 5.39explicates village wise number of farmers availing loan through Agri Clinics & Business Centers Scheme and involved in the model training courses also under the national mission on agriculture extension & technology (NMAET). This is the disappointing fact that no farmers from any village has been involved in these model training courses and also not

availing the facility of loan from Agri Clinics & Business Centers. These schemes& facilities are showing the supply side of it but no farmer is aware of this kind of scheme and courses in the chosen area. Therefore, farm wise analysis (table 5.44 & figure 5.40) also explains zero participation in this scheme irrespective of the categories of the farm.

Table 5.45 shows the village wise number of farmers using the facility of Kisan Call Center. This is clear from the table that except Sithauli village responses for yes have been observed in the remaining villages. Figure 5.41 shows that 16 percent of farmers from Jansar village, 17 percent of farmers from Charsoni village and 19 percent of farmers from Jonai village have used the facility of Kisan call center. Furthermore, it shows that the majority of the farmers from all the chosen villages have not used this facility. In addition to this farm wise analysis of availing the facility of Kisan call center also has been presented in the table 5.46and it shows that Kisan Call Center facility has used by small farmers with 26 percent followed by marginal farmers of around 12 percent, medium farmers of 10 percent and semi-medium farmers of 8 percent respectively. Hence, this is clear from figure 5.42 that the majority of the farmers are not using this facility irrespective of the holding category. It unveils by the figure that around 88 percent of marginal farmers, 74 percent of small farmers, 92 percent of semi-medium farmers and 90 percent of medium farmers are not using the facility of Kisan call center. This also has been informed by the farmers that maximum time the call has not been picked by Kisan call center workers. The facility has its own strength but due to improper communication between information receivers (farmers) and information giver (call-center worker), its utilization potential is still low. Moreover, the non-picking calls cases also reported by the farmers in the villages.

Table 5.47 & figure 5.43explains the village wise and farm wise awareness regarding the usage of pesticide residues in food crops under the NMAET. This awareness is provided to the farmers through its ongoing sub-scheme named as SMPP (Sub Mission for Plant Protection). The table exhibit that all the farmers from the chosen village are unaware of these kinds of awareness programs, so the implication of this in the production has not been realized yet. Table 5.48& figure 5.44 also demonstrates the same datum in terms of the different farm size in the villages.

Table 5.49 & 5.50, shows the village wise and farm wise involvement of the farmers in the seed production activity. No farmers are traced in the production of seed from all the four villages. It means that no seed production activity is carrying out in any village. Seed production activity is handled under the submission of plant protection (SMPP) and this submission has been running under NMAET. Further same fact demonstrates in figure 5.45& 5.46. This sub-plan has been designed to motivate the farmers to involve themselves in the seed production activity. This activity has further spread effect.

Table 5.51& figure 5.47explicates the village wise interaction of the farmers with the farmers' friend. The Farmer's Friend plays a vital role in reaching out to farmers through messages and organizing camps in villages for training. The purpose of the program is to disseminate technical messages relating to agriculture to the farmers. As per the program, one farmer from two neighboring villages will be taken, who will be provided training to let the other farmers know about government schemes. This scheme is running under ATMA Cell. Table clears that maximum interaction of the farmers with the "farmer friend" is found in the Jonai village as figure 5.47 implies 42 percent farmers from Jonai village interact with the "farmer friend" followed by Jansar village &Sithauli village where 20 percent of the farmers & 14 percent of the farmer have actively interacted with the "farmer friend". There is no farmer has been observed in the Charsoni village, who interacted or attended any training given by "farmer friend".

Table 5.52 & figure 5.48 shows how much farmers from each farm class have interacted with the farmer friend. It divulges that 20 farmers out of 233 marginal farmers which constitute around 9 percent of the marginal farmers have interacted with the farmer friend. In case of small farmers, 7 farmers out of 43 farmers have interacted with the farmer friend and attended some training demonstration running under it. The third category of the farmer is semi-medium farmer and it shows that 79 percent of semi-medium farmers have interacted with the farmer friend and also acknowledged with some training process bestowed by them. Lastly, under the medium category of farmers 15 out of total 20 medium farmers which constitute around 75 percent of the farmers have been encountered with the farmer friend. The figure demonstrates that the majority of the marginal farmers around 91 percent have not ever confronted with the farmer friend so no mutual knowledge transaction has happened between the marginal farmers and farmer friend (figure5.48).

Table 5.53 & figure 5.49 reveal the village wise and farm wise demonstration of the technology. It exhibits in the table that there is no demonstration of Technology that has happened in the chosen villages. It indicates the instance of asymmetric information from the supply side to the user (demand) side. Demonstration of the technology or of some new agricultural inputs has been given space under NMAET. But it exactly functioned through the sum-mission of Agricultural Mechanization (SMAM) which is the important component of NMAET. Demonstration of technology is a very useful tool to update the farmers to inculcate the use of new technologies with the practical approach. Nevertheless, unfortunately, these farmers are not able to obtain any kind of gain so they are also not able to imply it on a real ground. In addition to this, the farm wise analysis also explicates that the negligible participation of farmers in terms of learning of the new production techniques in different categories of farms (table 5.54 & figure 5.50).

Basic Amenities in Uttar Pradesh:

Basic amenities are an essential foundation for a decent living and it enhances economic growth and quality of life. The scope of basic amenities includes safe drinking water, sanitation, housing, road, electrification, fuel, connectivity, healthcare center, school, playground and recreational facilities and many more. This Section of the analysis reveals the basic infrastructure avails by each chosen village. The Foremost Priority of this amenities provision is to enhance the quality of life in the villages. Moreover, the basic amenities such as using individual toilets, housing taps, electricity connection, government hospital facility, availability of doctors and medicines have been analyzed. The poor and marginalized sections are living in rural affluent society are basic amenities in spite of dedicated schemes and budgetary allocations. Still, there are many villages and hamlets where basic amenities are a daydream. In the above context, basic amenities conditions have been analyzed in the surveyed area in order to assess the current situation of the village.

Table 5.55 & figure 5.51 exhibits the number of households is using the toilets for sanitation purposes in the village. This is clear from the table that in the first three village users of toilets or households having toilets in their home are lesser as compared to the last village Jonai. The table shows that 24 out of 80 households have the toilet in their homes from Jansar village which

comprises around 30 percent users of toilets from this village. On the other hand the second village Sithauli reveals that 18 out of 80 households *i.e.* around 22 percent of households have the toilet in their homes. It implies that awareness for making and using the toilets is neglected by the households in these villages. Furthermore, the third village Charsoni exhibits that only 12 households out of a total 80 households have toilets in their homes i.e. around 15 percent of households are using toilets. Lastly, the Jonai village shows that 48 out of total of 80 samples have toilets in their homes i.e. around 60 percent of toilet users have been observed form this village. Overall it may be said that households from these villages are not highly concerned about sanitation and its importance in order to improve their quality of a healthy life.

Table 5.56 & figure 5.52 shows the electrification status in the village. It has been observed that all the villages have been electrified. The definition of electrification as per the "Deendayal Upadhyay Gram Jyoti Yojana" has been considered. The village would be treated as an electrifying village if a) Basic infrastructure such as Distribution Transformer and Distribution lines are provided in the inhabited locality as well as the Dalit Basti hamlet where it exists. B) Electricity is provided to public places like Schools, Panchayat Office, Health Centers & Dispensaries, Community centers, etc. c) The number of households electrified should be at least 10% of the total number of households in the village. Therefore, if any of the above conditions is satisfied, the village would be regarded as an electrified village. Figure 5.52 shows that the villages namely Jansar, Sithauli, Charsoni and Jonai have 100 percent electricity connection. It implies that all the villages are connected to the electricity but how many households of the villages have taken the connection of it is difficult to assess. Hence, the next table 5.57 is important regarding this.

Table 5.57 & figure 5.53 exhibits the number and percentage of the households having a connection of power. It has been observed from the village Jansar that 36 out of 80 households have connection of electricity which comprises around 45 percent of the households while 46 out of 80 households (47percent) have power connections in Sithauli village. Table explicates that in the third village Charsoni, 41 out of 80 households *i.e.* around 51 percent of total households have power connections in their home. Moreover, lastly the Jonai Village shows the 100 percent electricity connection taken by households and they are using power connections instead of traditional sources of power such as kerosene or fuel-based tools for lightening & other daily

requirements. It implies that in Jonai village each household have power connection and using it too.

Table 5.58 & figure 5.54 expounds the number of households using Individual taps in their home or having their own water source. Generally, households of the villages have brought water from the outside for their day to day requirements. But now these days to access the water or having an individual tap is an imperative part of the basic amenities urged in the villages. Therefore, this table shows the number of households using individual taps for access to water in their homes in the villages. the first village Jansar reveals that 40 out of 80 households have taps in their home i.e. around 50 percent of the households have means of water while Sithauli village explains that 54 out of 80 households have taps in their home, i.e. around 68 percent households are using taps in their homes for accessing the water. In addition to this, the third village Charsoni shows that 45 out of 80 households have tap in their home which shows that around 56 percent of households from this village are using taps for water access in their home. Lastly the Jonai village is the only village where 100 percent individual tap users have been observed in the village as the 80 out of total 80 households have been found with the individual tap connection in their home for water in this village.

Table 5.59 & figure 5.55 exhibit the facility of the government hospital in the village is available or not. The table reveals that there is no government hospital in the first two villages i.e. Jansar and Sithauli while Charsoni & Jonai village has a government hospital. Figure 5.55 implies that 100 percent of households from Jansar and Sithauli have responded to no government hospital facility available in their village. Besides this, in Charsoni & Jonai village 100 percent of households have been responded that there are government hospitals in the village. Nevertheless, having a government hospital in the village is necessary but not a sufficient condition for the provision of basic amenities to the households of the village. Therefore, the question related to the availability of doctors has been asked to the households and responses expounded disappointing facts. As there is no hospital in the first two villages so consequently no facility of doctors for treatment of the patient has been observed too. Furthermore, in Charsoni & Jonai village doctors are available for a few hours. So, households are generally left with the disease or late treatment of it due to the non-availability of doctors in the hospital. Table 5.60 & figure 5.56 shows that only 47 percent of households are responding "yes" for the availability of doctors

from Charsoni village while 33 percent of households from Jonai village have responded to the availability of doctors in the hospital.

Table 5.61& figure 5.57 describes medicines available in the hospital for the patients in the villages. It has been found that 52 out of 80 households i.e. around 65 percent of households get medicines at the right time from the hospital of Charsoni village. On the other hand, Jonai village shows that 32 out of total 80 households i.e. around 40 percent of the households got the medicines at a time from the government hospital. Hence this is transparent in the analysis that villages who have government hospitals, the non-availability of doctors and medicines still an obstruction in providing the basic amenities to the households of the villages. The villages without government hospitals or health centers require more attention in order to improve the quality of life of the households of the villages.

Table 5.62 signifies the farmer's willingness to engage in a different kind of farming system. This is clear from the table that around 67.5 percent of farmers from Jansar Village willing to become a part of group farming whereas 32.5 percent of farmers do not willing to engage in any kind of farming system. It implies that these farmers want to continue their individual farming practices. Now, coming to the second village Sithauli, shows that 82.5 percent of farmers willing to become a part of group farming while only 17.5 percent want to continue individual farming. This reality has been observed that due to the lesser possession of agricultural land farmers reveal disinterest in participating in group farming, cooperative farming or contract farming, corporate farming. Further, third village Charsoni exhibits that around 71.25 percent of farmer wants to engage in contract farming as in the nearer village this kind of farming is being operated and farmers are at least earning regular subsistence income from it. On the other hand, around 28.75 percent of farmers are willing to engage in group farming. Lastly, the Jonai village shows 58.75 percent of farmers want to engage in group farming whereas 41.25 percent of farmers want to carry individuals farming practices in the villages.

Conclusion:

It is evident from the analysis that the land fragmentation is persisting in the selected villages. The land fragmentation is detected in a distinct manner for different farm sizes. It reveals the fragmentation index gets high as the farm size inclines except for the medium farms.

In addition to this, the Lorenz curve analysis demonstrates that the unequal distribution of land has been found with the unlike value of the Gini Coefficient for different farm sizes. Overall the Gini coefficient value is stood at 0.56, which signifies inequality in the land distribution for all the farms. Moreover, the discrepancies in the land distribution govern the return on investment for the different farm sizes in different modes. Therefore, farm wise return on investment has been computed. It exhibits that ROI 'Return on Investment' for the semi-medium and medium farms are relatively higher than the return on investment for marginal and small farms. The most important observed fact that disguised unemployment has been undergoing for the different farm size in unlike manner, and consequently makes net benefit 2 negative for the different farms. Similarly, total productivity, agricultural income, net income from other sources and saving analysis also reveals that total income and savings analysis for the semi-medium and medium farms are relatively greater than marginal & small farms. With an overview of farmers' participation in agricultural programs, it may be resolved that the majority of the marginal and small farmers are lagging behind in order to use and implement agricultural policy. This datum is also perceived in the analysis that most of the farmers are unacquainted with the agriculture schemes such as facility of godown& cold storage, assistance for horticulture & organic farming (MIDH & PKVY), Model Training courses and Loan through Agri Clinics & Business Centers Scheme (MTC & LT_AC& BCS), Awareness for the Use of Pesticides Residues in Food crop under SMPP, Seed Production Activity under SMPP, etc**.** Moreover, it also may be witnessed that there is improper functioning from the supply side for any specific facility such as Kisan Call Centre and Farmer friend, etc. Farmers share this fact that there are no grievances provided by the call center as workers are not responding to the call of farmers. Hence utilization of the schemes by the farmers has been found to be deficient in the surveyed area.

Furthermore, the general basic amenities stature flaunts that farmers are still not sensitized towards the use of toilets. Basic amenities in terms of using toilets, housing tap, electricity connection, government hospital and medicinal facilities are still lagging in the selected villages. It directly affects the standard of living of the farmers and ease of living life. These facilities are essential components of rural infrastructure; it signifies the poor stature of rural infrastructure in the villages that hinders the real potential of the farmers and keeping them far behind from participating as an active economic player.

Therefore, the findings reveal that Dr. Ambedkars' economic notion to consolidate or to collectivize the land resources is pertinent in the present era. His emphasis on the role of the state is equally imperative for the advancement of the farmers in order to the creation of reasonable income and their well-being in the future.

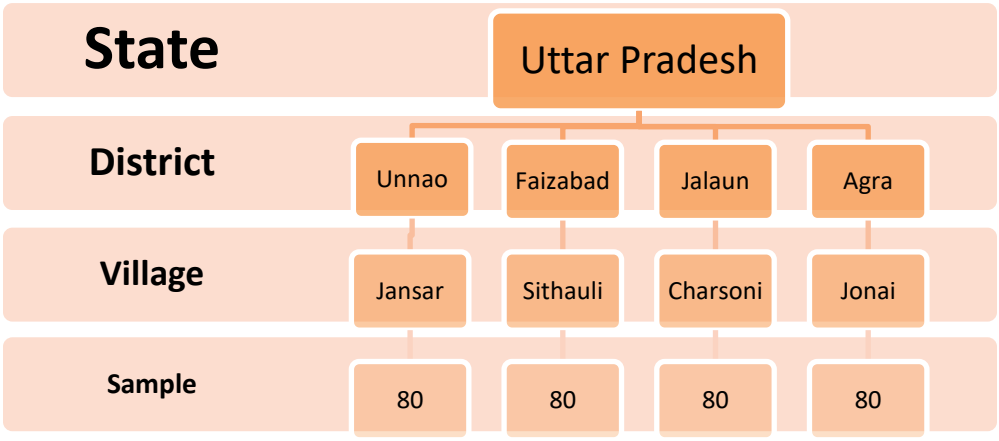
References

1. Agarwal, S. K. (1971). Economics of land consolidation in India. *Economics of land consolidation in India.*
2. Bentley, J. W. (1987). Economic and ecological approaches to land fragmentation: in defense of a much-maligned phenomenon. *Annual review of anthropology*, *16*(1), 31-67.
3. Blaikie, P. M. (1971). Spatial organization of agriculture in some North Indian villages: part I. *Transactions of the Institute of British Geographers*, 1-40
4. Burton, S. P. (1988). Land consolidation in Cyprus: A vital policy for rural reconstruction. *Land use policy*, *5*(1), 131-147.
5. Demetriou, D., Stillwell, J., & See, L. (2013). A new methodology for measuring land fragmentation. *Computers, Environment and Urban Systems*, *39*, 71-80.
6. Dovring, F. (1960). Land and labor in Europe, 1900-1950.
7. Hartvigsen, M. (2014). Land reform and land fragmentation in Central and Eastern Europe. *Land use policy*, *36*, 330-341.
8. Houston, J. M. (1953). Social geography of Europe. *Japanese Journal of Human Geography*, *7*(1), 76-76.
9. Hristov, J. (2009). Assessment of the impact of high fragmented land upon the productivity and profitability of the farms.
10. Karouzis, G. (1977). Land ownership in Cyprus; past and present (with special reference to Greek and Turkish ownerships).
11. Karouzis, G. (1980). Report on aspects of land tenure in Cyprus. *Report on aspects of land tenure in Cyprus.*, (Ed. 2).
12. King, R., & Burton, S. (1982). Land fragmentation: notes on a fundamental rural spatial problem. *Progress in Geography*, *6*(4), 475-494.
13. McPherson, M. F. (1982). *Land fragmentation: a selected literature review* (No. 141). Harvard University, Harvard Institute for International Development.
14. Mearns, R., & Sinha, S. (1999). *Social exclusion and land administration in Orissa, India*. The World Bank.
15. Papageorgiou, E. (1956). Fragmentation of land holdings and measures for consolidation in Greece. *Land tenure*, 543-547.

16. Rahman, S., & Rahman, M. (2009). Impact of land fragmentation and resource ownership on productivity and efficiency: The case of rice producers in Bangladesh. *Land Use Policy*, *26*(1), 95-103.
17. Schultz, T. W. (1964). Transforming traditional agriculture. *Transforming traditional agriculture.*
18. Shuhao, T. A. N., Heerink, N., Kruseman, G., & Futian, Q. U. (2008). Do fragmented landholdings have higher production costs? Evidence from rice farmers in Northeastern Jiangxi province, PR China. *China Economic Review*, *19*(3), 347-358.
19. Simmons, A. J. (1964). *An index of farm structure with a Nottinghamshire example*. Department of Geography university of Nottingham.
20. Tan, S. (2005). *Land fragmentation and rice production: a case study of small farms in Jiangxi Province, PR China*. Wageningen University.
21. Thapa, S. (2007). The relationship between farm size and productivity: empirical evidence from the Nepalese mid-hills.
22. Thomas, J. (2006). Property rights, land fragmentation and the emerging structure of agriculture in Central and Eastern European countries. *eJADE: electronic Journal of Agricultural and Development Economics*, *3*(853-2016-56129), 225-275.
23. Thompson, K. (1963). Farm fragmentation in Greece. *Centre of Economic Research,* Monograph Series 5, Athens.
24. Vanderpol, P. R. (1956). Reallocations of land in the Netherlands. *Land tenure*, 548-553.

Tables and Figures

Fig: 5.1 Sampling Distribution Structure of the Field Survey



Note: Primary Source

Table: 5.1Village Wise Religion Distribution

Religion	Village				
	Jansar	Sithauli	Charsoni	Jonai	Total
Hindu	73	67	70	77	287
%	(91.25)	(83.75)	(87.5)	96.25	(89.69)
Muslim	7	13	10	3	33
%	(8.75)	(16.25)	(12.5)	3.75	(10.31)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.2 Village Wise Religion Distribution

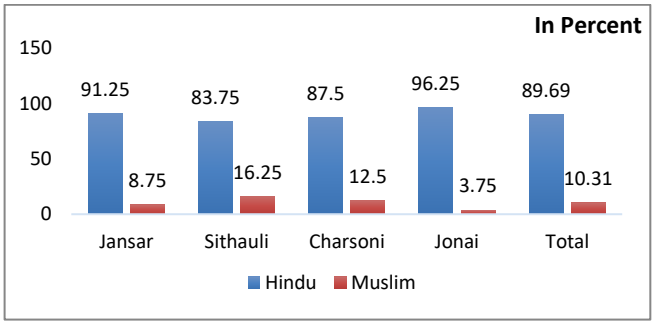


Table: 5.2 Village Wise Caste Distribution

Caste	Village				
	Jansar	Sithauli	Charsoni	Jonai	Total
General	9	7	9	19	44
%	(11.25)	(8.75)	(11.25)	(23.75)	(13.75)
OBC	20	24	18	56	118
%	(25)	(30)	(22.5)	(70)	(36.88)
SC	(51)	49	53	5	158
%	(63.75)	(61.25)	(66.25)	(6.25)	(49.38)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.3 Village Wise Caste Distribution

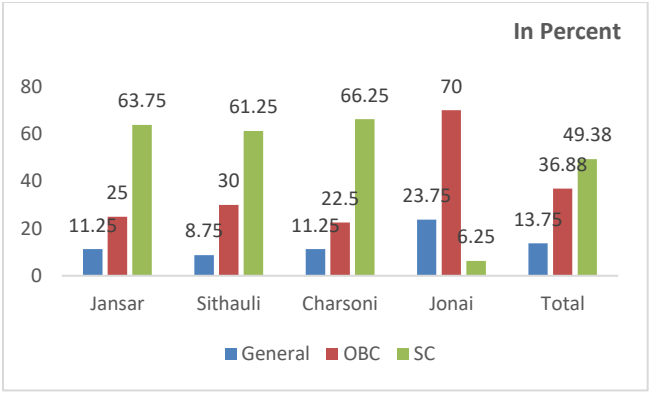


Table: 5.3 Village Wise Religion-based Distribution

Religion	Caste	Village				
		Jansar	Sithauli	Charsoni	Jonai	Total
Hindu	General	9	6	9	19	43
	%	(11.25)	(7.5)	(11.25)	(23.75)	(13.4)
	OBC	13	15	8	53	89
	%	(16.25)	(18.75)	(10)	(66.25)	(27.8)
	SC	51	46	53	5	155
	%	(63.75)	(57.5)	(66.25)	(6.25)	(48.4)
Muslim	General	0	1	0	0	1
	%	(0)	(1.25)	(0)	(0)	(0.31)
	OBC	7	9	10	3	29
	%	(8.75)	(11.25)	(12.5)	(3.75)	(9.1)
	SC	0	3	0	0	3
	%	(0)	(3.75)	(0)	(0)	(0.94)
Total		80	80	80	80	320
%		(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.4 Village Wise Religion-based Distribution

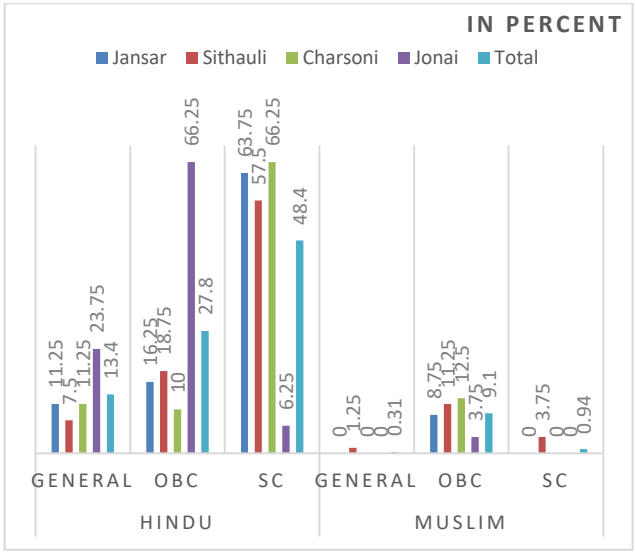


Table: 5.4 Farm Wise Classification of the Farmers

Farm Size	Village				
	Jansar	Sithauli	Charsoni	Jonai	Total
Marginal	75	78	80	0	233
%	(93.75)	(97.5)	(100)	(0)	(72.81)
Medium	0	0	0	20	20
%	(0)	(0)	(0)	(25)	(6.25)
Semi-Medium	5	2	0	17	24
%	(6.25)	(2.5)	(0)	(21.25)	(7.5)
Small	0	0	0	43	43
%	(0)	(0)	(0)	(53.75)	(13.44)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.5 Farm Wise Classification of the Farmers

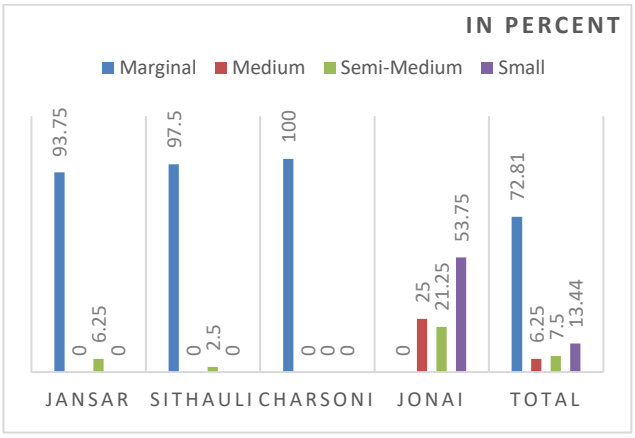


Table: 5.5 Village Wise Distress among Farmers

CTOF	Response	Village				
		Jansar	Sithauli	Charsoni	Jonai	Total
CTOF	Yes	31	21	27	33	112
	%	(38.75)	(26.25)	(33.75)	(41.25)	(35)
	No	49	59	53	47	208
	%	(61.25)	(73.75)	(66.25)	(58.75)	(65)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)
Yes Specify Reason_CTOF	NA	49	59	53	47	208
	%	(61.25)	(73.75)	(66.25)	(58.75)	(65)
	Less Opportunity	26	18	21	0	65
	%	(32.5)	(22.5)	(26.25)	(0)	(20.31)
	No Other Option for Livelihood	0	0	0	7	7
	%	(0)	(0)	(0)	(8.75)	(2.19)
	Satisfactory Income	5	3	6	26	40
	%	(6.25)	(3.75)	(7.5)	(32.5)	(12.5)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)
No Specify Reason_NCTOF	NA	31	21	27	33	112
	%	(38.75)	(26.25)	(33.75)	(41.25)	(35)
	Sluggish Job	6	9	15	21	51
	%	(7.5)	(11.25)	(18.75)	(26.25)	(15.94)
	Low Profitability	7	6	5	1	19
	%	(8.75)	(7.5)	(6.25)	(1.25)	(5.94)
	Irregular Income	36	44	33	25	138
	%	(45)	(55)	(41.25)	(31.25)	(43.13)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.6 Village Wise Distress Among Farmers

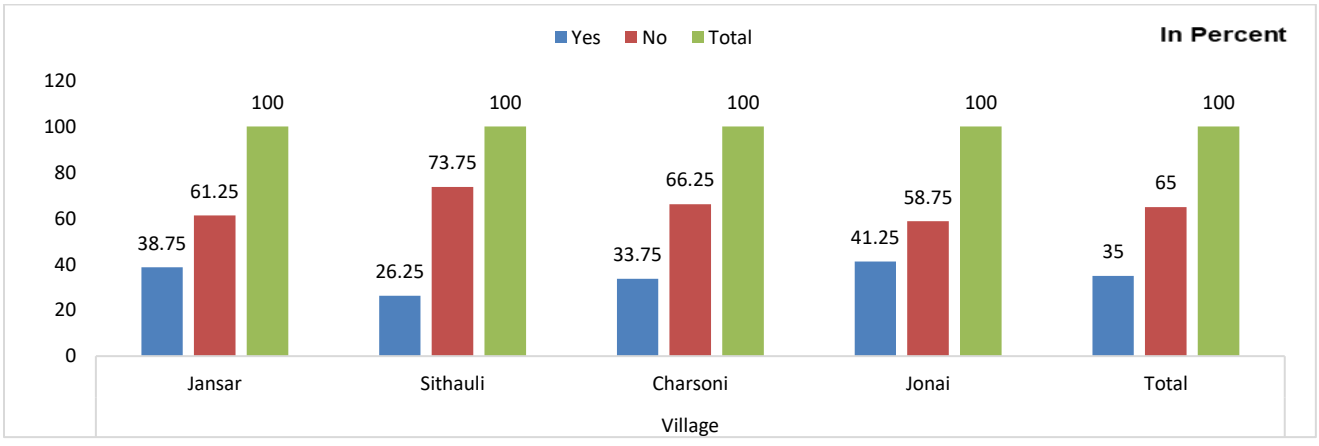


Fig: 5.7 Village Wise Distribution of Willingness to Continue Farming

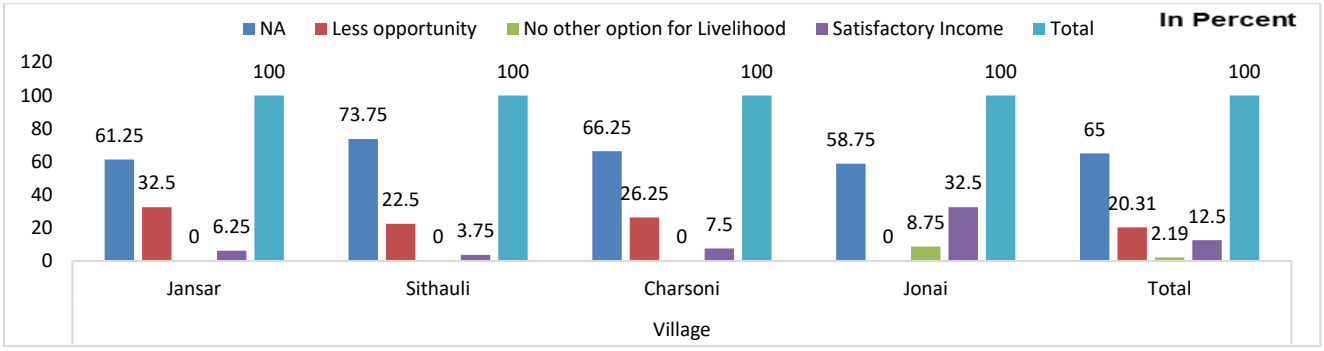


Fig: 5.8 Village Wise Distribution of Willingness to Discontinue Farming

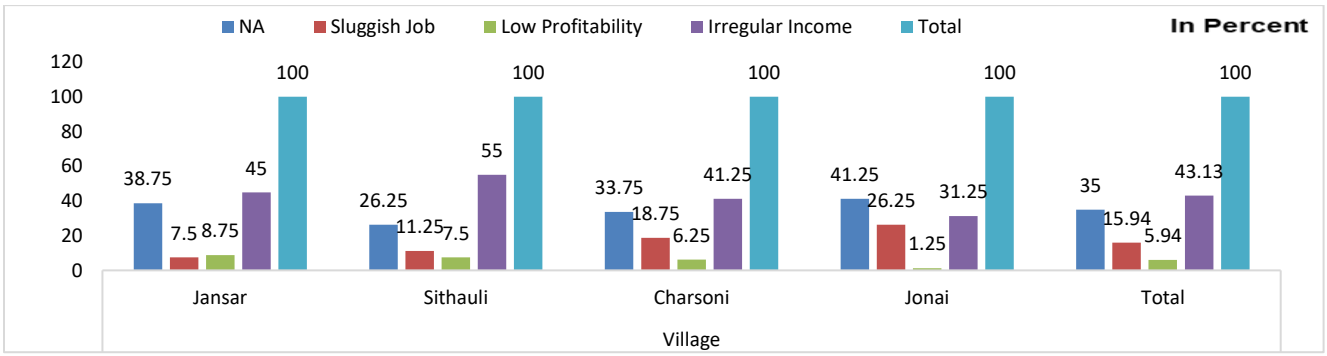


Table: 5.6 Socio-Economic Profile of Households

Socio-Economic Detail		Village				
		Jansar	**Sithauli**	**Charsoni**	**Jonai**	**Total**
Age	**Age (Mean Age)**	49.05	49.9875	47.725	54.975	50.43438
Gender	**Female**	5	7	10	2	24
	%	(6.25)	(8.75)	(12.5)	(2.5)	(7.5)
	Male	75	73	70	78	296
	%	(93.75)	(91.25)	(87.5)	(97.5)	(92.5)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)
Education	**Illiterate**	70	68	69	58	265
	%	(87.5)	(85)	(86.25)	(72.5)	(82.81)
	Below High School	2	8	5	13	28
	%	(2.5)	(10)	(6.25)	(16.25)	(8.75)
	High School	8	3	6	7	24
	%	(10)	(3.75)	(7.5)	(8.75)	(7.5)
	Senior Secondary	0	1	0	1	2
	%	(0)	(1.25)	(0)	(1.25)	(0.63)
	Higher Education	0	0	0	1	1
	%	(0)	(0)	(0)	(1.25)	(0.31)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Socio-Economic Detail		Village				
		Jansar	**Sithauli**	**Charsoni**	**Jonai**	**Total**
TOF	**Joint**	50	60	61	47	218
	%	(62.5)	(75)	(76.25)	(58.75)	(68.13)
	Nuclear	30	20	19	33	102
	%	(37.5)	(25)	(23.75)	(41.25)	(31.87)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)
Activity Status	**Student**	0	0	1	1	2
	%	(0)	(0)	(1.25)	(1.25)	(0.63)
	Domestic Work	2	2	3	9	16
	%	(2.5)	(2.5)	(3.75)	(11.25)	(5)
	Retired	0	0	0	2	2
	%	(0)	(0)	(0)	(2.5)	(0.63)
	Employed	77	78	72	67	294
	%	(96.25)	(97.5)	(90)	(83.75)	(91.88)
	House Maker	1	0	4	1	6
	%	(1.25)	(0)	(5)	(1.25)	(1.88)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)
Occupation	**Farmer**	77	76	80	76	309
	%	(96.25)	(95)	(100)	(95)	(96.56)
	Rural Labour	1	1	0	2	4
	%	(1.25)	(1.25)	(0)	(92.5)	(1.25)
	Urban Labour	0	1	0	1	2
	%	(0)	(1.25)	(0)	(1.25)	(0.63)
	Services	2	1	0	0	3
	%	(2.5)	(1.25)	(0)	(0)	(0.94)
	Others	0	1	0	1	2
	%	(0)	(1.25)	(0)	(1.25)	(0.63)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Table: 5.7 Village Wise Ancestral Occupational Distribution

OOA	Village				
	Jansar	**Sithauli**	**Charsoni**	**Jonai**	**Total**
Farming	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)
Labour	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Services	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Others	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.9 Farm Wise Rate of Sustainability and Un-Sustainability of Farming

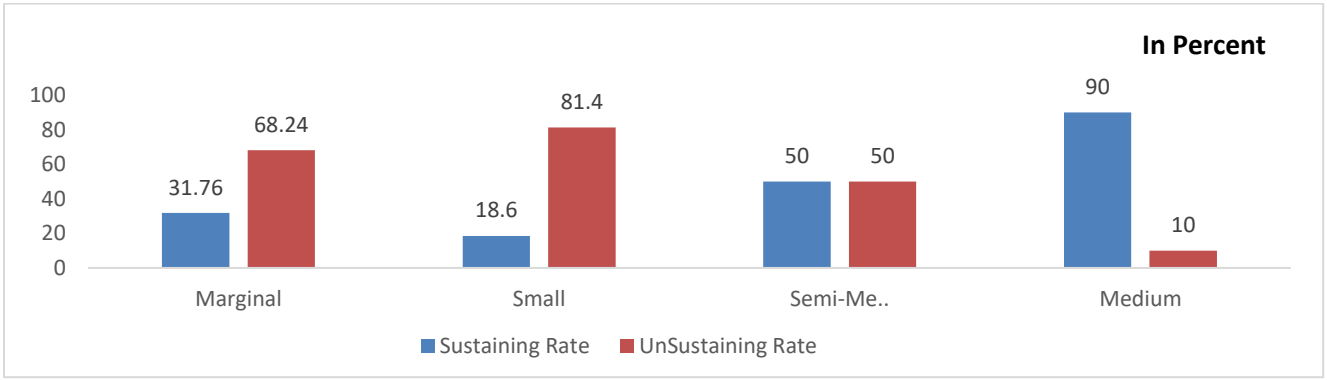


Table: 5.8 Village Wise Pattern of Land Distribution (In hectares)

Statistics	Total Land	lf1	lf2	lf3	lf4	lf5	lf6
Jansar							
Mean	0.67	0.52	0.21	0.07	0.01	0.00	0.00
Median	0.50	0.28	0.14	0.00	0.00	0.00	0.00
SD	0.74	1.61	0.29	0.21	0.11	0.01	0.00
Min	0.09	0.05	0.00	0.00	0.00	0.00	0.00
Max	3.89	14.50	1.83	1.28	0.97	0.10	0.00
Sithauli							
Mean	0.52	0.28	0.38	0.04	0.00	0.00	0.00
Median	0.45	0.27	0.18	0.00	0.00	0.00	0.00
SD	0.35	0.14	1.84	0.11	0.02	0.00	0.00
Min	0.09	0.09	0.00	0.00	0.00	0.00	0.00
Max	2.22	0.75	16.57	0.74	0.16	0.00	0.00
Charsoni							
Mean	0.49	0.26	0.18	0.03	0.01	0.00	0.00
Median	0.45	0.27	0.18	0.00	0.00	0.00	0.00
SD	0.20	0.10	0.14	0.07	0.03	0.00	0.00
Min	0.09	0.09	0.00	0.00	0.00	0.00	0.00
Max	1.00	0.50	0.50	0.27	0.23	0.00	0.00
Jonai							
Mean	3.26	2.66	1.09	0.67	0.18	0.07	0.01
Median	1.97	0.66	0.61	0.34	0.00	0.00	0.00
SD	2.58	7.24	1.16	1.35	0.39	0.17	0.06
Min	1.00	0.21	0.00	0.00	0.00	0.00	0.00
Max	9.75	40.00	4.88	8.29	2.38	0.81	0.54

Note: Primary Source

Table: 5.9 Farm Wise Pattern of Land Distribution (In hectares)

Statistics	Total Land	lf1	lf2	lf3	lf4	lf5	lf6
Marginal							
Mean	0.48	0.28	0.17	0.03	0.00	0.00	0.00
Median	0.45	0.27	0.18	0.00	0.00	0.00	0.00
SD	0.21	0.13	0.14	0.07	0.02	0.01	0.00
Min	0.09	0.05	0.00	0.00	0.00	0.00	0.00
Max	1.00	0.93	0.50	0.30	0.23	0.10	0.00
Small							
Mean	1.41	0.61	0.48	0.62	0.11	0.05	0.00
Median	1.36	0.48	0.45	0.27	0.00	0.00	0.00
SD	0.31	0.81	0.22	1.66	0.16	0.11	0.00
Min	1.00	0.21	0.00	0.00	0.00	0.00	0.00
Max	1.99	5.60	1.00	8.29	0.50	0.36	0.00
Semi-Medium							
Mean	3.17	1.62	1.51	0.76	0.26	0.14	0.02
Median	3.27	0.95	0.90	0.81	0.00	0.00	0.00
SD	0.61	2.83	3.23	0.40	0.36	0.26	0.11
Min	2.10	0.46	0.00	0.00	0.00	0.00	0.00
Max	4.03	14.50	16.57	1.33	0.97	0.81	0.54
Medium							
Mean	7.23	8.43	2.66	0.66	0.22	0.00	0.00
Median	7.24	3.22	2.97	0.00	0.00	0.00	0.00
SD	1.68	13.01	1.38	1.19	0.68	0.00	0.00
Min	4.13	2.02	0.00	0.00	0.00	0.00	0.00
Max	9.75	40.00	4.88	3.17	2.38	0.00	0.00

Note: Primary Source

Table: 5.10 Village Wise Perception of Farmers on Land Consolidation

PWFL	Response	Village				
		Jansar	**Sithauli**	**Charsoni**	**Jonai**	**Total**
PWFL	Yes	53	44	51	80	228
	%	(66.25)	(55)	(63.75)	(100)	(71.25)
	NO	27	36	29	0	92
	%	(33.75)	(45)	(36.25)	(0)	(28.75)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)
WPLCS	Yes	52	55	59	68	234
	%	(65)	(68.75)	(73.75)	(85)	(73.13)
	No	26	23	21	5	75
	%	(32.5)	(28.75)	(26.25)	(6.25)	(23.44)
	NA	2	2	0	7	11
	%	(2.5)	(2.5)	(0)	(8.75)	(3.44)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.10 Village Wise Perception of Farmers on Land Consolidation

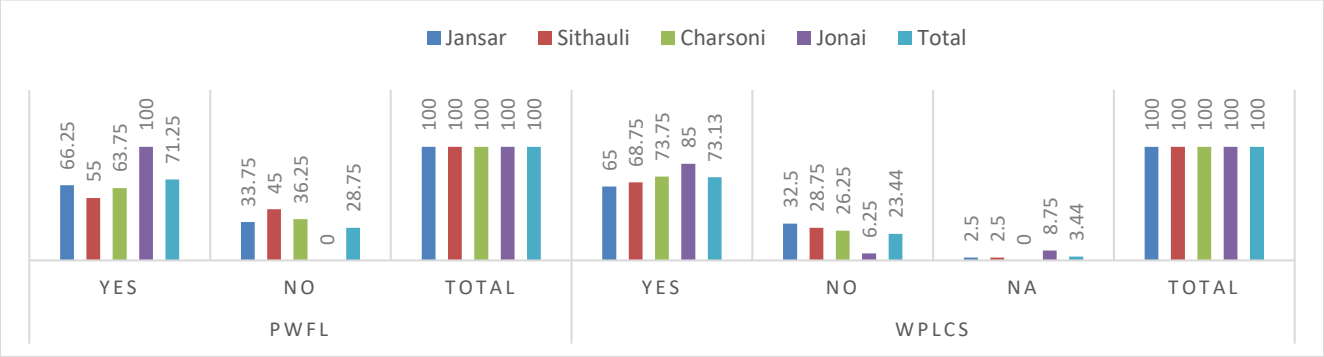


Table: 5.11 Farm Wise Perception of Farmers on Land Consolidation

PWFL	Response	Farm				
		Marginal	Small	Semi-Medium	Medium	Total
PWFL	Yes	164	42	22	17	245
	%	(70.39)	(97.67)	(91.67)	(85)	(76.56)
	NO	69	1	2	3	75
	%	(29.61)	(2.33)	(8.33)	(15)	(23.44)
	Total	233	43	24	20	320
	%	(100)	(100)	(100)	(100)	(100)
WPLCS	Yes	164	42	11	17	234
	%	(70.39)	(97.67)	(45.83)	(85)	(73.13)
	No	69	1	2	3	75
	%	(29.61)	(2.33)	(8.33)	(15)	(23.44)
	NA	0	0	11	0	11
	%	(0)	(0)	(45.83)	(0)	(3.44)
	Total	233	43	24	20	320
	%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.11 Farm Wise Perception of Farmers on Land Consolidation

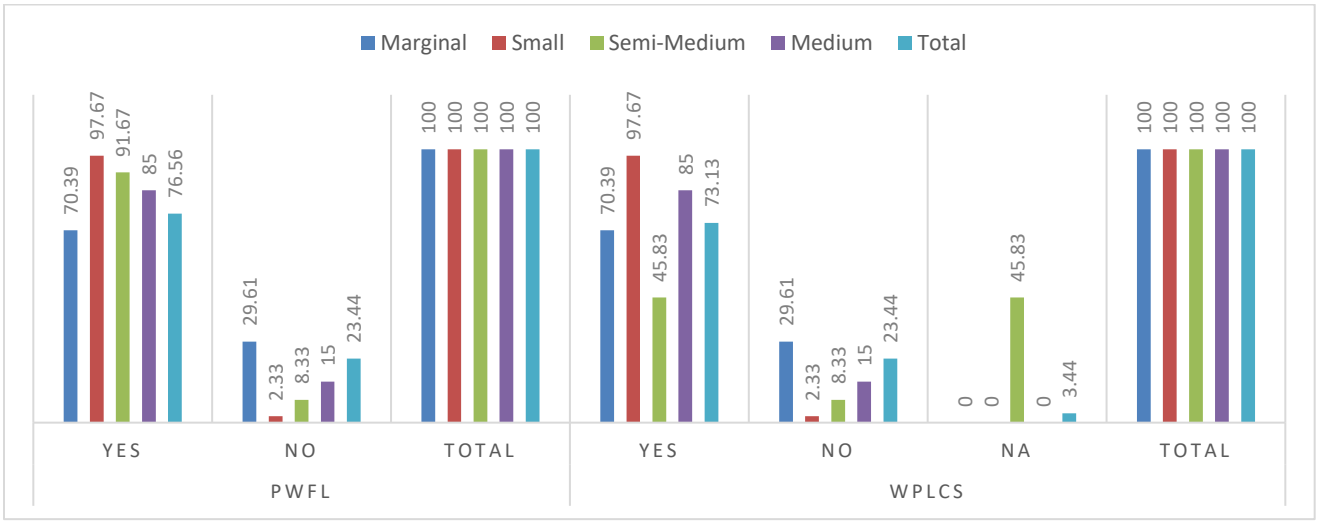


Fig: 5.12 Farm Wise Measurement of Land Distribution

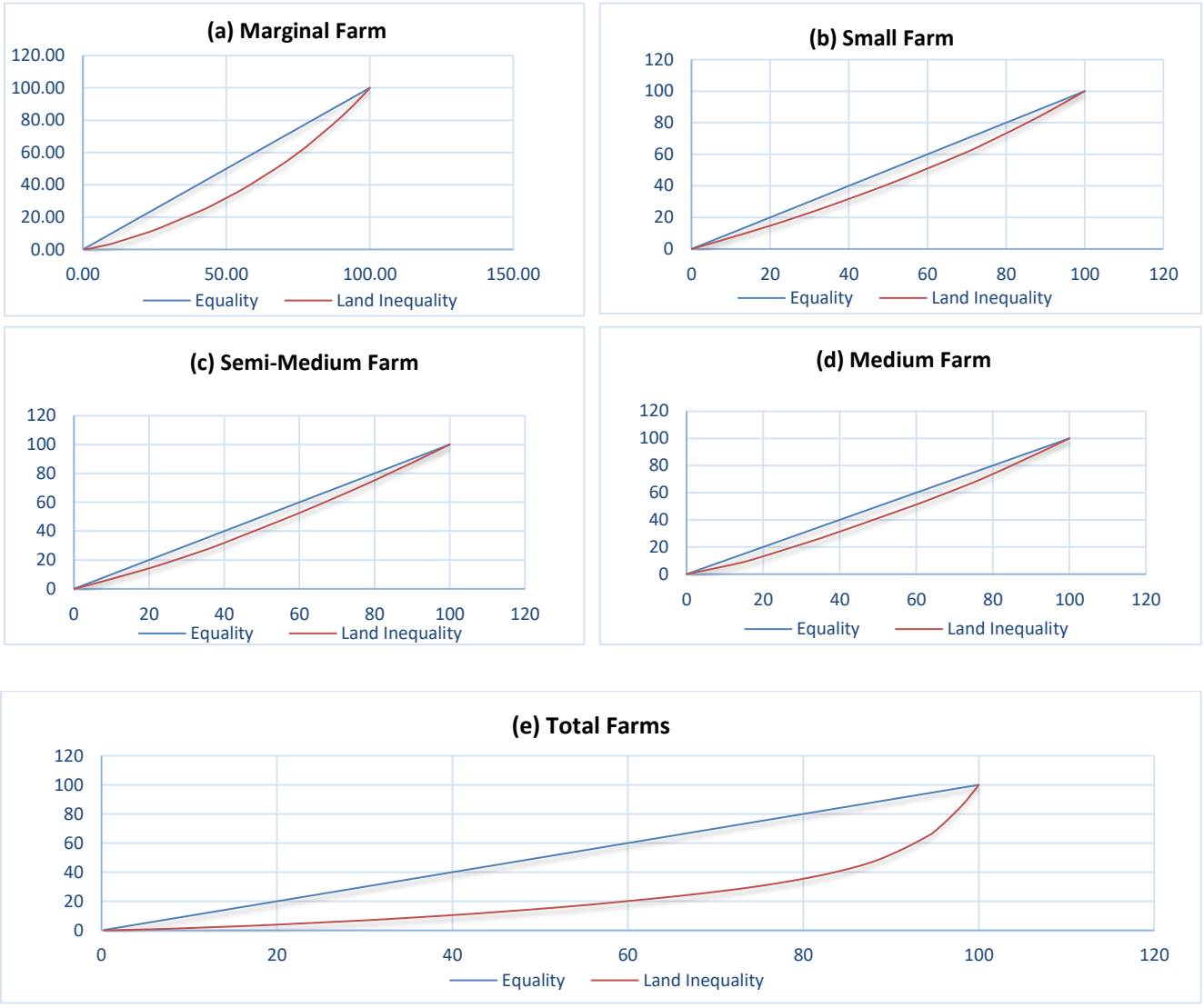


Table: 5.12 Farm Wise Gini Coefficient Values

Farm Category	Marginal	Small	Semi-Medium	Medium	Total
Gini Coefficient	0.24	0.12	0.1	0.12	0.56

Note: Primary Source

Table: 5.13 Village Wise Land Fragmentation Index

Simmons Index	Jansar	Sithauli	Charsoni	Jonai	Total
High (.01-0.33)	3	1	3	26	33
%	(3.75)	(1.25)	(3.75)	(32.5)	(10.31)
Medium(0.34-0.66)	16	13	13	25	67
%	(20)	(16.25)	(16.25)	(31.25)	(20.94)
Low(0.67-1.00)	61	66	64	29	220
%	(76.25)	(82.5)	(80)	(36.25)	(68.75)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.13 Village Wise Land Fragmentation Index

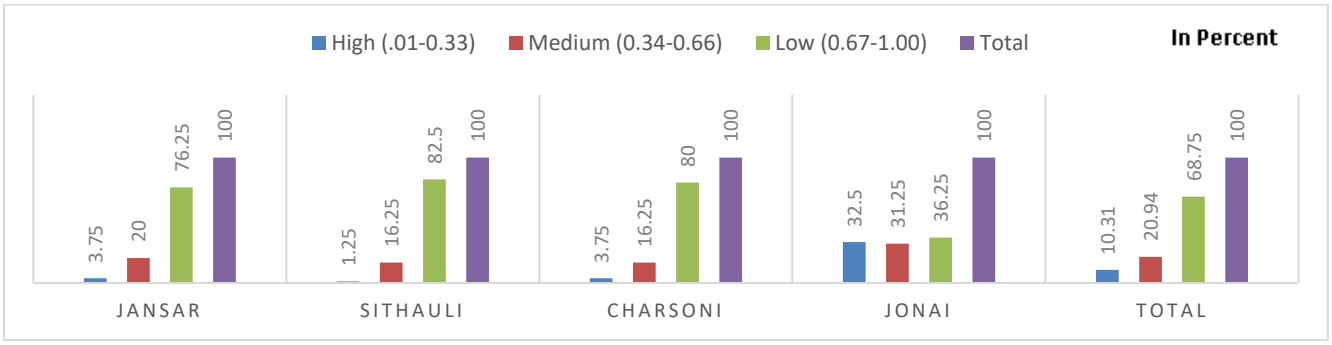


Table: 5.14 Farm Wise Land Fragmentation Index

Simmons Index	Marginal	Small	Semi-Medium	Medium	Total
High	6	16	9	2	33
%	(2.58)	(37.21)	(37.5)	(10)	(10.31)
Medium	38	14	12	3	67
%	(16.31)	(32.56)	(50)	(15)	(20.94)
Low	189	13	3	15	220
%	(81.12)	(30.23)	(12.5)	(75)	(68.75)
Total	233	43	24	20	320
	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.14FarmWise Land Fragmentation Index

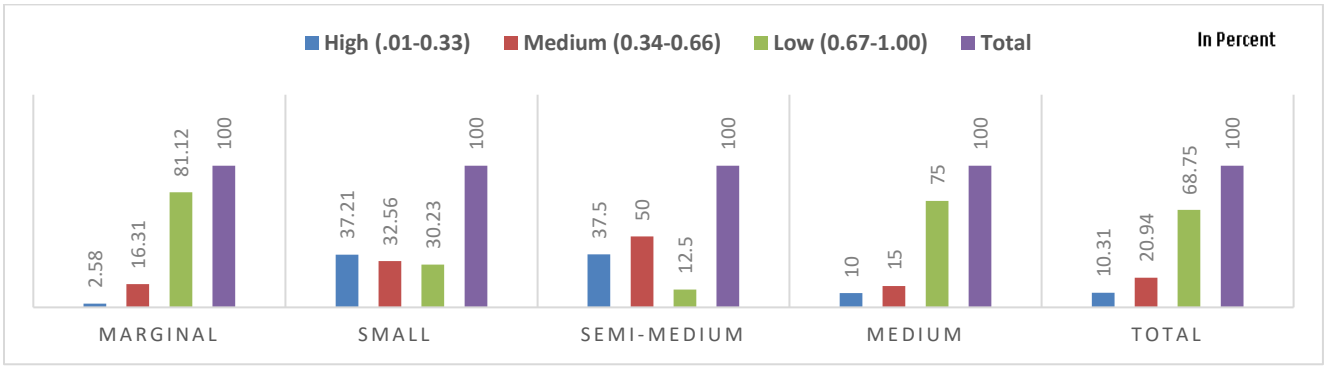
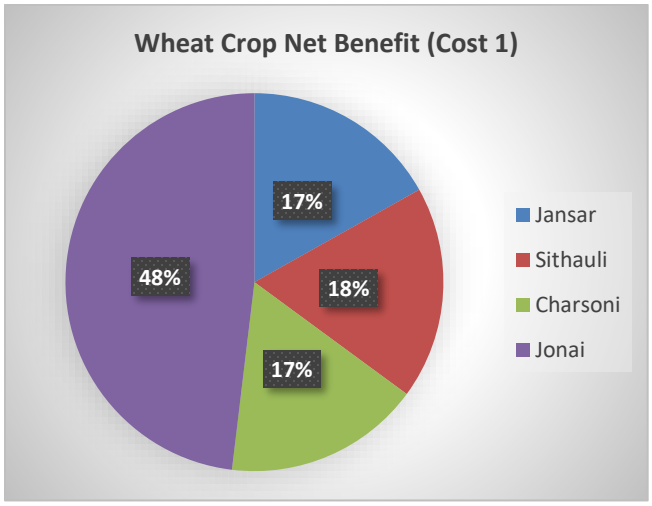


Table: 5.15 Village Wise Return on Investment in Wheat Production (Per Hectare)

Cost Benefit Indicators	Village							
	Jansar		Sithauli		Charsoni		Jonai	
	Mean	% Cost	Mean	% Cost	Mean	% Cost	Mean	% Cost
Gross Yield (Quintal/ha)	28		27		30		33	
Gross Production (Rs/ha)	31315		31360		31052		41146	
Irrigation (Rs/ha)	8708	32.4	8846	33.33	8950	33.64	6661	23.43
Fertilizer (Rs/ha)	7602	28.3	7689	28.97	7726	29.04	5721	20.12
Seeds (Rs/ha)	3196	11.9	3193	12.03	3195	12.01	2612	9.19
Pesticides (Rs/ha)	1257	4.7	1272	4.79	1271	4.78	997	3.51
Equipment (Rs/ha)	5444	20.3	5427	20.45	5461	20.53	4687	16.49
Hired Labour (Rs/ha)	650	2.4	114	0.43	0	0.00	7751	27.26
Total Cost1	26856.10		26542.00		26604.10		28429.45	
Net Benefit1	4458.66		4817.53		4447.61		12716.89	
ROI1	16.60		18.15		16.72		44.73	
Imputed Rent of SOL (for 5member in Family)(Rs/ha)	106395		111626		103690		76588	
Total Cost2	133250.66		138168.26		130293.69		105017.78	
Net Benefit2	-101935.90		-106808.74		-99241.98		-63871.44	
ROI2	-76.50		-77.30		-76.17		-60.82	

Note: Primary Source

Fig: 5.15 Village Wise Return on Investment in Wheat Production (Per Hectare)



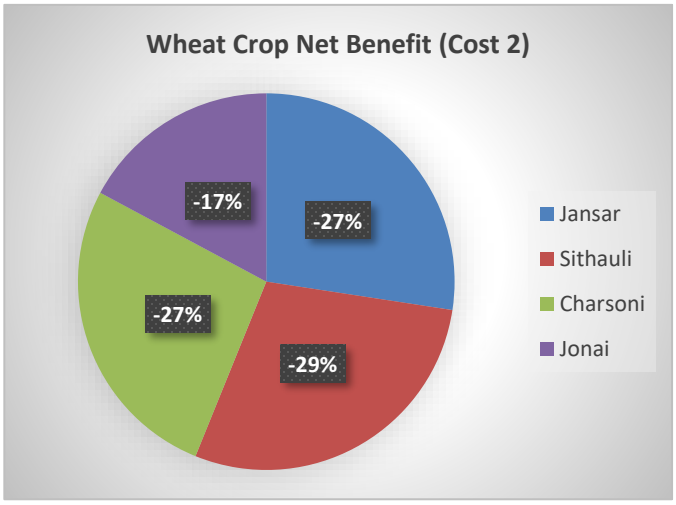
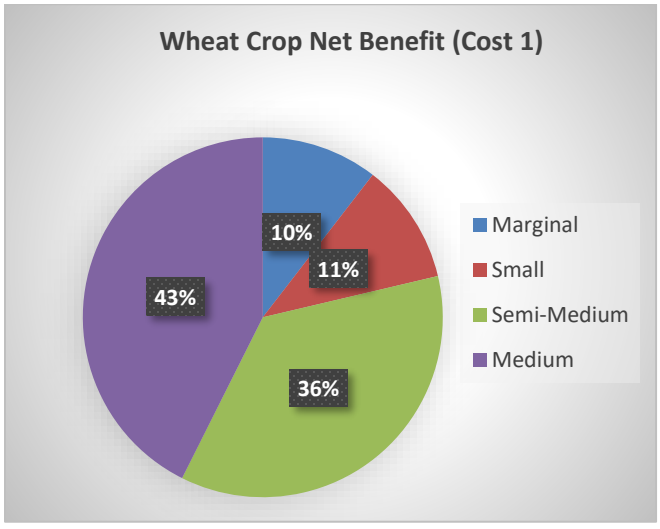


Table: 5.16 Farm Wise Return on Investment in Wheat Production (Per Hectare)

Cost Benefit Indicators	FC							
	Marginal		Small		Semi-Medium		Medium	
	Mean	% Cost	Mean	% Cost	Mean	% Cost	Mean	% Cost
Gross Yield (Quintal/ha)	28		23		41		42	
Gross Production (Rs/ha)	31299		30467		48791		50807	
Irrigation (Rs/ha)	8879	33.5	7782	30.52	7366	22.82	3650	11.66
Fertilizer (Rs/ha)	7718	29.1	6775	26.57	6165	19.10	3077	9.83
Seeds (Rs/ha)	3199	12.1	2946	11.55	3058	9.47	1513	4.83
Pesticides (Rs/ha)	1270	4.8	1143	4.48	1142	3.54	565	1.80
Equipment (Rs/ha)	5445	20.5	5269	20.66	5429	16.82	2802	8.95
Hired Labour (Rs/ha)	0	0.0	1585	6.22	9120	28.25	19708	62.93
Total Cost1	26510.88		25500.74		32278.29		31314.35	
Net Benefit1	4787.67		4966.74		16512.71		19492.70	
ROI1	18.06		19.48		51.16		62.25	
Imputed Rent of SOL (for 5member in Family)(Rs/ha)	107306		73772		92675		73258	
Total Cost2	133817.03		99272.84		124953.29		104572.65	
Net Benefit2	-102518.48		-68805.35		-76162.29		-53765.60	
ROI2	-76.61		-69.31		-60.95		-51.41	

Note: Primary Source

Fig: 5.16 Farm Wise Return on Investment in Wheat Production (Per Hectare)



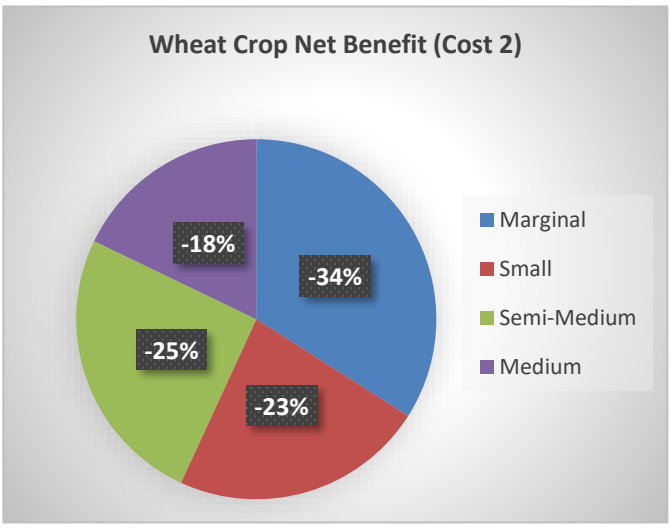


Table: 5.17 Village Wise Return on Investment in Rice Production (Per Hectare)

Cost Benefit Indicators	RICE							
	Jansar		Sitholi		Charsoni		Jonai	
	Mean	% Cost	Mean	% Cost	Mean	% Cost	Mean	% Cost
Gross Yield (Quintal/ha)	30.00		30.06		29.67		40.99	
Gross Production (Rs/ha)	25581.89		25349.77		29660.06		50100.85	
Irrigation (Rs/ha)	6514.09	39.09	6344.12	38.90	6392.88	39.06	6485.37	23.40
Fertilizer (Rs/ha)	2140.05	12.84	1934.17	11.86	1972.99	12.06	3328.16	12.01
Seeds (Rs/ha)	2803.81	16.82	2774.28	17.01	2833.64	17.31	3683.03	13.29
Pesticides (Rs/ha)	722.03	4.33	656.47	4.03	591.77	3.62	2047.15	7.39
Equipment (Rs/ha)	4486.35	26.92	4439.19	27.22	4574.59	27.95	5410.75	19.52
Hired Labour (Rs/ha)	0.00	0.00	161.32	0.99	0.00	0.00	6759.30	24.39
Total Cost1	16666.32		16309.55		16365.87		27713.76	
Net Benefit1	8915.57		9040.22		13294.19		22387.10	
ROI1	53.49		55.43		81.23		80.78	
Imputed Rent of SOL (Rs/ha)	176388.69		188983.29		101289.10		24913.38	
Total Cost2	193055.01		205292.84		117654.97		52627.14	
Net Benefit2	-167473.12		-179943.07		-87994.91		-2526.28	
ROI2	-86.75		-87.65		-74.79		-4.80	

Note: Primary Source

Fig: 5.17 Village Wise Return on Investment in Rice Production (Per Hectare)

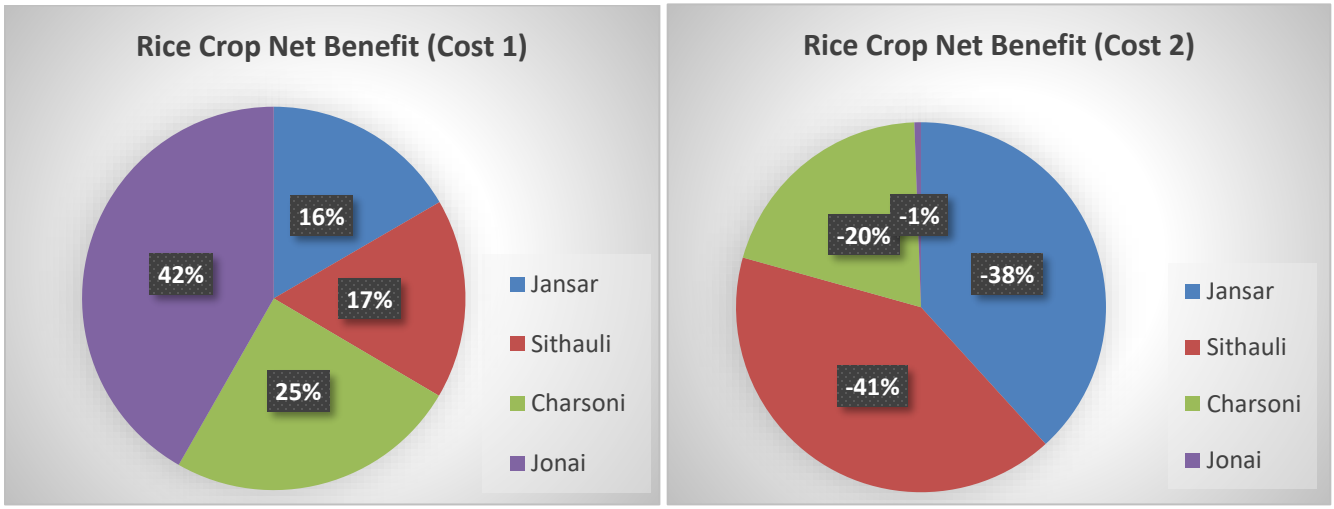


Table: 5.18 Farm Wise Return on Investment in Rice Production (Per Hectare)

Cost-Benefit Indicators	RICE							
	Marginal		Small		Semi-Medium		Medium	
	Mean	% Cost	Mean	% Cost	Mean	% Cost	Mean	% Cost
Gross Yield (Quintal/ha)	30		31		42		40	
Gross Production (Rs/ha)	25081		34272		51638		49076	
Irrigation (Rs/ha)	6411	39	6814	32	6971	22	6161	25
Fertilizer (Rs/ha)	2004	12	2745	13	2903	9	3611	15
Seeds (Rs/ha)	2760	17	3424	16	3415	11	3862	16
Pesticides (Rs/ha)	660	4	1296	6	1942	6	2117	9
Equipment (Rs/ha)	4416	27	5468	25	4751	15	5851	24
Hired Labour (Rs/ha)	0	0	1775	8	11976	37	3282	13
Total Cost1	16252		21523		31958		24884	
Net Benefit1	8829		12749		19679		24192	
ROI1	54		59		62		97	
Imputed Rent of SOL (Rs/ha)	187490		67909		47556		9818	
Total Cost2	203741		89431		79514		34702	
Net Benefit2	-178660		-55159		-27877		14374	
ROI2	-88		-62		-35		41	

Note: Primary Source

Fig: 5.18 Farm Wise Return on Investment in Rice Production (Per Hectare)

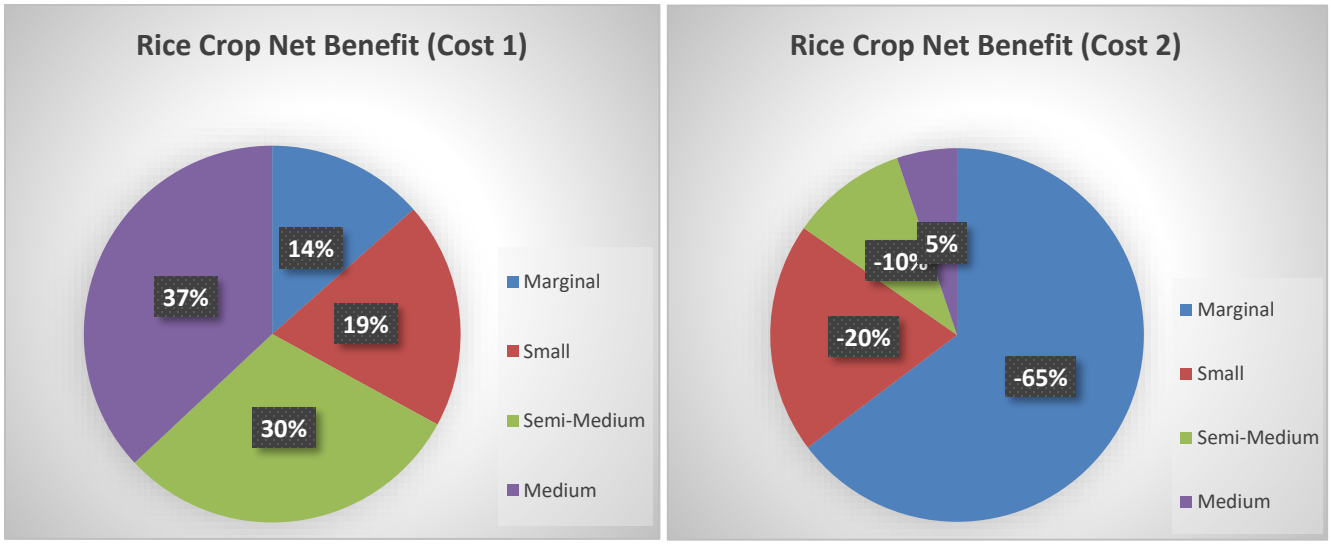
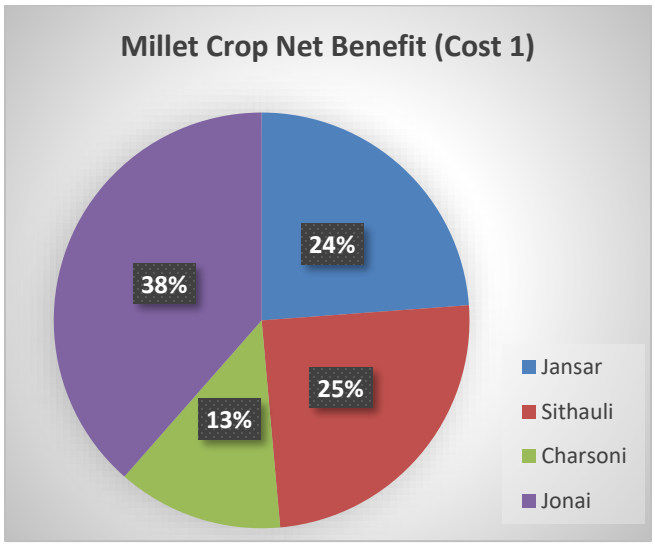


Table: 5.19 Village Wise Return on Investment in Millet Production (Per Hectare)

Cost-Benefit Indicators	MILLET							
	Jansar		Sithauli		Charsoni		Jonai	
	Mean	%Cost	Mean	% Cost	Mean	% Cost	Mean	% Cost
Gross Yield (Quintal/ha)	14		13		13		18	
Gross Production (Rs/ha)	16117		15806		14369		22408	
Irrigation (Rs/ha)	4871	43	4621	43	5067	43	5156	35
Fertilizer (Rs/ha)	1582	14	1306	12	1531	13	1828	13
Seeds (Rs/ha)	1022	9	985	9	1027	9	1292	9
Pesticides (Rs/ha)	388	3	653	6	650	6	975	7
Equipment (Rs/ha)	3433	30	3240	30	3486	30	3714	25
Hired Labour (Rs/ha)	0	0	0	0	0	0	1655	11
Total Cost1	11297		10805		11761		14620	
Net Benefit1	4819		5001		2608		7789	
ROI1	43		46		22		53	
Imputed Rent of SOL (Rs/ha)	157076		205102		83722		56058	
Total Cost2	168374		215907		95483		70678	
Net Benefit2	-152257		-200101		-81114		-48269	
ROI2	-90		-93		-85		-68	

Note: Primary Source

Fig: 5.19 Village Wise Return on Investment in Millet Production (Per Hectare)



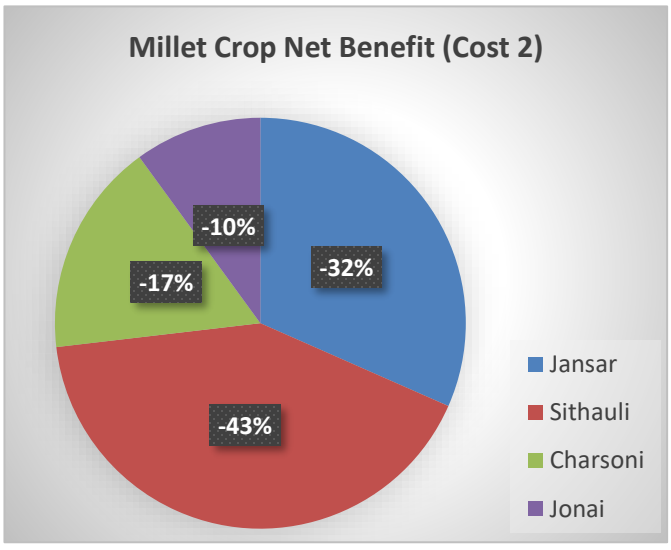
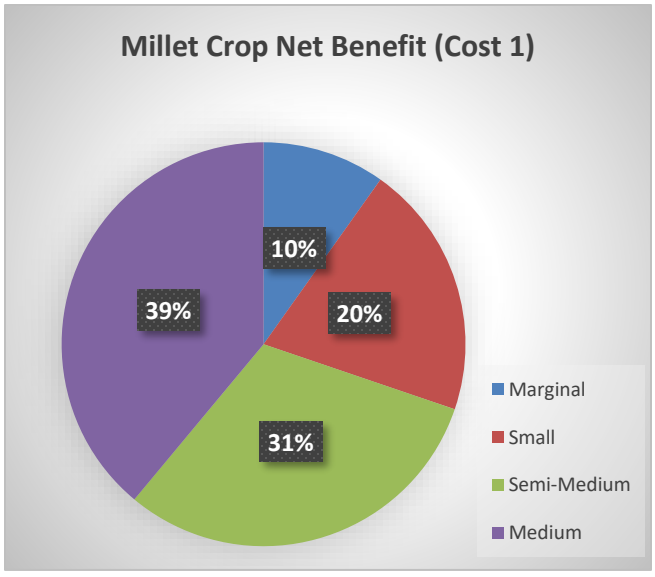


Table: 5.20 Farm Wise Return on Investment in Millet Production (Per Hectare)

Cost-Benefit Indicators	MILLET							
	Marginal		Small		Semi-Medium		Medium	
	Mean	%Cost	Mean	% Cost	Mean	% Cost	Mean	% Cost
Gross Yield (Quintal/ha)	13		16		20		22	
Gross Production (Rs/ha)	14493		19017		24781		27073	
Irrigation (Rs/ha)	5040	43	5181	39	5212	33	5029	31
Fertilizer (Rs/ha)	1522	13	1889	14	1813	11	1709	11
Seeds (Rs/ha)	1025	9	1298	10	1352	8	1205	8
Pesticides (Rs/ha)	642	5	953	7	977	6	1021	6
Equipment (Rs/ha)	3473	30	3683	28	3723	23	3772	24
Hired Labour (Rs/ha)	0	0	220	2	2945	18	3271	20
Total Cost1	11700		13224		16023		16007	
Net Benefit1	2793		5793		8759		11066	
ROI1	24		44		55		69	
Imputed Rent of SOL (Rs/ha)	91831		91237		28433		11435	
Total Cost2	103531		104461		44456		27442	
Net Benefit2	-89038		-85445		-19674		-369	
ROI2	-86		-82		-44		-1	

Note: Primary Source

Fig: 5.20 Farm Wise Return on Investment in Millet Production (Per Hectare)



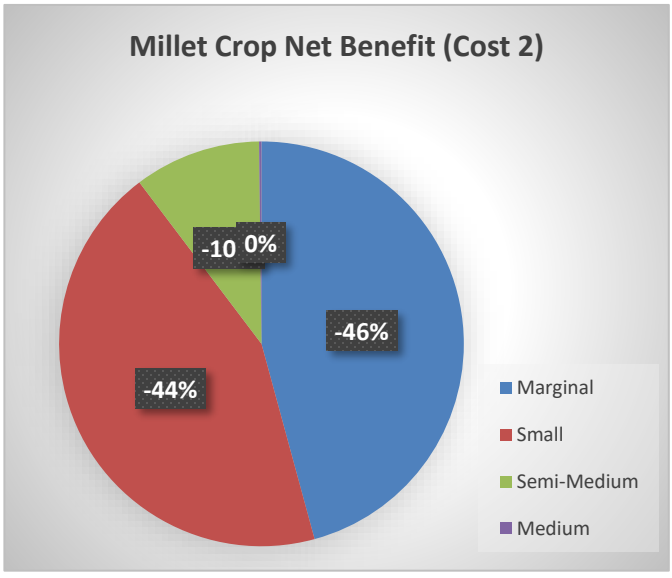


Table: 5.21 Village Wise Source of Marketing Facilities for Agricultural Production

SOSAP	Village				
	Jansar	**Sithauli**	**Charsoni**	**Jonai**	**Total**
Wheat					
NA	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Intermediate	73	77	76	47	273
%	(91.25)	(96.25)	(95)	(58.75)	(85.31)
Mandi /Bazar	7	3	4	33	47
%	(8.75)	(3.75)	(5)	(41.25)	(14.69)
Direct Sell	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)
Rice					
NA	0	0	0	0	0
%	(0)	(0)	(0)	(0)	0
Intermediate	62	68	69	38	237
%	(77.5)	(85)	(86.25)	(47.5)	(74.06)
Mandi /Bazar	18	12	11	42	83
%	(22.5)	(15)	(13.75)	(52.5)	(25.94)
Direct Sell	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)
Millet					
NA	60	64	58	65	247
%	(75)	(80)	(72.5)	(81.25)	(77.19)
Intermediate	14	12	11	6	43
%	(17.5)	(15)	(13.75)	(7.5)	(13.44)
Mandi /Bazar	6	4	11	8	29
%	(7.5)	(5)	(13.75)	(10)	(9.06)
Direct Sell	0	0	0	1	1
%	(0)	(0)	(0)	(1.25)	(0.31)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.21 Village Wise Source of Marketing Facilities for Agricultural Production

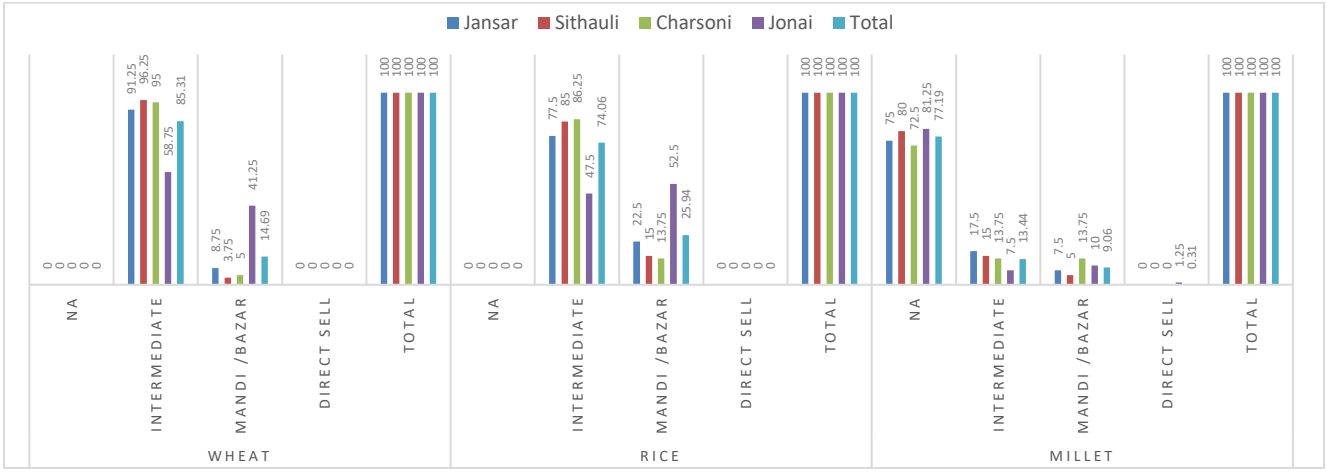


Table: 5.22Farm Wise Source of Marketing Facilities for Agricultural Production

SOSAP	Farm				
	Marginal	Small	Semi-Medium	Medium	Total
Wheat					
NA	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Intermediate	221	30	12	10	273
%	(94.8)	(69.7)	(50)	(50)	(85.31)
Mandi /Bazar	12	13	12	10	47
%	(5.15)	(30.23)	(50)	(50)	(14.69)
Direct Sell	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Total	233	43	24	20	320
%	(100)	(100)	(100)	(100)	(100)
Rice					
NA	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Intermediate	194	29	13	1	237
%	(83.26)	(67.44)	(54.17)	(5)	(74.06)
Mandi /Bazar	39	14	11	19	83
%	(16.74)	(32.56)	(45.83)	(95)	(25.94)
Direct Sell	0	0	0	0	0
%	(0)	(0)	(0)	(0)	(0)
Total	233	43	24	20	320
%	(100)	(100)	(100)	(100)	(100)
Millet					
NA	175	32	24	16	247
%	(75.11)	(74.42)	(100)	(80)	(77.19)
Intermediate	37	2	0	4	43
%	(15.88)	(4.65)	(0)	(20)	(13.44)
Mandi /Bazar	21	8	0	0	29
%	(9.01)	(18.6)	(0)	(0)	(9.06)
Direct Sell	0	1	0	0	1
%	(0)	(2.33)	(0)	(0)	(0.31)
Total	233	43	24	20	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.22 Farm Wise Source of Marketing Facilities for Agricultural Production

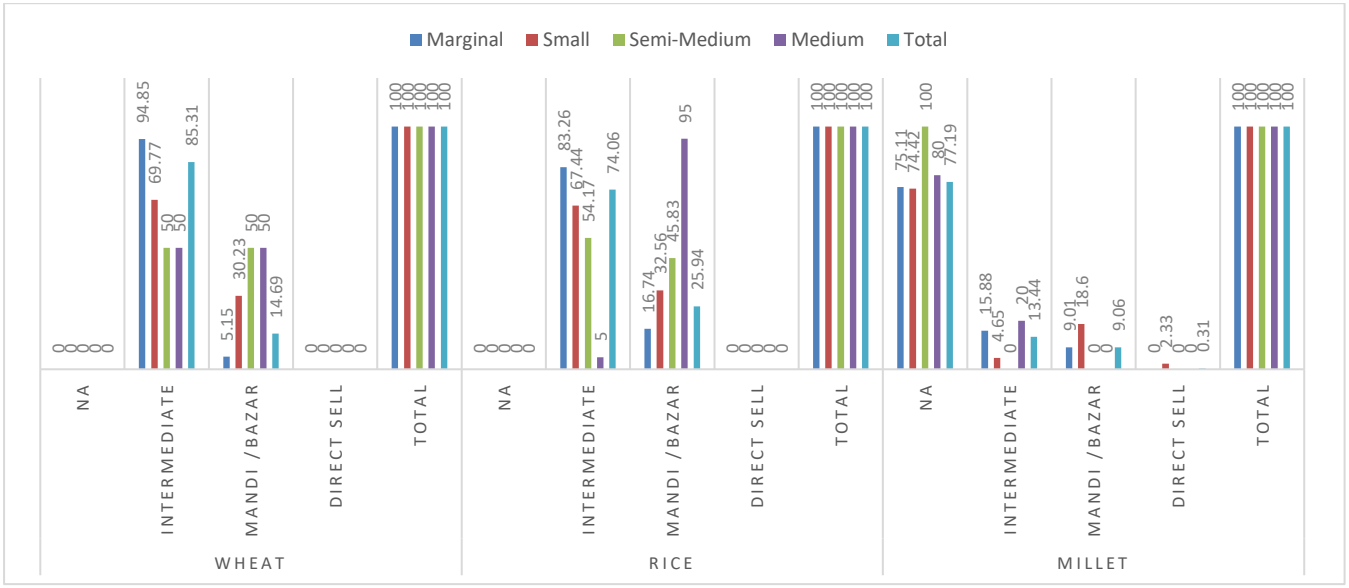


Table: 5.23 Village Wise Investments on Agricultural Machines

Investment	Village				
	Jansar	Sithauli	Charsoni	Jonai	Total
Custom Hiring	79	80	78	66	303
%	(98.75)	(100)	(97.5)	(82.5)	(94.69)
Rotavator	1	0	1	2	4
%	(1.25)	(0)	(1.25)	(2.5)	(1.25)
Thresher	0	0	0	4	4
%	(0)	(0)	(0)	(5)	(1.25)
Tractor	0	0	1	8	9
%	(0)	(0)	(1.25)	(10)	(2.81)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.23 Village Wise Investments on Agricultural Machines

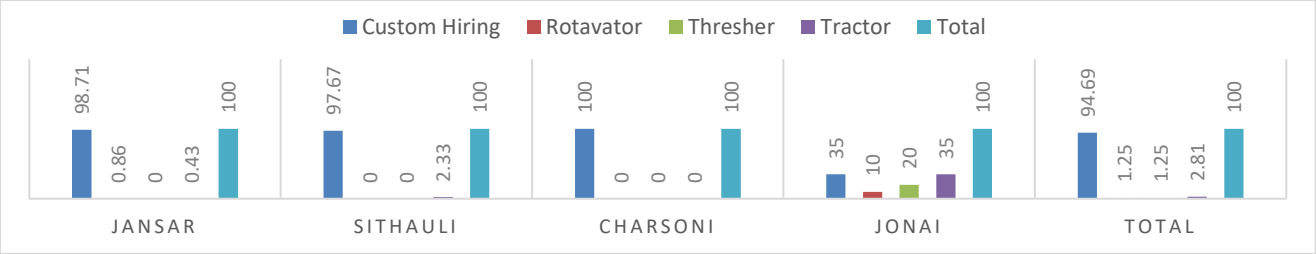


Table: 5.24Farm Wise Investments on Agricultural Machines

Investment	Farm				
	Marginal	Small	Semi-Medium	Medium	Total
NA	230	42	24	7	303
%	(98.71)	(97.67)	(100)	(35)	(94.69)
Rotavator	2	0	0	2	4
%	(0.86)	(0)	(0)	(10)	(1.25)
Thresher	0	0	0	4	4
%	(0)	(0)	(0)	(20)	(1.25)
Tractor	1	1	0	7	9
%	(0.43)	(2.33)	(0)	(35)	(2.81)
Total	233	43	24	20	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.24 Farm Wise Investments on Agricultural Machines

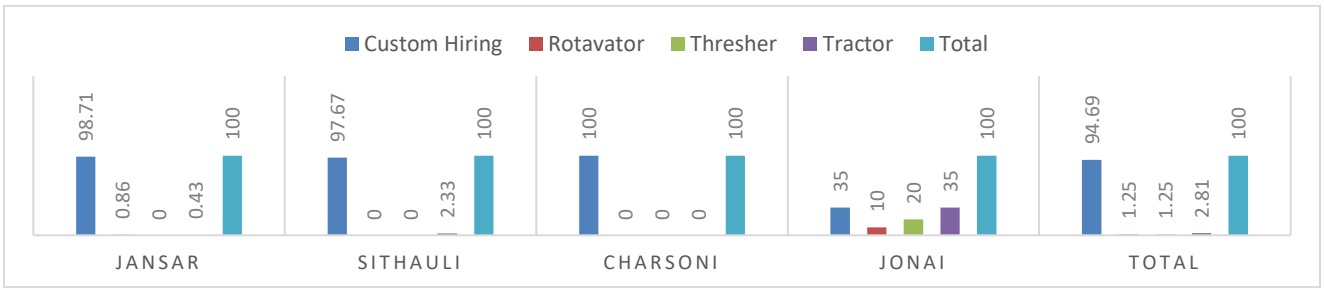


Table: 5.25 Village Wise Status of Agricultural Loan Among Farmers

Indebtedness		Village				
		Jansar	**Sithauli**	**Charsoni**	**Jonai**	**Total**
TAL	Yes	13	17	24	21	75
	%	(16.25)	(21.25)	(30)	(26.25)	(23.44)
	No	67	63	56	59	245
	%	(83.75)	(78.75)	(70)	(73.75)	(76.56)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)
S_TAL	NA	67	63	56	59	245
	%	(83.75)	(78.75)	(70)	(73.75)	(76.56)
	Commercial Bank	4	3	10	4	21
	%	(5)	(3.75)	(12.5)	(5)	(6.56)
	Co-operative Bank	0	1	1	4	6
	%	(0)	(1.25)	(1.25)	(5)	(1.88)
	Informal Source	2	2	5	1	10
	%	(2.5)	(2.5)	(6.25)	(1.25)	(3.13)
	RRB	7	11	8	12	38
	%	(8.75)	(13.75)	(10)	(15)	(11.88)
	Total	80	80	80	80	320
	%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.25 Village Wise Status of Agricultural Loan Among Farmers

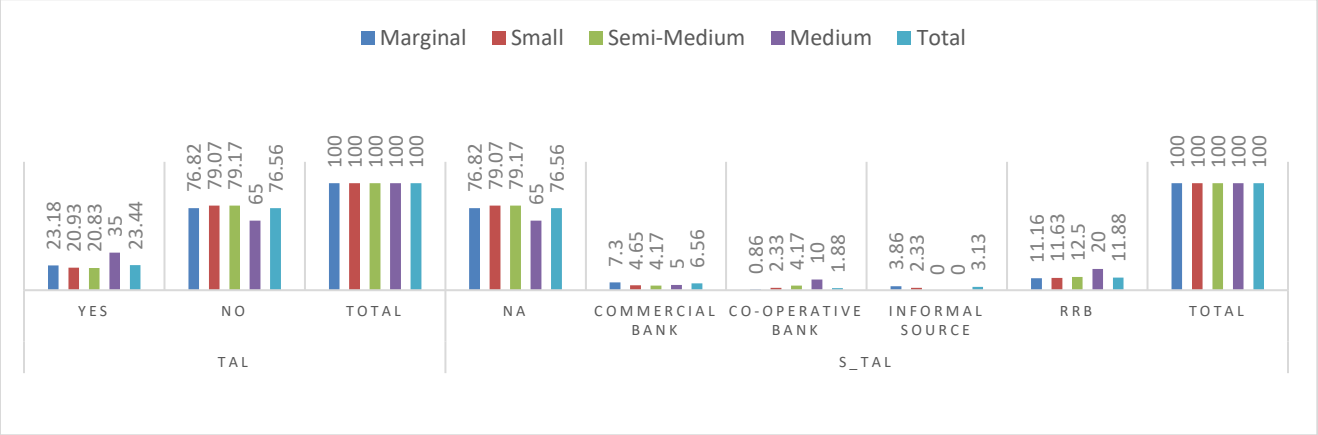


Table: 5.26 Farm Wise Status of Agricultural Loan Among Farmers

Indebtedness		Farm				
		Marginal	Small	Semi-Medium	Medium	Total
TAL	Yes	54	9	5	7	75
	%	(23.18)	(20.93)	(20.83)	(35)	(23.44)
	No	179	34	19	13	245
	%	(76.82)	(79.07)	(79.17)	(65)	(76.56)
	Total	233	43	24	20	320
	%	(100)	(100)	(100)	(100)	(100)
S_TAL	NA	179	34	19	13	245
	%	(76.82)	(79.07)	(79.17)	(65)	(76.56)
	Commercial Bank	17	2	1	1	21
	%	(7.3)	(4.65)	(4.17)	(5)	(6.56)
	Co-operative Bank	2	1	1	2	6
	%	(0.86)	(2.33)	(4.17)	(10)	(1.88)
	Informal Source	9	1	0	0	10
	%	(3.86)	(2.33)	(0)	(0)	(3.13)
	RRB	26	5	3	4	38
	%	(11.16)	(11.63)	(12.5)	(20)	(11.88)
	Total	233	43	24	20	320
	%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.26 Farm Wise Status of Agricultural Loan Among Farmer

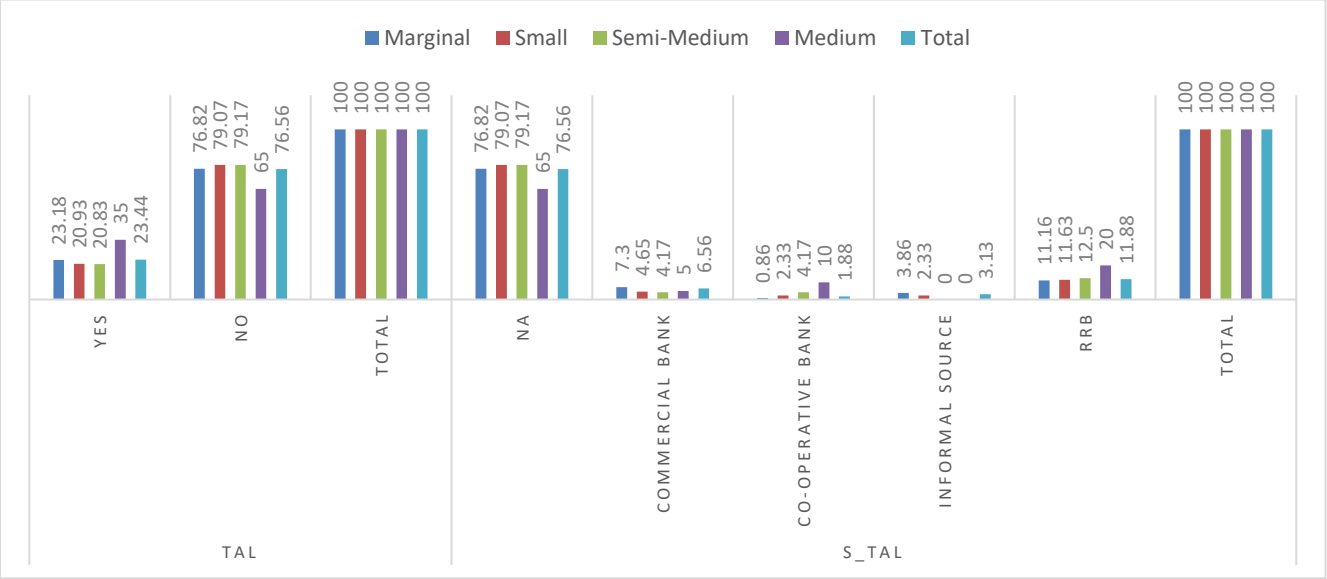


Table: 5.27 Village Wise Pattern of Utilization of Agricultural Loan

AU_TAL	Village				
	Jansar	**Sithauli**	**Charsoni**	**Jonai**	**Total**
NA	67	63	56	59	245
%	(83.75)	(78.75)	(70)	(73.75)	(76.56)
Agriculture & Allied	5	6	10	7	28
%	(6.25)	(7.5)	(12.5)	(8.75)	(8.75)
Construction	2	6	4	4	16
%	(2.5)	(7.5)	(5)	(5)	(5)
Education	1	0	0	0	1
%	(1.25)	(0)	(0)	(0)	(0.31)
Machine & Equipment's	0	1	0	1	2
%	(0)	(1.25)	(0)	(1.25)	(0.63)
Medical Treatment	3	3	5	3	14
%	(3.75)	(3.75)	(6.25)	(3.75)	(4.38)
Social Ceremony	2	1	4	6	13
%	(2.5)	(1.25)	(5)	(7.5)	(4.06)
Livestock	0	0	1	0	1
%	(0)	(0)	(1.25)	(0)	(0.31)
Total	80	80	80	80	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.27 Village Wise Pattern of Utilization of Agricultural Loan

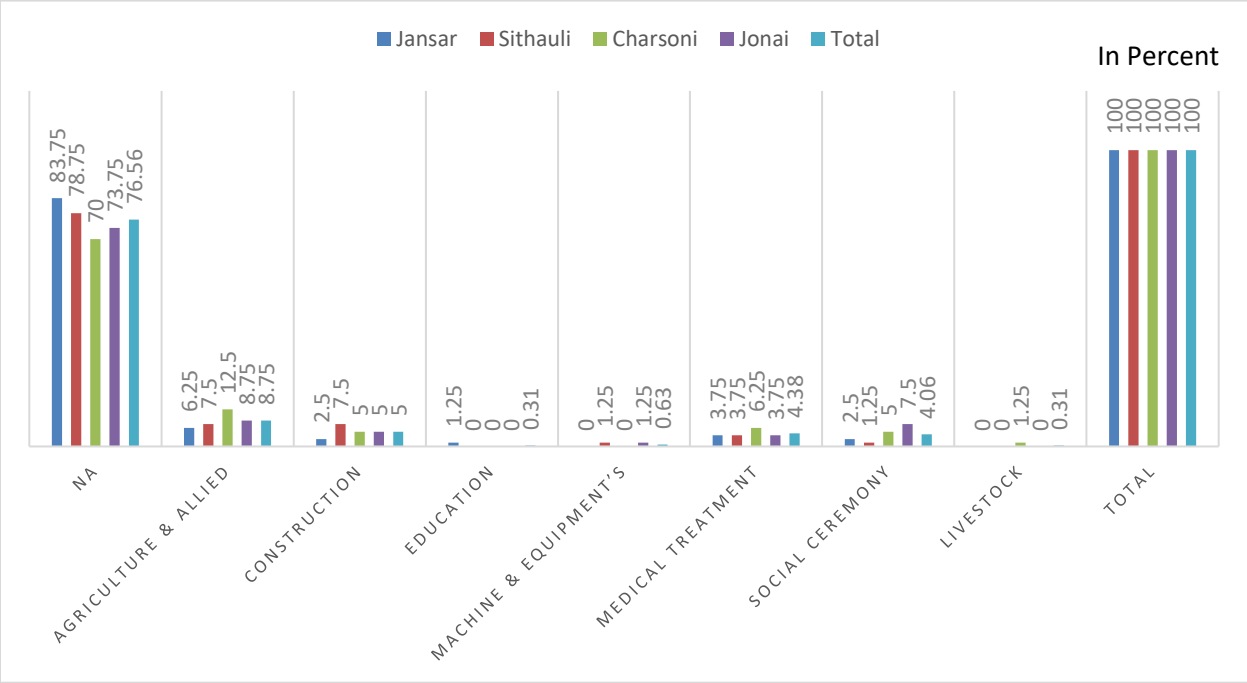


Table: 5.28 Farm Wise Pattern of Utilization of Agricultural Loan

AU_TAL	Farm				
	Marginal	Small	Semi-Medium	Medium	Total
NA	179	34	19	13	245
%	(76.82)	(79.07)	(79.17)	(65)	(76.56)
Agriculture & Allied	21	3	1	3	28
%	(9.01)	(6.98)	(4.17)	(15)	(8.75)
Construction	12	1	1	2	16
%	(5.15)	(2.33)	(4.17)	(10)	(5)
Education	1	0	0	0	1
%	(0.43)	(0)	(0)	(0)	(0.31)
Machine & Equipment's	1	0	0	1	2
%	(0.43)	(0)	(0)	(5)	(0.63)
Medical Treatment	11	2	1	0	14
%	(4.72)	(4.65)	(4.17)	(0)	(4.38)
Social Ceremony	7	3	2	1	13
%	(3)	(6.98)	(8.33)	(5)	(4.06)
livestock	1	0	0	0	1
%	(0.43)	(0)	(0)	(0)	(0.31)
Total	233	43	24	20	320
%	(100)	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.28 Farm Wise Pattern of Utilization of Agricultural Loan

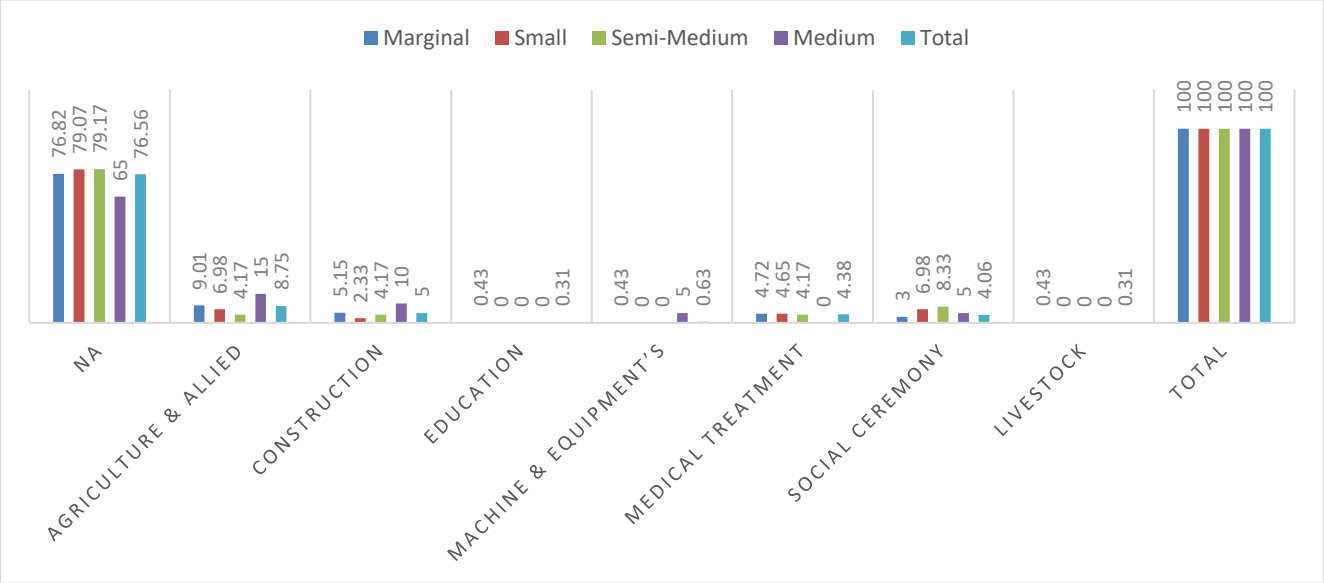


Table: 5.29 Village Wise Average Income of farmers from other Sources (Rs.)

SOIOA			Village			
			Jansar	Sithauli	Charsoni	Jonai
			Mean	Mean	Mean	Mean
SOIOA1		IFS_1	0	0	0	0
	Livestock	IFS_1	46274	45314	43433	56763
	Non-Farm	IFS_1	77250	62708	49478	182095
	Wages & Salary	IFS_1	47987	40829	46757	121683
SOIOA2		IFS_2	0	0	0	0
	Livestock	IFS_2	16686	12300	14033	26750
	Non-Farm	IFS_2	40000	36250	0	0
	Wages & Salary	IFS_2	36000	32750	29550	136000

Note: Primary Source

Table: 5.30 Farm Wise Average Income of farmers from other Sources (Rs.)

SOIOA			Farm			
			Marginal	Medium	Semi-Medium	Small
			Mean	Mean	Mean	Mean
SOIOA1		IFS_1	0	0	0	0
	Livestock	IFS_1	44933	60250	71433	53685
	Non-Farm	IFS_1	51370	257500	132214	60000
	Wages & Salary	IFS_1	42415	324000	204750	52025
SOIOA2		IFS_2	0	0	0	0
	Livestock	IFS_2	14203	0	34560	26750
	Non-Farm	IFS_2	37500	0	0	0
	Wages & Salary	IFS_2	31689	72000	168000	0

Note: Primary Source

Table: 5.31 Village Wise Average Income& Saving of Farmers (Rs.)

Mean Income & Saving	Village			
	Jansar	Sithauli	Charsoni	Jonai
TP_Crop1	35.16	27.50	27.02	145.15
TP_Crop2	18.11	12.62	11.68	107.68
NAI	8422	3413	2347	177848
NIFOS	35469	34461	31355	71753
TI	43891	37873	33702	249601
AHE	46883	44737	41734	95848
Savings	-2992	-6864	-8032	153753

Note: Primary Source

Table: 5.32 Farm Wise Average Income& Saving of Farmers (Rs.)

Mean Income & Saving	Farm			
	Marginal	Small	Semi-Medium	Medium
TP_Crop1	22.46	36.95	176.12	340.14
TP_Crop2	11.52	45.14	105.14	242.90
NAI	1955	40153	153639	474645
NIFOS	31657	39920	79882	141655
TI	33613	80072	233520	616299
AHE	43466	72548	95544	139794
Savings	-9853	7524	137976	476505

Note: Primary Source

Table: 5.33 Village Wise Problem of Soil Fertility

SFP	Village			
	Jansar	Sithauli	Charsoni	Jonai
Low	0	0	0	30
Modest	1	2	0	16
High	4	0	34	34
Very High	75	78	46	0
Total	80	80	80	80

Note: Primary Source

Fig: 5.29 Village Wise Problem of Soil Fertility

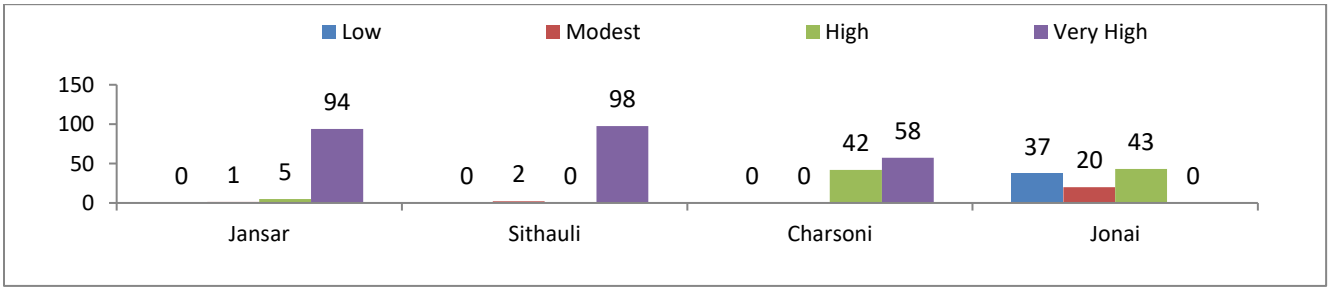


Table: 5.34 Farm Wise Problem of Soil Fertility

SFP	Farm			
	Marginal	Small	Semi-Medium	Medium
Low	0	0	10	20
Modest	0	5	14	0
High	34	38	0	0
Very High	199	0	0	0
Total	233	43	24	20

Note: Primary Source

Fig: 5.30 Farm Wise Problem of Soil Fertility

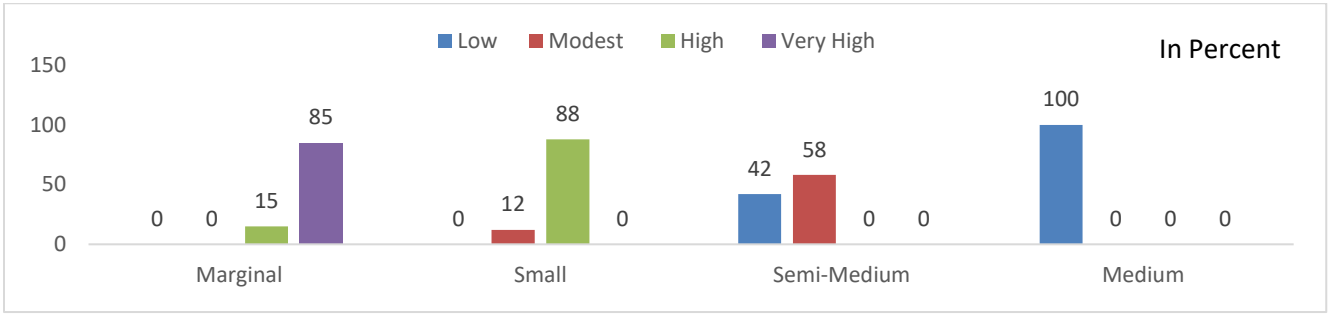


Table: 5.35: Village Wise Distribution of Soil Health Cards

OSHC	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	22	17	26	42
No	58	63	54	38
Total	80	80	80	80

Note: Primary Source

Fig: 5.31 Village Wise Distribution of Soil Health Cards

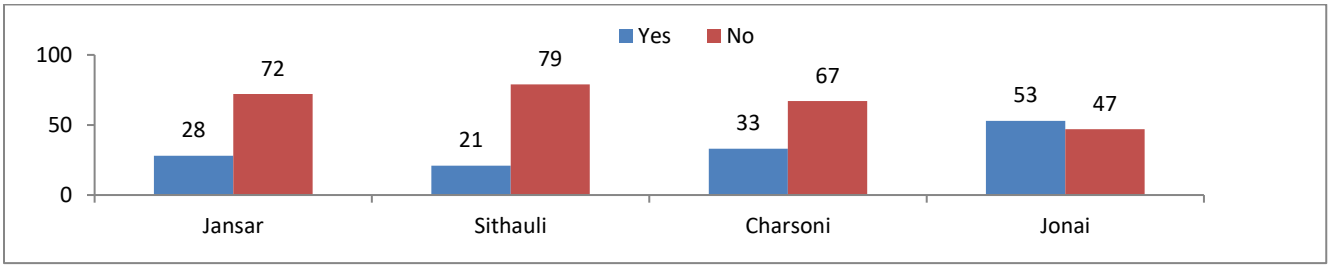


Table: 5.36 Farm Wise Distribution of Soil Health Cards

OSHC	Farm			
	Marginal	**Small**	**Semi-Medium**	**Medium**
Yes	65	30	12	0
No	168	13	12	20
Total	233	43	24	20

Note: Primary Source

Fig:5.32 Farm Wise Distribution of Soil Health Cards

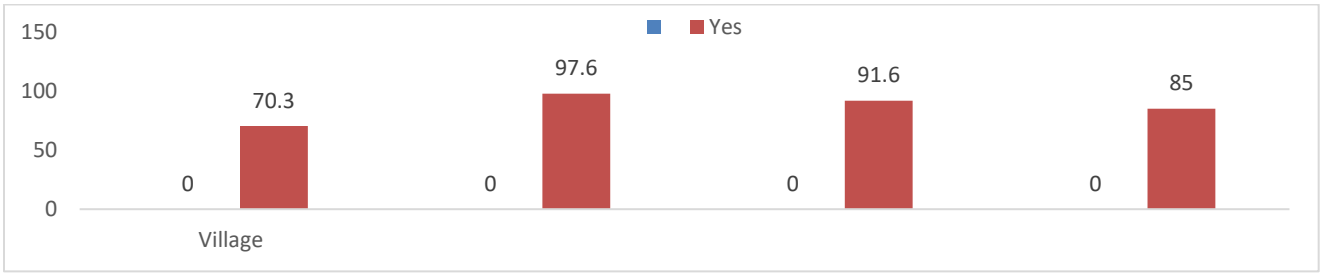


Table: 5.37 Village Wise Status of Agricultural Insurance under PMFBY

Insurance under Scheme PMFBY		Village			
		Jansar	Sithauli	Charsoni	Jonai
NIS_PMFBY	A&AI	5	2	0	58
	A&TI	0	0	0	13
	A&PI	0	0	0	0
	WBI	0	0	0	9
	NOTA	75	78	80	0
	Total	80	80	80	80

Note: Primary Source

Fig:5.33 Village Wise Status of Agricultural Insurance under PMFBY

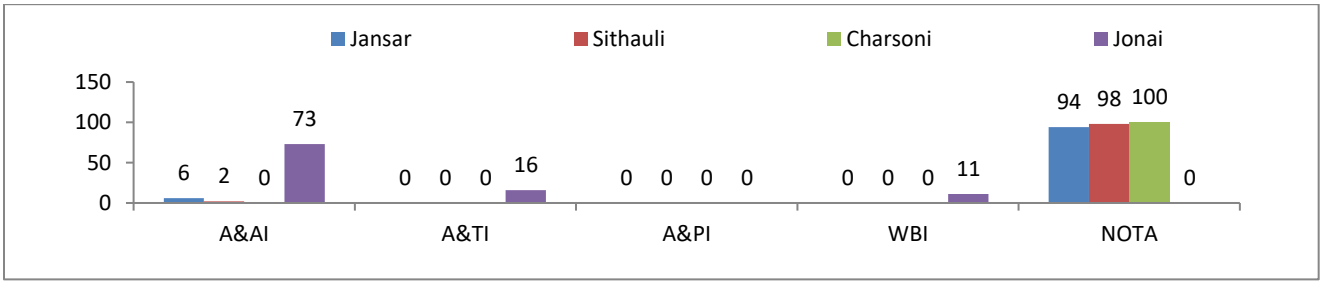


Table: 5.38 Farm Wise Status of Agricultural Insurance under PMFBY

Insurance under Scheme PMFBY		Farm			
		Marginal	Small	Semi-Medium	Medium
NIS_PMFBY	**A&AI**	13	21	18	13
	A&TI	0	0	6	7
	A&PI	0	0	0	0
	WBI	0	9	0	0
	NOTA	220	13	0	0
	Total	233	43	24	20

Note: Primary Source

Fig: 5.34 Farm Wise Status of Agricultural Insurance under PMFBY

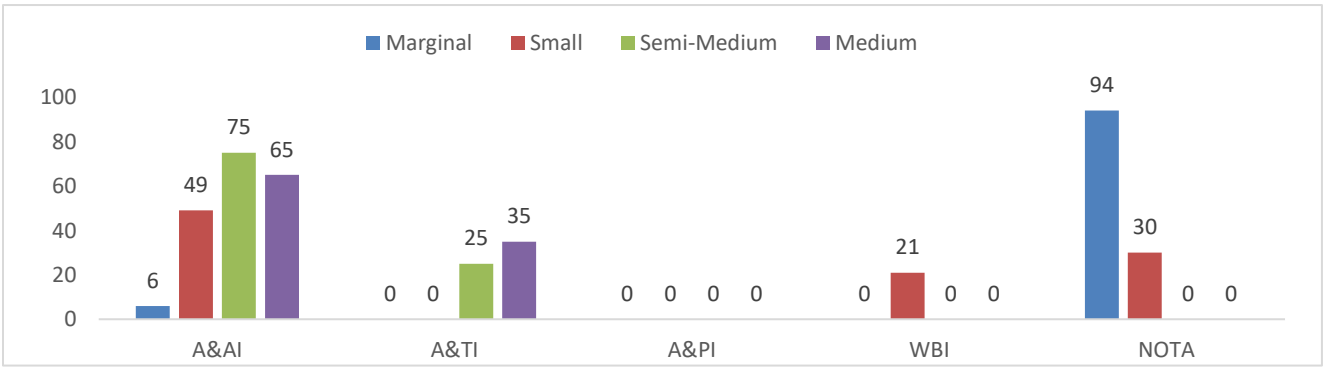


Table: 5.39 Village Wise Availability of Godowns and Cold Storage Facility

AF_G&CS	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	0	0	0	27
No	80	80	80	53
Total	80	80	80	80

Note: Primary Source

Fig:5.35Village Wise Availability of Godowns and Cold Storage Facility

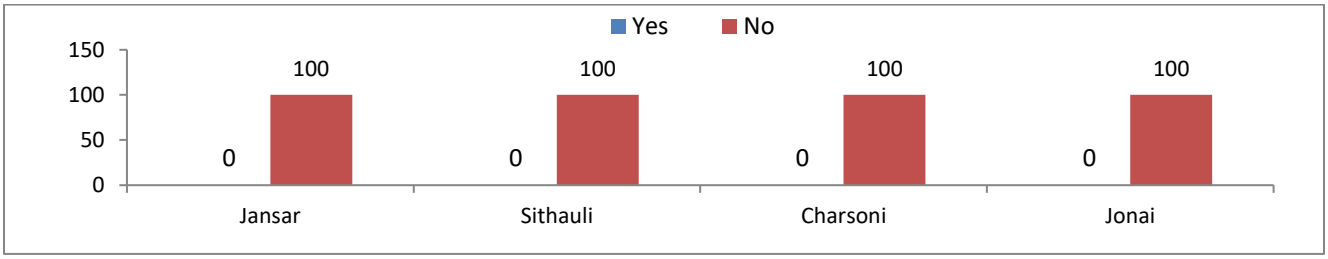


Table: 5.40 Farm Wise Availability of Godowns and Cold Storage Facility

AF_G&CS	Farm			
	Marginal	**Small**	**Semi-Medium**	**Medium**
Yes	0	0	13	14
No	233	43	11	6
Total	233	43	24	20

Note: Primary Source

Fig: 5.36 Farm Wise Availability of Godowns and Cold Storage Facility

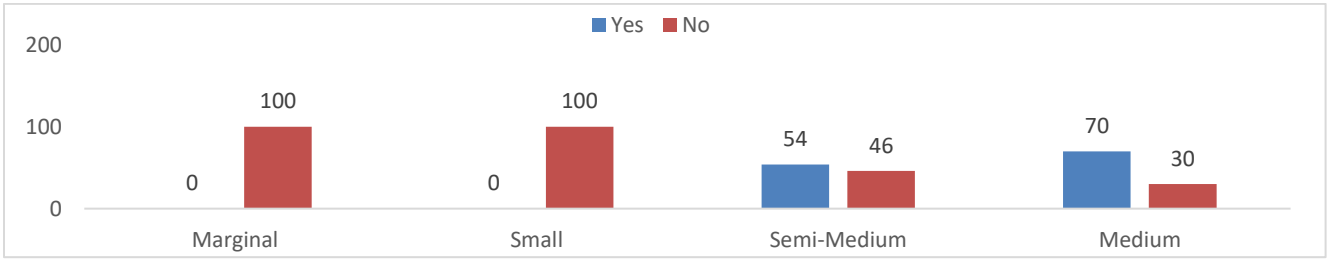


Table: 5.41 Village Wise Supporting System for Horticulture Crop/Organic Farming

AHC /OF	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	0	0	0	0
No	80	80	80	80
Total	80	80	80	80

Note: Primary Source

Fig: 5.37 Village Wise Supporting System for Horticulture Crop/Organic Farming

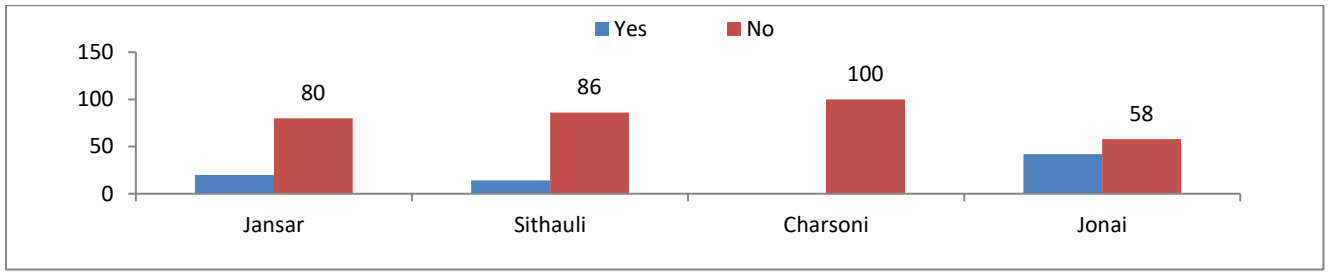


Table: 5.42 Farm Wise Supporting System for Horticulture Crop/Organic Farming

AHC /OF	Farm			
	Marginal	**Small**	**Semi-Medium**	**Medium**
Yes	0	0	0	0
No	233	43	24	20
Total	233	43	24	20

Note: Primary Source

Fig:5.38 Farm Wise Supporting System for Horticulture Crop/Organic Farming

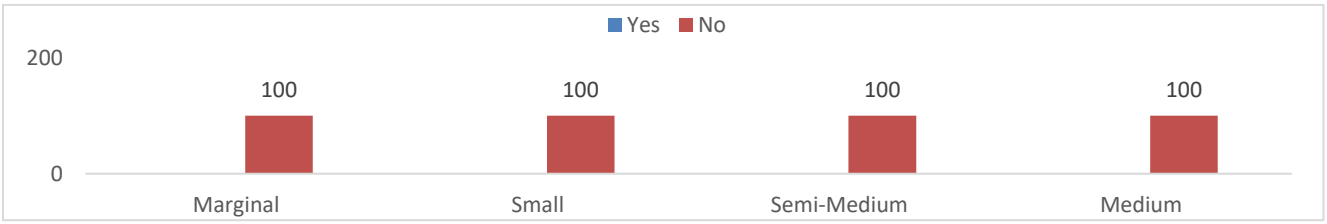


Table: 5.43 Village Wise Participation of Farmers in Model Training Courses, Agri Clinics & Business Centers Schemes

MTC&LT_AC&BCS	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	0	0	0	0
NO	80	80	80	80
Total	80	80	80	80

Note: Primary Source

Fig: 5.39 Village Wise Participation of Farmers in Model Training Courses, Agri Clinics & Business Centers Schemes

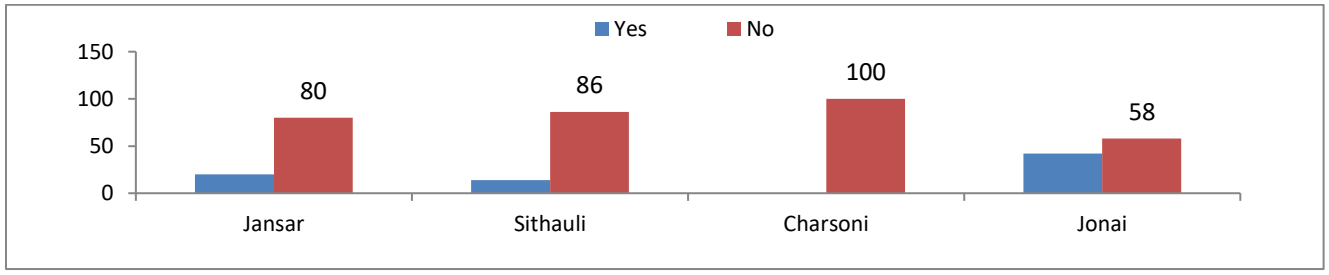


Table: 5.44 Farm Wise Participation of Farmers in Model Training Courses, Agri Clinics & Business Centers Schemes

MTP&LT_AC&BCS	Farm			
	Marginal	Small	Semi-Medium	Medium
Yes	0	0	0	0
NO	233	43	24	20
Total	233	43	24	20

Note: Primary Source

Fig: 5.40 Farm Wise Participation of Farmers in Model Training Courses, Agri Clinics & Business Centers Schemes

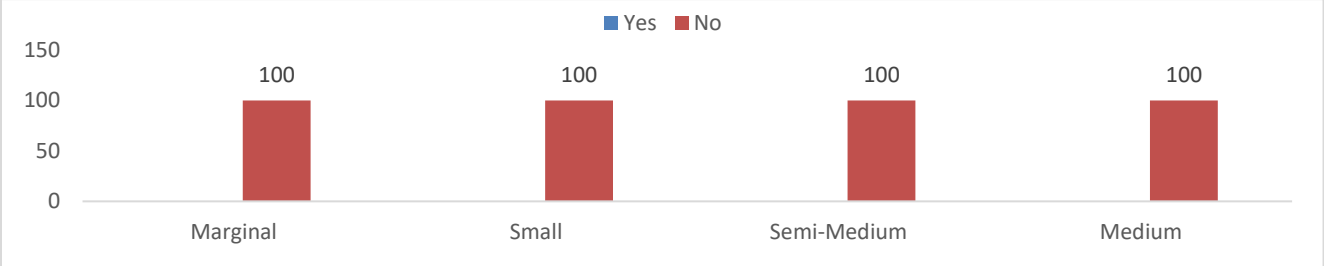


Table: 5.45 Village Wise Participation of Farmers in Kisan Call Center Program

FKCC_SMAM	Village			
	Jansar	Sithauli	Charsoni	Jonai
Yes	13	0	14	15
No	67	80	66	65
Total	80	80	80	80

Note: Primary Source

Fig: 5.41 Village Wise Participation of Farmers in Kisan Call Center Program

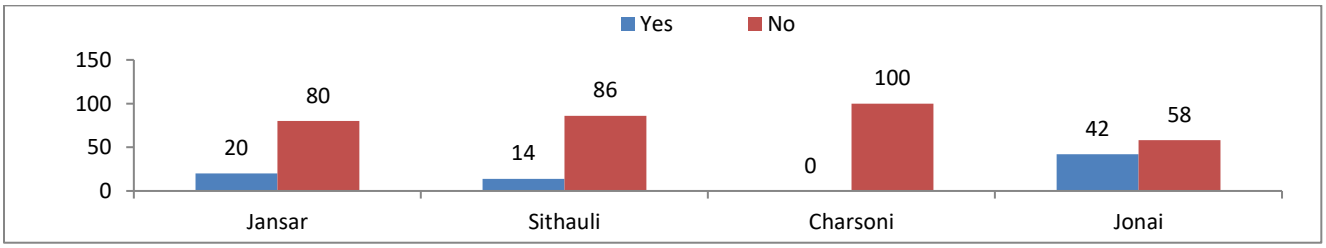


Table: 5.46 Farm Wise Participation of Farmers in Kisan Call Center Program

FKCC_SMAM	Farm			
	Marginal	Small	Semi-Medium	Medium
Yes	27	11	2	2
No	206	32	23	18
Total	233	43	24	20

Note: Primary Source

Fig: 5.42 Farm Wise Participation of Farmers in Kisan Call Center

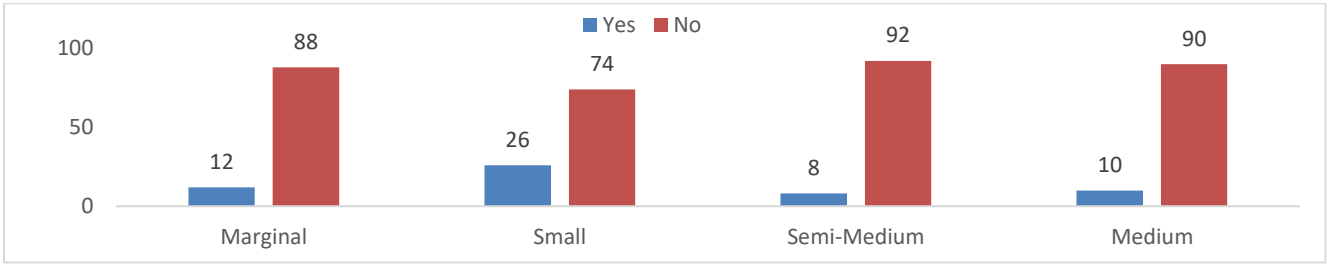


Table: 5.47 Village Wise Participation of Farmers in the Use of Pesticides Residues in Food Crops

AUPRFC_SMPP	Village			
	Jansar	Sithauli	Charsoni	Jonai
Yes	0	0	0	0
No	80	80	80	80
Total	80	80	80	80

Note: Primary Source

Fig: 5.43 Village Wise Participation of Farmers in the Use of Pesticides Residues in Food Crops

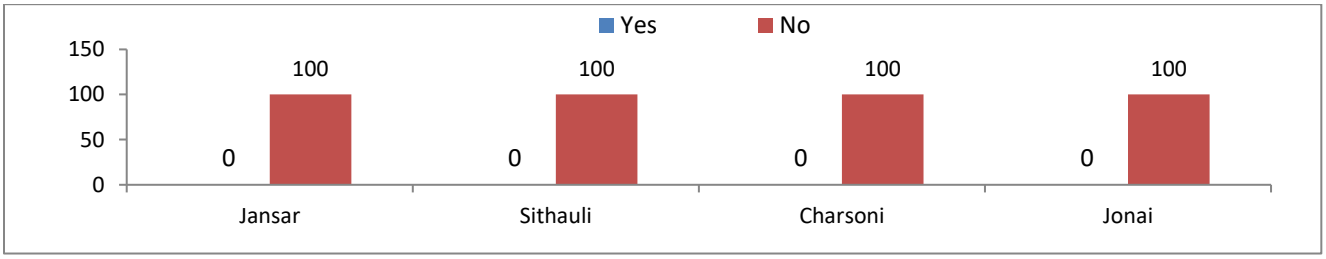


Table: 5.48 Farm Wise Participation of Farmers in the Use of Pesticides Residues in Food Crops

AUPRFC_SMPP	Farm			
	Marginal	Small	Semi-Medium	Medium
Yes	0	0	0	0
No	233	43	24	20
Total	233	43	24	20

Note: Primary Source

Fig: 5.44FarmWise Participation of Farmers in the Use of Pesticides Residues in Food Crops

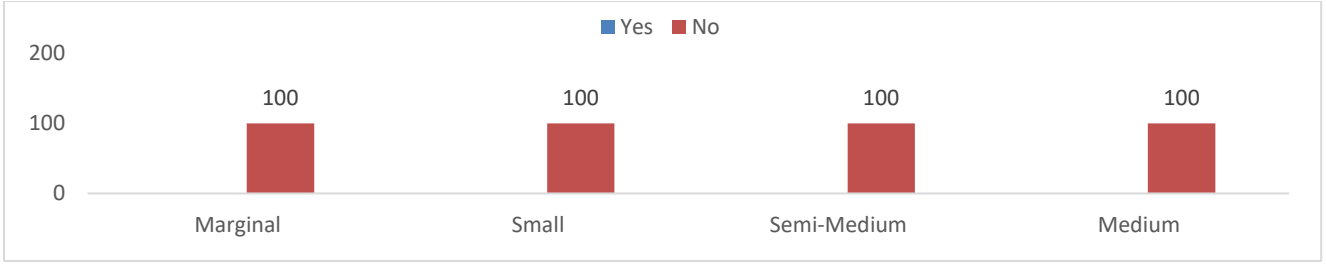


Table: 5.49 Village Wise Participation of Farmers in Seed Production Activity

ISPA	Village			
	Jansar	Sithauli	Charsoni	Jonai
Yes	0	0	0	0
No	80	80	80	80
Total	80	80	80	80

Note: Primary Source

Fig: 5.45 Village Wise Participation of Farmers in Seed Production Activity

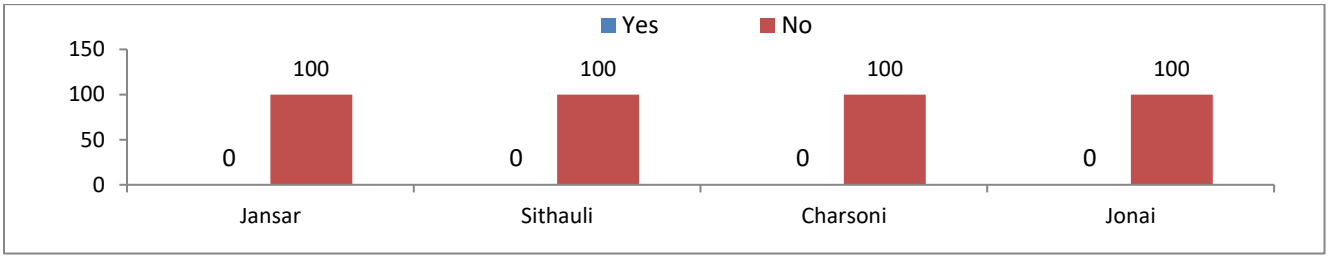


Table: 5.50 Farm Wise Participation of Farmers in Seed Production Activity

ISPA	Farm			
	Marginal	Small	Semi-Medium	Medium
Yes	0	0	0	0
No	233	43	24	20
Total	233	43	24	20

Note: Primary Source

Fig: 5.46 Farm Wise Participation of Farmers in Seed Production Activity

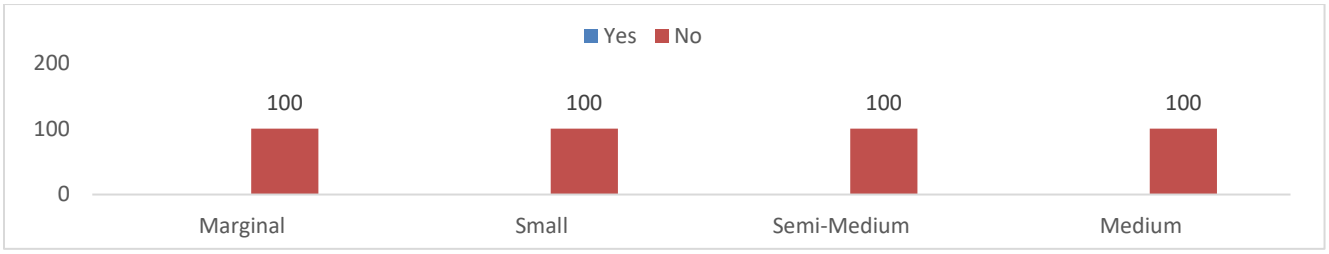


Table: 5.51 Village Wise Participation of the Farmers in the Farmer's Friend Program

Farmers Friend	Village			
	Jansar	Sithauli	Charsoni	Jonai
Yes	16	11	0	34
No	64	69	80	46
Total	80	80	80	80

Note: Primary Source

Fig: 5.47 Village Wise Participation of Farmers in the Farmer's Friend Program

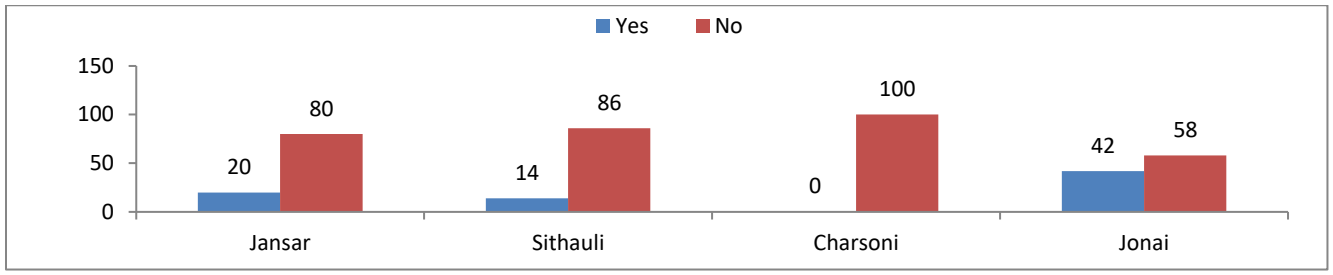


Table: 5.52 Farm Wise Participation of Farmers in the Farmer's Friend Program

Farmers Friend	Farm			
	Marginal	Small	Semi-Medium	Medium
Yes	20	7	19	15
No	213	36	5	5
Total	233	43	24	20

Note: Primary Source

Fig: 5.48 Farm Wise Participation of Farmers in the Farmer's Friend Program

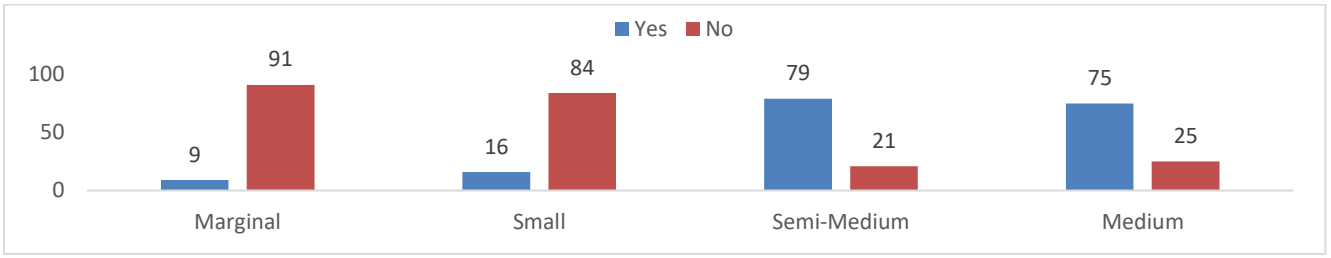


Table: 5.53 Village Wise Participation of Farmers in Demonstration of Technology

PFDT	Village			
	Jansar	Sithauli	Charsoni	Jonai
Yes	0	0	0	0
No	80	80	80	80
Total	80	80	80	80

Note: Primary Source

Fig: 5.49 Village Wise Participation of Farmers in Demonstration of Technology

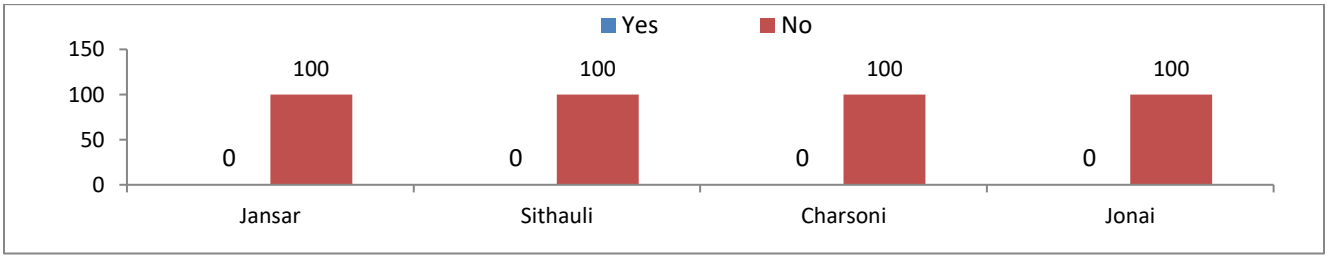


Table: 5.54 Farm Wise Participation of Farmers in Demonstration of Technology

PFDT	Farm			
	Marginal	**Small**	**Semi-Medium**	**Medium**
Yes	0	0	0	0
No	233	43	24	20
Total	233	43	24	20

Note: Primary Source

Fig: 5.50 Farm Wise Participation of Farmers in Demonstration of Technology

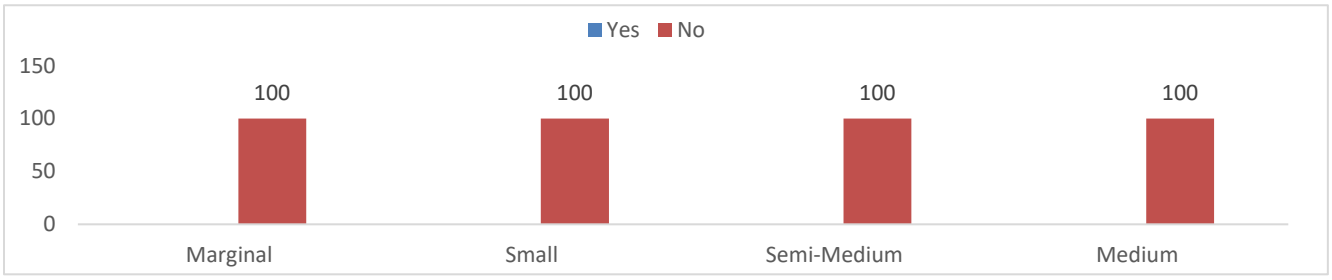


Table: 5.55 Village Wise Availability of Toilets

UTI	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	24	18	12	48
No	56	62	68	32
Total	80	80	80	80

Note: Primary Source

Fig: 5.51 Village Wise Availability of Toilets

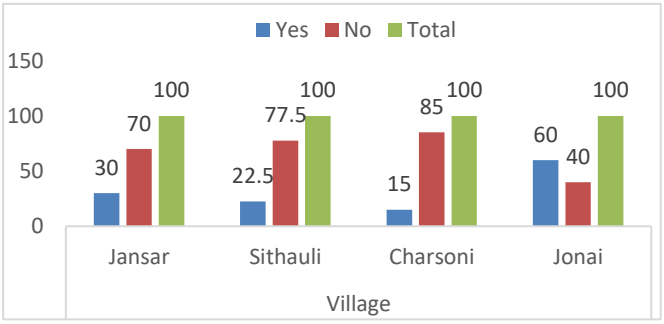


Table: 5.56Village Wise Electricity Status

EIV	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	80	80	80	80
No	0	0	0	0
Total	80	80	80	80

Note: Primary Source

Fig: 5.52 Village Wise Electricity Status

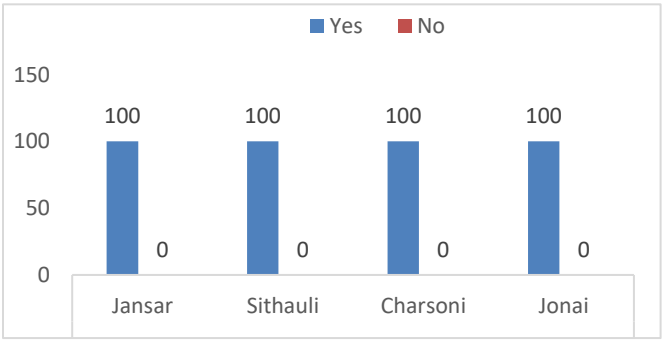


Table: 5.57Village Wise Electricity Connection

EC	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	36	46	41	80
No	44	34	39	0
Total	80	80	80	80

Note: Primary Source

Fig: 5.53Village Wise Electricity Connection

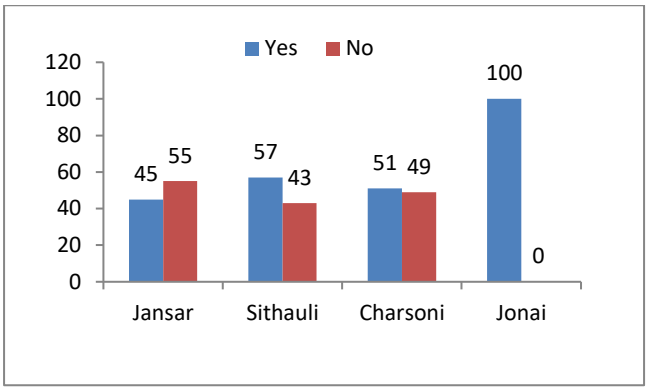


Table: 5.58 Village Wise Housing Tap Status

IHT	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	40	54	45	80
No	40	26	35	0
Total	80	80	80	80

Note: Primary Source

Fig: 5.54 Village Wise Housing Tap Status

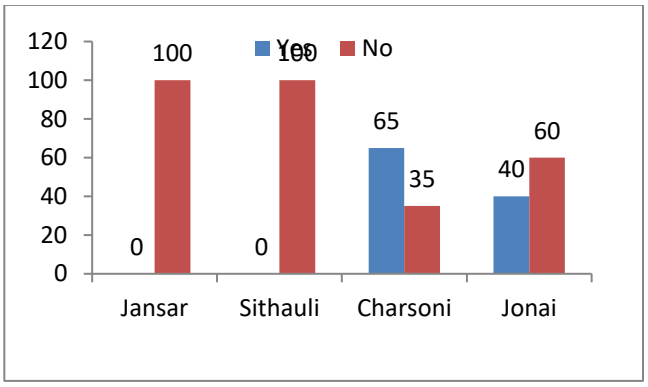


Table: 5.59Village Wise Government Hospital Status

GH_V	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	0	0	80	80
No	80	80	0	0
Total	80	80	80	80

Note: Primary Source

Fig: 5.55 Village Wise Government Hospital Status

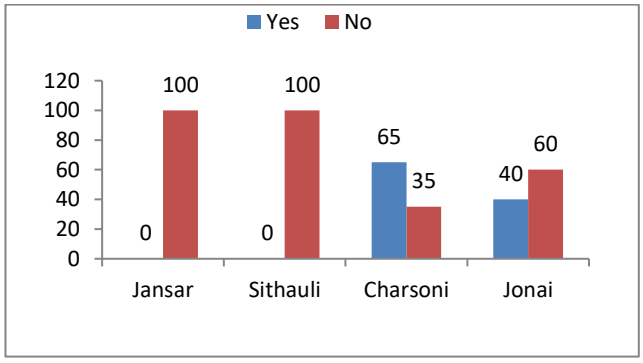


Table: 5.60 Village Wise Availability of Government Doctor

DA_V	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	0	0	38	26
No	80	80	42	52
Total	80	80	80	80

Note: Primary Source

Fig: 5.56 Village Wise Availability of Government Doctor

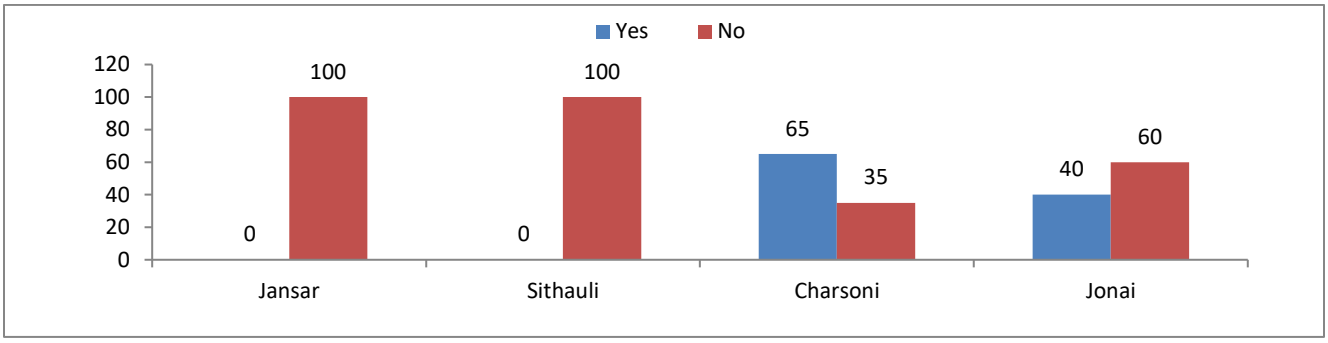


Table: 5.61 Village Wise Availability of Medicines

MFGH_V	Village			
	Jansar	**Sithauli**	**Charsoni**	**Jonai**
Yes	0	0	52	32
No	80	80	28	48
Total	80	80	80	80

Note: Primary Source

Fig: 5.57 Village Wise Availability of Medicines

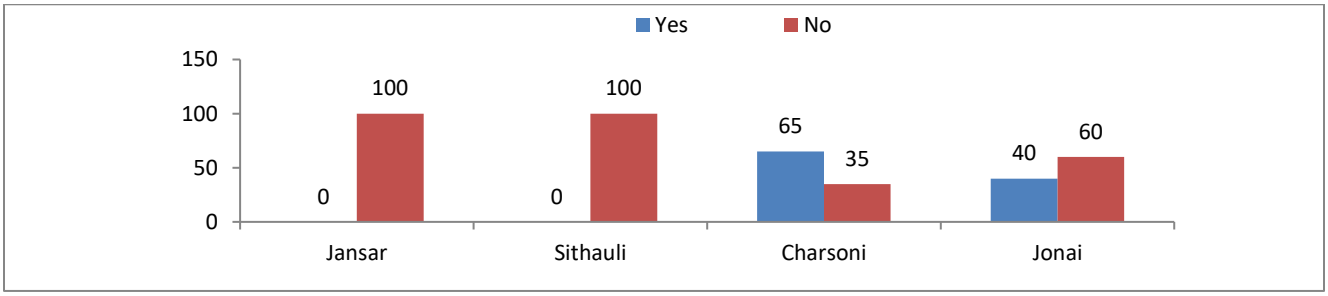
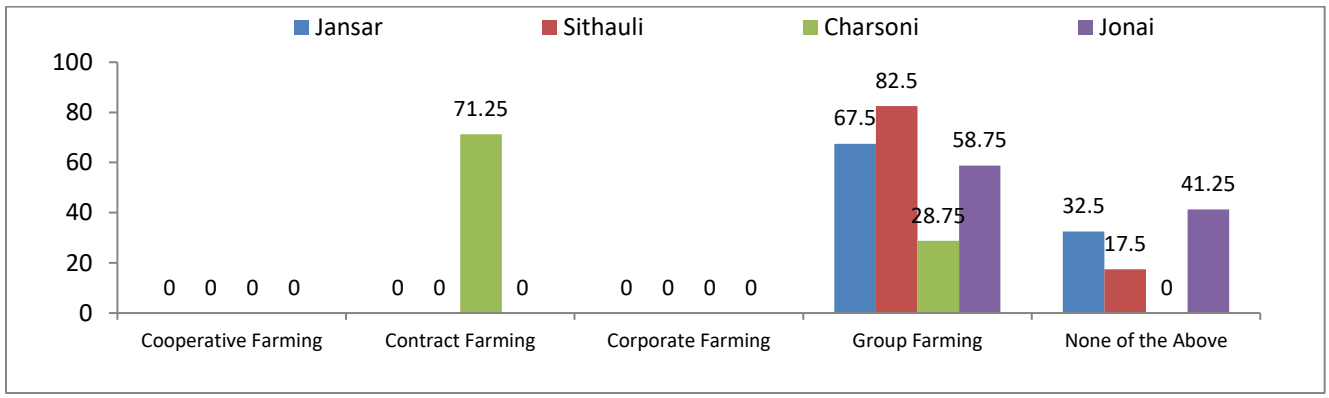


Table: 5.62 Willingness to Participate in Farming Systems

WTPFS	Village			
	Jansar	Sithauli	Charsoni	Jonai
Cooperative Farming	0	0	0	0
%	(0)	(0)	(0)	(0)
Contract Farming	0	0	57	0
%	(0)	(0)	(71.25)	(0)
Corporate Farming	0	0	0	0
%	(0)	(0)	(0)	(0)
Group Farming	54	66	23	47
%	(67.5)	(82.5)	(28.75)	(58.75)
None of the Above	26	14	0	33
%	(32.5)	(17.5)	(0)	(41.25)
Total	80	80	80	80
%	(100)	(100)	(100)	(100)

Note: Primary Source

Fig: 5.58 Willingness to Participate in Farming Systems



Chapter -6

Economics Analysis of Technical Inefficiency of Farming

Introduction

The present chapter examines the third objective of the study to justify Dr. Ambedkar's theoretical line of approach. This diminutive size of holdings is said to be greatly harmful to Indian Agriculture. The average farm size has been persistently declining in India as the number of farms has increased from 71 million in 1970-71 to 145 million in 2015-16, whereas the average farm size is moving on the path of declination from 2.28 hectares (ha.) to 1.08ha. (Agriculture Census, 2015). The evils of smallholdings are multiples. But it would have been no slight mitigation of them if the smallholdings are compact holdings. Unfortunately, they are not. A holding of a farmer though compact for the purposes of revenue is for purposes of tillage composed of various small strips of land scattered all over the village and interspersed by those belonging to others. How the fields are scattered can only be shown graphically by a map. Herein we shall have to remain content, since we cannot give a map, with knowing how many separate plots are contained in holding. The number of separate plots in each holding will show how greatly fragmented it is (Dr. Ambedkar, 1918). The diminutive size of the land was the major problem of agriculture in 18th century as elucidates by Dr. Ambedkar in his paper "Small Holdings in India and Their Remedies" published in the Journal of the Indian Economic Society Vol. I.1918. This was not the obstruction in agrarian development which was persisted in the era of 19th & 20th century. The evils are still transmittable in the present era and consequently hinder the actual potential of agrarian produce cultivated in India.

The associationship of farm size and productivity has been dealt with and contended in literature in a distinct manner from time to time. Various studies conducted in the late 60s and 70s have opined strongly that there is a negative relationship between farm size and productivity in agriculture. This consensus was supported by the various agronomists (Sen 1962, 1964; Mazumdar 1965; Khusro 1968; Hanumantha Rao 1966; Saini 1971; Bardhan 1973; Berry 1972).

A. K. Sen (1962), described main proposition on the farm size and productivity i.e. profitability in the agriculture will increase as the size of holding will increase but in general productivity per hectare decreases with the size of holdings. He came up with a further proposition in 1964, that labor land ratio is higher on the small farms in contrast with the large farms this grater volume of labour use keep on the productivity higher for small farms than large farms. Other economists, for instance, Deepak Mazumdar, A.M.Khusro, G.R.Saini, and Hanumanta Rao have similar labor for farm size and productivity. Dyer (1997) reasoned that negative or inverse relationship is necessarily not a product of higher efficiency on the parcels possessed by small farmers and not even owing to better quality of land but it upraises due to dire struggle of hapless farmers for their livelihood on the subsistence parcels. Here the argument made by Dyer that agricultural land redistribution on the point of inverse relation will keep the farmers far from mitigating poverty and generating employment opportunity. Consequently, it will heighten the degree of exploitation and penury. This argument built by dyer is ponderable in Indian context.

The above stated associations between farm size and productivity are later on further explained and examined by the eminent peer A.P Rao, Krishna Bhardwaj, Rajvir Singh &R.K.Patel, Ashok Rudra, Joginder Singh & D.K. Grover. A.P.Rao and Krishna Bhardwaj (1974) conducted the test on the earlier round of the farm management surveys, resolved that there is no certain and systematic relationship between farm size and productivity per acre of individual crop and the size of holding. Their economic notion was further supported by the Rajiv Singh and R.K Patel (1973), conducted an enquiry by executing study in Meerut district of U.P. His findings reject the earlier hypothesis stated inverse relationship between farm size and productivity and contended the argument that medium and large farmers are also evident with greater interest in using land more intensively with the advance mechanization skills and technical know-how. Madhusudhan Ghosh (1986) statistically validates that farm size and productivity have positive relationship, particularly for the crop undergoing technological transformation. Moreover, Singh & Grover (1989) has carried empirical analysis on different farm size of Punjab for the wheat crop and resolved that wheat yield increase with an increase in the farm size and vice versa. It reveals that yield was more on large farms due to implementation of higher mechanical inputs and better access of the large farms to the institutional apportioning with farm inputs. Foster and Rosenzweig (2010) exercised the plot-level panel data of the Rural Economic Development Survey for the period of 1999 to 2008 and built a model. The model

contains variables such as supervision costs, credit & risk imperfections, and economies of scale and result expounds that these variables are accounted for inefficiency in the small- scale agriculture in India. Thapa and Gaiha (2011) utilized Rural Economic Development Survey 2006 of NCAER to examine the relationship between farm size & crop yields by applying the Kernel density function. The study reveals that the relation varies within the food commodity bunch. He also stresses that the lower fractions of smallholders are contracted in lower range of yields compared with medium- and large landholders, while it is not a case for all commodities. Wang et.al, (2015) has carried a study on rice farm productivity in China and India based on 325 farmers from Jianxi and 400 farmers from Allahabad. A regression computation exhibits that agricultural land yield increases with the holding size. Further, the land productivity inclines with the effective use of machines in both the country China and India. In addition to this, A. Amarendra Reddy (2015) scrutinized the state-wise drifts in the profitability of rice crops in India by employing unit-level data of cost of cultivation scheme of Government of India. The findings reveal that there was a convergence in the profit creation all over the states mainly propelled by the major use of irrigation, fertilizers and farm machinery. The major fact-finding here is that the gross yield, gross returns and profits have positive association with farm size. Further the most significant inference is drawn in the study that after controlling state effects and other inputs usage, farm size is the positive determinant of the profitability.

The evaluation of the major inefficiency factor responsible for nonattainment of the highest possible output is specified and taken in the model. Therefore, the deterioration in farm size and rising number of fragmented lands is considered as an inefficiency generating element. This chapter draws stochastic production function approach to inspect the inefficiency level among different farm sizes of the land such as marginal, small, semi medium and medium farms.

This chapter analyses empirically crop production inefficiency for a pre-classified structure of farmers in UP state. The profitability of a holding directly associated with its efficiency or inversely associated with inefficiency. In literature, efficiency is measured with reference to either the desired performance of a farm or with that of another farm. Therefore, it is a relative measure, compares the observed performance of a farm with some specific standard of performance. The production frontier serves as one of such standard for measuring technical efficiency or inefficiency. Theoretically, the definition of the production function represents the

maximum possible output for any given combination of factor inputs. Thus, it sets the limit or frontier on the observed value of production. Accordingly, the amount by which a farm's actual output lies below its production frontier can be regarded as a measure of technical inefficiency. Farrell (1957) demonstrated the use of frontier production function that was deterministic. In the deterministic model, all farms share production of frontier and any variation in a farm's performance is attributed to inefficiency relative to the common frontier. However, this deterministic approach ignores the fact that some factors are entirely outside the control of a farm such as (weather, pest and prices). Therefore it gives the genesis to the stochastic frontier model framed by Aigner et.al. 1977 is free from this problem. It is modeled with compound error term with two components *viz.*, (i) asymmetric component that permits random variation of the frontier of the farms (i.e., random shocks outside the farm's control) and (ii) a one-sided component that captures the effect of technical inefficiency. Further, by inclusion of the one-sided error component, the observed output function cannot lie above the frontier. Using this function technical efficiency or inefficiency can be measured. This function is known as the farm-specific stochastic frontier production function. The advantage of the stochastic frontier over deterministic frontier is that farm-specific efficiency and random error effect can be separated (Mythili and Shanmugam, 2000, Banik, 1994). However, recent studies in India, estimated technical efficiency or inefficiency level of individual farm (Hazarika and Subramanian, 1999; Mitra, 1999; Mythili and Shanmugam, 2000; Shanmugam, 2003; Chattopadhay and Sengupta, 2001; Singh et al., 2002; Pillai, 2001; Panda, 1996; Neogi and Ghosh, 1998). The stochastic frontier production function approach provides a scope to measure technical inefficiency of the farm. So that with the extra betterment driven by reduction in the inefficiency factors, the farm output would be possible to increase in future.

The main objective here is to estimate the technical inefficiency of various farms of the villages by using stochastic production frontier approach. The stochastic frontier approach has applied mainly because of the following reasons: Firstly, the method is capable of capturing measurement errors and other statistical noises influencing the shape and position of the production frontier (Battese, 1992; Msuya et al, 2008). Battese, extensively described techniques such as deterministic versus stochastic, parametric versus non-parametric that could be used to measure the relative inefficiency. Secondly, the technique better suits to agricultural production largely influenced by random exogenous shocks found in Indian states particularly in Uttar

Pradesh. This technique assumes that the farmers may deviate from the frontier not only because of measurement errors, statistical noise or any non-systematic influence but also because of certain technical inefficiency effects.

The analysis of the technical inefficiency effect assists in identifying the causes of inefficiency. The inefficiency can be reduced to raise agriculture production. The agricultural sector in Uttar Pradesh plays an important role in the overall state economy through its significant contributions to rural employment, food security, and provision of industrial raw materials for other sectors in India. The performance of the overall Uttar Pradesh economy has been driven by the performance of the agricultural sector due to its large share in the economy. Agriculture in Uttar Pradesh employs the majority of the poor and has strong consumption linkages with other sectors. Marginal (< 1 ha) and small (1 – 2 ha) farmers cultivate 92.5 percent of all landholdings in UP which accounts for 64.8 percent of the total area cultivated in UP (Agricultural Statistics at a Glance, 2015). It implies that the marginal & small holders farming dominate agricultural production, and a large proportion is for subsistence. Since poverty is predominantly a rural phenomenon, and agriculture is a major economic activity for rural population, it follows that the poverty alleviation depends critically on performance of the agricultural sector. However in recent years there is high discrepancy appeared in the agricultural growth rate of the Uttar Pradesh in 2011 at 5.9 percent with the downfall for the next year, it stands at 5.2 percent. Moreover in 2014 it shows negative growth rate by -2.5 percent followed by positive growth of 3.7 percent in 2015. Therefore this kind of variation in the growth requires some investigation as majority of farmers in Uttar Pradesh are marginal farmers. It influences its profitability and income-generating capacity. Nevertheless the genesis of marginal farmers' prone state is directly proportional to rate of fragmentation of land holdings in agriculture sector. This phenomenon was well explicated by Dr. Ambedkar in 1918 in the Economic Journal entitled "Small Holdings in India and their Remedies". He stated that the land fragmentation affects agriculture development and farmers' profitability negatively. In the early phase, there was also agrarian land found to be fragmented and farmers are left with no profitability further, overall influencing agrarian development by generating more marginal land holdings and by questioning the production efficiency of farms at wider level.

The chapter examines farm wise inefficiency in the production operated by various categories of farmers' *i.e.* marginal, small, semi-medium and medium farmers of Uttar Pradesh. Therefore, farm or holdings inefficiency is measured with the help of stochastic production frontier technique. The study was undertaken in the four villages from the four economic regions of Uttar Pradesh State. A sample of 320 farmers comprising 233 marginal (< 1 hectare), 43 small (1-2 hectares), 24 semi-medium (2-4 hectares) and 20 medium (4-10 hectares). Farmers are randomly selected from the villages. Data pertaining to the agricultural year 2018-2019 are collected through personal interview method from the farmers.

Hypotheses for the present chapter are:

1) **H_{01}:** $\gamma = \alpha 0 = \ldots = \alpha 10 = 0$, i.e., inefficiency is absent
2) **H_{02}:** There is no technical inefficiency among the group of farms (A1=A2=A3=A4)

Technical inefficiency of the individual farm owned by farmers was assessed through stochastic frontier production function analysis. The specific stochastic frontier production function model is:

$$\ln Y = \beta 0 + \beta 1 \ln X1 + \beta 2 \ln X2 + \beta 3 \ln X3 + \beta 4 \ln X4 + \beta 5 \ln X5 + \beta 6 \ln X6 + \beta 7 \ln X7 + (Vi - Ui) \ldots\ldots\ldots\ldots\ldots (1)$$

Where:

Y = Output of Wheat (in Quintals)

β0….β7 = Parameters to be estimated

X1 = (Land in Hectares) X2 = Irrigation (in Rupees)

X3 = (Fertilizers in Rupees) X4= Seeds (in Rupees)

X5 = (Pesticides in Rupees) X6 = Equipment utilized (in Rupees)

X7= Self Owned Labor (in Rupees)

Where the subscript 'i' indicates the i-th farmer in the sample (i =1, 2,……, N); ln represents the natural logarithm (i.e., the logarithm to base e); The βs are unknown parameters to be estimated in the study. Whereas, V_i= Random error having zero mean which is associated with random factors (e.g., measurement errors in production, weather, etc.,) which are not under the control of the farmer and U_i = One-sided inefficiency component. This type of stochastic frontier was independently proposed by Aigner et al. (1977) and Meeusen and Van den Broeck

(1977). The random errors, Vi, i = 1, 2, …., were assumed to be independently and identically distributed as N (0,σv2) random variable which is independent of U_i's which were assumed to be non-negative truncations of the N (0, σu2) distribution (i.e., half-normal distribution). Given the assumptions of the above stochastic frontier model, inferential parameters of the model can be based on the maximum likelihood estimation because the standard regularity conditions hold. Hence, for inefficiency analysis, model was carried out in terms of gathering information on wheat output, as the dependent variable along with the seven input categories and eight inefficiency factors that may explain inefficiency differentials among four farm classes defined and used in the production function (see table 6.1). On the other hand, Inefficiency factors for stochastic frontier analysis defined in the equation below:

$\mu i = \alpha 0 + \alpha 1$ (Age) + $\alpha 2$ (FS) + $\alpha 3$ (SFP) + $\alpha 4$ (ASP) + $\alpha 5$ (ICS) + $\alpha 6$ (LFI)……. (2)

Where α0 is constant and α1, α2, α3, α4, α5 and α6 are the coefficients are unknown parameters to be estimated, together with the variance parameters, which are expressed in terms of Age, Farm Size (FS), Soil Fertility Problem (SFP), Awareness Spread by Panchayat (ASP), Inaccessibility to Certified Seeds and Simmons Land Fragmentation Index (LFI).

The stochastic frontier model for all farms were marginal, small, semi-medium and medium of wheat producers are defined by equations (1) and (2). The production function, defined by equation (1), specifies that the four groups of farms (marginal, small, semi-medium and medium farms may have different mean levels of wheat output. The model for the technical inefficiency effects, defined by equation (2), specifies that the technical inefficiency effects in the stochastic frontier (1) are a function of farmers' age, Farm Size, Soil Fertility Problem, Awareness Spread by Panchayat, inaccessibility to Certified Seeds and Land Fragmentation Index The maximum Likelihood estimates of the parameter of stochastic frontier have been obtained by using the software STATA and the Model of Batteese & Coili is exercised in order to interpret Stochastic Production Frontier on the primary data set.

The maximum likelihood (ML) results of the estimation of the parameters of the stochastic frontier production function are presented in Table 6.4. The values of the likelihood ratio (LR) sigma-square (σ2) and gamma (γ) are statistically significant. This indicates that the frontier model is an adequate representation of the farms considered in the study. The γ-

parameters indicated above have a value between zero and one. The discrepancy parameter γ is an indicator of the relative variability of the two error components. If γ approaches zero, this implies that the random effect dominates the variation between the frontier output level and the actually obtained output level. Conversely as γ approaches one, it can be assumed that the variations in output are determined by technical inefficiency

The parameter λ explicates the relative dominant of inefficiency factor over random error in the total composed error. Technical inefficiency of the i-th farmer in the appropriate data set for the individual farm is defined as

Technical inefficiency = 1- (exp (-Ui)).

= 1- (Qi / Qi*)

where Qi* is the maximum possible output.

Empirical Result

A summary of the farm-wise descriptive values of the selective variables, for the wheat production frontier analysis, is presented in table 6.2 (a, b, c, d).On the other hand, the descriptive values for the total sample size have been described in table 6.3. It is observed from the summary table that the medium & semi-medium farm households are utilizing more resources than small& marginal farm households in terms of output produced, land operated, total fertilizers applied (phosphorus and nitrogen), seed & pesticides applied, labor utilized and equipment operated for the production of wheat. A production function defines the technological relationship between the level of inputs and the resulting level of outputs. If estimated econometrically from data on observed outputs and input usage, it indicates the average level of outputs that can be produced from a given level of inputs (Schmidt, 1986). Further. It gives the production function coefficients for the best fit frontier and it implies that at best fit frontier, what movement in the inputs variable should take place. The movements in the sign of input variables will eventually direct to the best fit frontier in the model. Therefore, the present frontier model and its coefficients are interpreted here.

The estimated coefficients of frontier production function are given in Table 6.4. All independent variables considered have positive coefficients except irrigation and fertilizers. Land (0.77), Seeds (1.35), Pesticides (1.51), Equipment (0.75) and human labor (0.06) were positively

significant. These positive significant values indicate that there is scope for increasing production of wheat by increasing the expenditure on these inputs. These five input coefficients explicate the positive signs in to reach at the 'best fit frontier'. The coefficient value of irrigation and fertilizers at -1.04, -2.7 respectively are significant at 1 percent level. It implies that 10 percent reduction in the expenditure of irrigation will raise farm production by 10.4 percent. Likewise, with reduction in the expenditure on fertilizer by 10 percent will raise farm production by 27 percent. The negative value of these coefficients in the model shows that model allows for reduction in the expenditure incurred upon the irrigation and fertilizer to obtain the best fit frontier for agricultural production. The subsidized rate of fertilizers may be the reason for incurring higher expenditure on this variable. And thus, with increasing the farm size, model allowed for reduction in the expenditure due to the operation of scale economies as more land brought to the agriculture use. The Gamma value is found to be 0.86 indicating the presence as well as dominance of inefficiency effect over random error.

Further, the positive coefficient of Land implies that by increasing 10 percent of the land (in hectares) for the wheat production, the wheat production will rise by 7 percent. Similarly, the 10 percent incline in the expenditure of seeds will raise the production by 13 percent. The increase in expenditure by 10 percent in pesticide accentuates the wheat production by 15 percent. Similarly, incline in the expenditure on Equipment and human labor by 10 percent will augment the wheat production by 7.5 percent and 0.06 percent respectively. The low wage rate prevailing in the agriculture sector might be the reason that allows for incurring expenditure positively. In simple words, there is a sufficient scope for raising farm production by increasing the area of farm and expenditure on pesticide, seeds, equipment and human labor. It may resolved that inputs such as area, seeds, pesticides, equipment and human labor are under-utilized in order to reach at the best-fit farm production frontier. Besides this, fertilizer and irrigation expenditure coefficients render the scope to raise the production by reducing the expenditure on these inputs. However it doesn't imply the absolute reduction in the irrigation. But the expenditure incurred on these inputs is required to minimize to reach at the best fit frontier. This kind of phenomenon is observed in the study because marginal farmers are usually preferred the custom hiring for irrigation as they don't have their own source of irrigation on the contrary semi-medium and medium farmers have their own source of irrigation. Hence, they are able to gain economies on input expenditure. However in case of fertilizer input usage, farmers have opinion of higher the

use of fertilizer, higher will be the production. This misconception pushes them to raise the use of fertilizer finally reflects the expenditure of the particular input.

Furthermore, the specified reason for technical inefficiency in farms was determined with the stochastic frontier model in single-stage maximum likelihood estimation. The parameter of inefficiency has taken in the model explaining the technical inefficiency due to the chosen parameters. From the estimated coefficients of the inefficiency variables, such as soil fertility problem (SFP) and inaccessibility to certified seeds (ICS) are statistically significant and divulging the positive relation with technical inefficiency. On the other hand, farm-size (FS), awareness spread by Panchayat (ASP) and land fragmentation index (LFI) are statistically significant and revealing negative or inverse association ship with technical inefficiency in the frontier production. A possible reason is that the static conditions of traditional agriculture and minimal learning will have little profound effect in order to improve productivity by mitigating inefficiency. The Technical inefficiency for the whole 320 samples ranged from 2 to 91 percent with a mean value of 23.5.

Table 6.5 depicted Farm wise Distribution of Technical Inefficiency in Wheat Production. The table gives the absolute frequency and percentage of inefficiency for each category of farm. The table reveals that marginal and small farms are relatively more inefficient as compared to semi-medium and medium farms. Inefficiency ranges between 0 percent to 80 percent for the marginal farms while for small farms, inefficiency extended further and it lies between the ranges of 10 percent to 90 percent. Moreover in case of semi-medium farms it compasses through 0 percent to 50 percent and lastly for medium farms inefficiency lies between the ranges of 0 percent to 20 percent only. Further, the analysis of the detailed inefficiency distribution among the different farm size reveals that 0 to 10 percent inefficiency range comprises the 73 percent inefficiency for marginal farms followed by 13 percent for semi-medium farms and 12.5 percent for medium farms respectively. Similarly, 10 to 20 percent range of inefficiency consists of 88.8 percent inefficiency for marginal farms followed by 5.97 percent inefficiency for medium farms and 4.48 percent inefficiency for semi-medium farms. Moreover, 20-30 percent range of inefficiency shows that no farm is inefficient between this range except the marginal farms as 21 (100%) marginal farms are inefficient. Likewise, inefficiency range between 30-40 percent expounds 58 percent inefficiency for marginal farms followed by 33.3 percent inefficiency for semi-medium

farms and 8.3 percent inefficiency for small farms. Similarly, the inefficiency range between 40-50 percent comprises the 50 percent inefficiency for the marginal farms followed by 25 percent inefficiency for small and semi-medium farms. The inefficiency range between 50-60 percent comprises the 55.5 percent inefficiency for marginal farms and 44.5 percent inefficiency for small farms. Further, the inefficiency range between 60-70 percent contains the 63.6 percent inefficiency for small farms and 36.4 percent inefficiency for marginal farms. As we further move to the higher range of inefficiency of 70-80 percent, only marginal and small farms are found inefficient. Lastly, inefficiency range of 80-90 percent comprises the inefficiency for small farms. Hence, it is clear from the table that high inefficiency range is detected for the marginal and small farms as compared to the semi-medium and medium farms.

Table 6.6 explicates ANOVA statistics stating farm size-wise differences that lie in regard to technical inefficiency between the different farm group i.e. marginal, small, semi-medium, and medium. Inefficiency among the one category of farm is different to another category of farm, this is analyzed with the help of ANOVA test. Dr. Ambedkar always argued that marginal farms and its diminution will suppress the farmers' potential and agricultural development in future. Therefore, in order to examine this economic conception, sub-hypothesis proving has done here. The Sub-Null Hypothesis of the ANOVA states that technical inefficiency is same among the different farm sizes. The test verified that inefficiency among the four category of farms have the differences. The score value of the ANOVA is found significant at 1 percent. Therefore, the null hypothesis is rejected as per the results. Table shows that mean inefficiency for small and marginal farm are higher than semi-medium and medium farms. Therefore, special inefficiency preventive steps are required for marginal and small farms in the villages.

Conclusion

This reflects in the key observations of the study that Dr. Ambedkar's economics conception regarding the farm size and production is pertinent in the present era. Frontier coefficient of land has witnessed the positive value, explains that increase in the operated land will govern the incline in wheat production**.** The analysis demonstrates the existence of technical inefficiency in the production of wheat among different four farm size. The yield of wheat can be considerably improved in the study area if the efforts would be driving to mitigate the inefficiency effects such as land fragmentation: a reflection of parcels, influence of the farm size,

soil fertility problem, inaccessibility to certified seeds and awareness spread by Panchayat. It may be resolved that technical inefficiency in the production of wheat is inversely related to farm size, and awareness spread by Panchayat and land fragmentation Index, and positively related with inaccessibility to certified seeds, soil fertility problem. Further, the above factors have significant association-ship with inefficiency. Further A.R. Reddy and C. Sen (2004) flaunt that technical inefficiency in rice production decreases with the increase in the farm size. The similar notion investigated by Abate Bekele et.al (2009), reveals that increase in the farm size will reduce inefficiency in the production process. Therefore, Dr. Ambedkar's economic notion (1918) regarding farm size and productivity is pertinent in the 21st century too. If the farm size will continue to diminutive in future, it will harm the total productivity as well as profitability of the farmers, particularly marginal and small farmers. This construct is presently supported by economists such as C. Rangrajan and S.M. Dev (2019), authors stated that the Shrinking size of farms is the responsible factor for low income and farmers' distress. The author resolved lastly that measures to improve productivity and consolidation of land holdings to attain the benefit of farm size can allow the elevation of the farmers' distress in India. Ramesh Chand's (2017) model of "small farmers' large fields (SFLF)" clearly designed to bestow the advantage of large farms to the marginal and small farmers in India and genesis of this model is aimed at to reduced ill-effect of shrinking farm size in India. However the "small farmers' large fields (SFLF)" is nothing but expressing the notion of Dr. Ambedkar. Diminution of land will harm the agriculture hence state should come forward for collective or joint farming, land consolidation, etc. SFLF Model is also encouraging farmers to pool their resources and make agricultural operations in order to raise the yield and as well as profitability. Further, finding also reveals that as land fragmentation index gets high, inefficiency in production will deepen further. Therefore, Dr. Ambedkar's conception and importance to the crucial factor land have found to be well-grounded in present context too.

Moreover, to reduce inefficiency in the production measures like encouraging collective or joint farming, land consolidation, strengthening extension services and other facilities should be required to promote in this area. Furthermore, based on the results of the stochastic frontier production function estimated in this study, significant technical inefficiencies in production exist between small and large farm groups. This suggests that there exists some scope for raising agricultural output through the correction of technical inefficiency, with resort to new improved

technologies. The main reasons for technical inefficiency are the low farm size as majority of land is gradually moving toward diminution mainly and increasing fragmentation and other factors such as inaccessibility to certified seeds, awareness spread by Panchayat for farm technical demonstrations and soil fertility problem. Results of the study also supported by the findings of Abate Bekele et.al (2009) & A.R.Reddy et.al (2004). Hence, the application of Stochastic Production frontier model reveals that increase in the marginal & small farms will bring down the agricultural production and consequently it will influence the income generating capacity of the farmers, especially it is a key concern for marginal and small farmers. Similarly Land fragmentation index and inefficiency also expounds the direct relation in the model. So, if the land fragmentation will increase inefficiency in the production will also increase. Hence it is inferential in the chapter that Dr. Ambedkar's economic conception of harmful impact of diminutive land on agriculture production is pertinent in the present time.

References

1. Aigner, D., J. Lovell & P. Schmidt (1977), "Formulation and Estimation of Stochastic Frontier Production Function Models", *Journal of Econometrics*, Vol. 6, No.1, pp. 21-38
2. Ashok Rudra (1983), "Indian Agricultural Economics", Allied Pulications, New Delhi,
3. Battese, G. E., & Coelli, T. J. (1992). Frontier production functions, technical efficiency and panel data: with application to paddy farmers in India. *Journal of productivity analysis*, *3*(1-2), 153-169.
4. Battese, G.E. & G.S. Corra (1977), "Estimation of a Production Frontier Model with Application to the Pastoral Zone of Eastern Australia", *Australian Journal of Agricultural Economics*, Vol. 21, pp. 169-179.
5. Battese, G.E. & T.J. Coelli (1995), "A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data", *Empirical Economics*, Vol.20, pp.325-332.
6. Bekele, A., Viljoen, M. F., Ayele, G., & Ali, S. (2009). Effect of farm size on efficiency of wheat production in Moretna-Jirru district in Central Ethiopia. *Indian Journal of Agricultural Economics*, *64*(902-2016-66750).
7. Belete, A., J. Dillon & F. Anderson (1991), "Development of Agriculture in Ethiopia since the 1975 Land Reform", *Agricultural Economics*, Vol.6, pp. 159-175.
8. Bharadwaj, K. (1974). Notes on farm size and productivity. *Economic and Political Weekly*, A11-A24.
9. Bravo-Ureta, B. E., & Evenson, R. E. (1994). Efficiency in agricultural production: the case of peasant farmers in eastern Paraguay. *Agricultural economics*, *10*(1), 27-37.
10. Chattopadhyay, M. & A. Sengupta (2001), "Technical Tenancy Inefficiency: A Study Based on West Bengal Agriculture", *Economic and Political Weekly*, Vol. 36, Nos. 5 and 6, February, 3-9/10-16.
11. Dev, S. M. (2008). Challenges for the revival of Indian agriculture.
12. Doraiswamy, P. (1992), "Effect of Education and Extension Contacts on Agricultural Production", *Indian Journal of Agricultural Economics*, Vol. 47, No. 2, April-June, pp. 205-214.

13. Dyer, G. (1997). Class, State and Agricultural Productivity in Egypt: A Study of the Inverse Relationship between Farm Size and Land Productivity (London: Frank Cass Publishers).
14. Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A (General)*, *120*(3), 253-281.
15. Foster, A., & Rosenzweig, M. R. (2010, September). Barriers to farm profitability in India: mechanization, scale and credit markets. In *Conference Agriculture for Development-Revisited, University of California at Berkeley. October* (Vol. 24, pp. 1-2).
16. Ghosh, M. (1986). Farm Size-Productivity Nexus Under Alternative Technology. *Indian Journal of Agricultural Economics*, *41*(902-2018-2428), 17-28.
17. Huang, C.J. & J.T. Liu (1994), "Estimation of a Non-Neutral Stochastic Frontier Production Function", *Journal of Productivity Analysis*, Vol. 4, pp. 171-180.
18. Jondrow, J.C, C.A.K. Lovell, I.S. Materov & P. Schmidt (1982), "On the Estimation of the Technical Efficiency in the Stochastic Frontier Production", *Journal of Econometrics*, Vol.19, No.1, pp.233-238.
19. Khan, I., & Afzal, M. (2012). Production uncertainty and technical inefficiency of textile manufacturing and exporting firms in Pakistan. *International Journal of Research in Social Sciences*, *2*(4), 567.
20. Khusro, A. M. (1964). Returns to scale in Indian agriculture. *Indian Journal of Agricultural Economics*, *19*(902-2016-67093), 51-80.
21. Khusro, A. M. (1973). Economics of land reform and farm size in India.
22. Kumbhakar, S., S.C. Ghosh and J.T. Mcguckin (1991), "A Generalised Production Frontier Approachfor Estimating Determinants of Inefficiency in U.S. Dairy Farms", *Journal of Business, Economicsand Statistics,* Vol.9, pp. 279-286.
23. Mazumdar, D. (1963). On the economics of relative efficiency of small farmers. *Economic Weekly*, *15*(28-30), 1259-63.
24. Parmeter, C. F., & Kumbhakar, S. C. (2014). Efficiency analysis: a primer on recent advances. *Foundations and Trends® in Econometrics*, *7*(3–4), 191-385.
25. Pascoe, S., Gréboval, D., Kirkley, J., & Lindebo, E. (2004). Measuring and appraising capacity in fisheries: framework, analytical tools and data aggregation.
26. Porcelli, F. (2009). Measurement of Technical Efficiency. A brief survey on parametric and non-parametric techniques. *University of Warwick*, *11*, 1-27.

27. Rao A.P. (1974). Size of Holding and Prductivity. *Economic and Political Weekly*,
28. Rao, C. H. (1966). Alternative explanations of the inverse relationship between farm size and output per acre in India. *Indian Economic Review*, *1*(2), 1-12.
29. Reddy, A. A. (2015). Regional Disparities in Profitability of Rice Production: Where Small Farmers Stand?. *Indian Journal of Agricultural Economics*, *70*(902-2016-68395), 259-271.
30. Reddy, A. R., & Sen, C. (2004). Technical inefficiency in rice production and its relationship with farm-specific socio-economic characteristics. *Indian Journal of Agricultural Economics*, *59*(902-2016-68050).
31. Rudra, A., & Sen, A. (1980). Farm size and labour use: analysis and policy. *Economic and Political Weekly*, 391-394.
32. Saini, G. R. (1969). Farm size, productivity and returns to scale. *Economic and Political Weekly*, A119-A122.
33. Saini, G. R. (1971). Holding size, productivity, and some related aspects of Indian agriculture. *Economic and Political Weekly*, A79-A85.
34. Sarker, D., & De, S. (2004). High technical efficiency of farms in two different agricultural lands: A study under deterministic production frontier approach. *Indian Journal of Agricultural Economics*, *59*, 197-208.
35. Sen, A. (1964). Size of holdings and productivity. *Economic Weekly*.
36. Sen, A. K. (1962). An aspect of Indian agriculture. *Economic Weekly*, *14*(4-6), 243-246.
37. Simar, L., & Wilson, P. W. (2009). Inferences from cross-sectional, stochastic frontier models. *Econometric Reviews*, *29*(1), 62-98.
38. Singh Joginder & Jindal B.R. (1994), "Tractorization of Punjab Agriculture: Socio-Economic Considerations" *PAU Report.*
39. Singh Joginder & Jindal B.R. (1989), "Relation of farm size and productivity", *The Economic Tmes*, Jan 23.
40. Singh, R., & Patel, R. K. (1973). Returns to scale, farm size and productivity in Meerut District. *Indian Journal of Agricultural Economics*, *28*(902-2018-2202), 43-49.
41. Taylor, G.T. & J.S. Shonkwiler (1986), "Alternative Stochastic Specifications of the Frontier Production Function in the Analysis of Agricultural Credit Programmes and Technical Efficiency", *Journal of Development Economics*, Vol. 21, pp. 149-160.

42. Thapa, G., & Gaiha, R. (2011, January). Smallholder farming in Asia and the Pacific: Challenges and opportunities. In *IFAD Conference on New Directions for Smallholder Agriculture*, (Vol. 25). International Fund for Agricultural Development Rome.
43. Thomas, K. & R. Sundaresan (2000), "Economic Efficiency of Rice Production in Kerala", *The Bihar Journal of Agricultural Marketing*, Vol. 8, No. 3, pp. 310-315.
44. Wang, J., Chen, K. Z., Das Gupta, S., & Huang, Z. (2015). Is small still beautiful? A comparative study of rice farm size and productivity in China and India. *China Agricultural Economic Review*, *7*(3), 484-509.

Tables & Figures

Table: 6.1 Variables for Stochastic Production Frontier and Technical Inefficiency

Stochastic Production Frontier Variables	
A. Production (Output)	Quintal Per Hectare
B. Input Categories	-
C. Land	In Rupees Per Hectare
D. Irrigation	In Rupees Per Hectare
E. Fertilizers	In Rupees Per Hectare
F. Seeds	In Rupees Per Hectare
G. Pesticides	In Rupees Per Hectare
H. Equipment	In Rupees Per Hectare
I. Self-owned Labour	In Rupees Per Hectare
Inefficiency Factors	
a. Age	In Years
b. Farm Size (FS)	Categorical
c. Soil Fertility Problem (SFP)	Categorical
d. Awareness spread by Panchayat (ASP)	Categorical
e. Inaccessibility to Certified Seeds (ICS)	Categorical
f. Land Fragmentation Index (LFI)	Absolute (0 to 1)

Table: 6.2 (a) Descriptive Statistics of Marginal Farms

Variables	Mean	Std. Dev.	Min	Max
Total Output	26.46781	5.805953	4.7	44.3
Land	0.484847	0.212094	0.0905	0.9955
Irrigation	4313.736	1938.606	805.764	8840
Fertilizer	3724.15	1602.172	742.5	7566.5
Seed	1534.209	644.2952	330	3118.02
Pesticide	600.2805	238.0702	139.5	1178.74
Equipment	2611.963	1106.019	535	5279
Total_solh wages	107306.2	34590.53	19000	203000
Inefficiency Factors				
Age	48.70386	11.88678	22	75
FS	1	0	1	1
SFP	3.854077	0.353789	3	4
ASP	1.493562	0.501035	1	2
ICS	1.072961	0.260633	1	2
LFI	0.889695	0.231296	0.16	1

Source: Primary Survey Data (2018-19)

Table: 6.2 (b) Descriptive Statistics of Small Farms

Variables	Mean	Std. Dev.	Min	Max
Total Output	36.95581	9.841416	27.8	79
Land	1.414368	0.309219	0.9955	1.991
Irrigation	10827.1	2232.886	7944	16180
Fertilizer	9466.07	1920.794	6602	13832
Seed	4121.997	865.778	2735	6127.93
Pesticide	1594.07	298.8492	1185	2283
Equipment	7310.442	1721.444	4415	10820
Total_solh wages	74420.39	16961.15	44800	119250
Inefficiency Factors				
Age	52.72093	9.153	30	70
FS	6.790698	3.028108	4	10
SFP	1.325581	0.474137	1	2
ASP	3.488372	0.505781	3	4
ICS	2.465116	0.504685	2	3
LFI	0.523308	0.334331	0.16	1

Source: Primary Survey Data (2018-19)

Table: 6.2 (c) Descriptive Statistics of Semi-Medium Farms

Variables	Mean	Std. Dev.	Min	Max
Total Output	176.1208	40.35935	95	232.1
Land	3.17014	0.611403	2.0996	4.02725
Irrigation	23346.13	4489.563	15492	29710
Fertilizer	19536.79	3731.688	12762	24545
Seed	9691.479	1857.33	6435	12302.5
Pesticide	3613.354	670.2671	2500	4533
Equipment	17201.85	3282.591	11520	21700
Total_solh wages	97235	23170.79	50500	128950
Inefficiency Factors				
Age	54.20833	10.02163	32	67
FS	2.083333	0.408248	2	4
SFP	2.833333	0.481543	1	3
ASP	1.583333	0.583592	1	3
ICS	2	0	2	2
LFI	0.416435	0.258438	0.111111	1

Source: Primary Survey Data (2018-19)

Table: 6.2 (d) Descriptive Statistics of Medium Farms

Variable	Mean	Std. Dev.	Min	Max
Total Output	340.145	26.63684	276.7	382.1
Land	7.23292	1.676453	4.1268	9.75
Irrigation	24607.75	4173.413	17100	32510
Fertilizer	20825.9	3982.249	14340	31505
Seed	10197.35	1759.363	7084.5	13492.5
Pesticide	3820.525	716.9396	2620	5593
Equipment	18534.85	4357.382	12292.5	32700
Total_solh wages	82508.25	18232.52	46300	113960
Inefficiency Factors				
Age	61.15	10.25093	39	75
FS	2	0	2	2
SFP	2.85	0.366348	2	3
ASP	1.65	0.587143	1	3
ICS	2	0	2	2
LFI	0.841667	0.285578	0.25	1

Source: Primary Survey Data (2018-19)

Table: 6.3 Descriptive Statistics of Total Sample Farms

Variables	Mean	Std. Dev.	Min	Max
Total Output	58.70594	83.80378	4.7	382.1
Land	1.232903	1.786682	0.0905	9.75
Irrigation	7884.774	7202.799	805.764	32510
Fertilizer	6750.528	6058.559	742.5	31505
Seed	3035.185	3031.159	330	13492.5
Pesticide	1161.067	1125.536	139.5	5593
Equipment	5332.744	5536.082	535	32700
Total_solh wages	100581.9	33364.31	19000	203000
Inefficiency Factors				
Age	50.43438	11.76662	22	75
FS	1.921875	2.244496	1	10
SFP	3.375	0.958382	1	4
ASP	1.778125	0.847728	1	4
ICS	1.3875	0.602893	1	3
LFI	0.801965	0.30111	0.111111	1

Source: Primary Survey Data (2018-19)

Table: 6.4 Results of Stochastic Frontier Model

Log Likelihood= 51.4			**No. of Observation= 320** **Wald Chi2(7)= 4585.27** **Prob>Chi2= 0.00000**
Total Production	**Coefficient**	**Std. Error**	**Z**
Frontier			
Log(Land)	0.77***	0.06	12.09
Log(Irrigation)	-1.04***	0.23	-4.43
Log (Fertilizer)	-2.70***	0.28	-9.52
Log (Seed)	1.35**	0.42	3.15
Log (Pesticides)	1.51***	0.27	5.50
Log (Equipment)	0.75***	0.20	3.70
Log(Total wage SOL)	0.06*	0.03	2.09
Constant	8.63***	.74	11.59
Mu			
Age	.005	0.004	1.27
Farm Size	-0.12*	0.06	-1.87
SFP	0.38*	0.17	2.15
ASP	-0.22**	0.08	-2.71
ICS	1.09***	0.24	4.46
LfI	1.79***	0.47	-3.78
Constant	-1.43	0.95	-1.50
U Sigma	-2.24	0.27	-8.28
V Sigma	-4.04	0.15	-26.7
Sigma u	.32	0.04	7.37
Sigma v	.13	0.01	13.21
Variance Parameter(σ2)			
Gamma	0.86		
Lambda	2.45	.04	51.30

Source: Author Calculation, Primary Survey Data (2018-19)

Table: 6.5 Frequency Distribution of Technical Inefficiency of Farms

Tech. Inefficiency	Marginal	Small	Semi-Medium	Medium	Total
0-10	71 (73.9) (30.47)	0 (0) (0)	13 (13.5) (54.1)	12 (12.5) (60)	96 (100) (30)
10-20	119 (88.8) (51.1)	1 (0.75) 2.33	6 (4.48) (25)	8 (5.97) (40)	134 (100) (41)
20-30	21 (100) (9.1)	0 (0) (0)	0 (0) (0)	0 (0) (0)	21 100 6.56
30-40	7 (58.3) (3)	1 (8.33) (2.33)	4 (33.3) (16.6)	0 (0) (0)	12 (100) (3.7)
40-50	2 (50) (0.86)	1 (25) (2.33)	1 (25) (4.17)	0 (0) (0)	4 (100) (1.25)
50-60	5 (55.56) (2.15)	4 (44.4) (9.30)	0 (0) (0)	0 (0) (0)	9 (100) (2.8)
60-70	4 (36.36) (1.72)	7 (63.64) (16.28)	0 (0) (0)	0 (0) (0)	11 (100) (3.44)
70-80	4 (21.05) (1.72)	15 (78.9) (34.8)	0 (0) (0)	0 (0) (0)	19 (100) (5.94)
80-90	0 (0) (0)	13 (100) (30.2)	0 (0) (0)	0 (0) (0)	13 (100) (4.6)
90-100	0 (0) (0)	1 (100) (2.33)	0 (0) (0)	0 (0) (0)	1 (100) (0.31)
Total	233 (72.8) (100)	43 (13.4) (100)	24 (7.5) (100)	20 (6.25) (100)	320 (100) (100)

Source: Primary Survey Data (2018-19)

Table: 6.6 Technical Inefficiency of Farms (ANOVA Statistics)

Farm Category	Mean	Std. Deviation	Frequency
Marginal Farms	21.4	14	233
Small Farms	76.9	15.2	43
Semi Medium Farms	19.1	12.8	24
Medium Farms	14	5.02	20
Total	28.2	23.6	320

Source	SS	DOF	MS	F	Prob>F
Between Group	118880.5	3	39626.8	209.8	0
Within Group	59674.1	316	188.8	-	-
Total	178554.6	319	559.7	-	-

***Bartlett's Test for Equal Variance: Chi2 (3)= 22.79 Prob>Chi2=0.000**

Note: Significance at 1% level of significance implies there are differences in the technical inefficiency among four farm groups.

Source: Primary Survey Data (2018-19)

Chapter-7

Summary & Conclusions

The present research work is substantively useful to the researcher, academicians who have come forward with their keen interest in the agricultural issues and committed to mitigating the obstacles prevailing within this particular sector. Agriculture adoption and story of human civilization towards prosperity and wellbeing dwelled deep in our past. In its true essence, agriculture is a mirror of our traditions, culture and values that handovers by one generation to the next generation for development and betterment of the entire human race. From our experience we know that every individual is being presented on this earth dream for their better wellbeing and so that overall economies too. And in this race of achieving better wellbeing and prosperity, agricultural sector possess the multi-dimensional grip that keeps a unique place among all the other sectors. The agricultural oriented economies are better known this multi-dimensional hold of the agricultural sector upon the whole economy and therefore the priority to agriculture sector given by the developing economies such as ours can be widely seen. However, the challenges bestow in front of Indian economy today, is somewhat different from the past.

According to the World Bank report 2017, the rural population of India is 66.46% and the major occupation of the rural population is farming. Farming is entirely relying on the available agrarian land and here the sensitivity and consciousness arise for making the agrarian division more versatile profitable and sustainable, especially from the point of view of poor Indian farmers. The importance of agriculture land from the farmers' perspective had been first time visualized by Dr. Ambedkar in his article "Small Holdings in India and their Remedies" in 1918s. Dr. Ambedkar stresses that the holdings in India are not only small but they are also diminutive. This character of Indian agriculture has caused great anxiety among the farmers concerning the agriculture development in the past decades as well as in the present era. The problems of the agricultural holdings are two-fold (1) How to consolidate the fragmented land holdings and (2) after consolidation, how to perpetuate the said consolidation. Dr. Ambedkar discusses methods for consolidation e.g., restriping, restricted sale of the occupancy of the

fragmented land to the contagious holder. In this connection Dr. Ambedkar had discussed the report of the Baroda Committee and the proposals of Prof. Jevons and Mr. Keatinge. In the light of in-depth understanding of Indian farming and with the assimilation of the observations from the primary findings, he pointed out that the consolidation may obviate the evils of scattered holdings, but it will not obviate the evils of smallholdings unless the consolidated holding becomes an economic holding (Dr. Ambedkar 1918). According to Dr. Ambedkar Major remedy of agriculture lies in increasing the inputs utilization and farm technical support, this may lead to better successive production and equivalently benefitted to the all class of the farmers in India. Nevertheless, the significance of land in the agriculture sector can't be extinguished and this crucial impression efficaciously is prognosticated by Dr. Ambedkar.

Therefore, this study examines and evaluates the Pertinence of Dr. Ambedkar's Views on Agricultural Development in India with Special Reference to Uttar Pradesh. This can be fulfilled via the following set of objectives of the study. Firstly, is to examine & integrate Dr. B. R. Ambedkar's views on agriculture in the light of contemporary Indian economy. The second objective is to construct the Comparative Analysis of the small and large band foodgrain production in India. Thirdly, to evaluate the farmers' potential in terms of production & productivity, land fragmentation Index, returns on investment, income, expenditure and savings for each category of land holdings and farmers' participation in Agricultural program. At last, analyze the technical inefficiency in wheat production for each category of holdings.

To accomplish the objectives of the extant study, it is catalogued in following chapters. Chapter one describes the significance of agriculture in Indian context and the agrarian issues prevailed in modern era. This chapter states about various impediments faced by agrarian sector on the ground of inputs access such as land, irrigation, fertilizers, technological inputs, electricity, etc. and their betterment along with the effective policy implications such as land reforms, land ceilings law. In this context, the reviewed studies flaunt the situation of prime input factor land and the usage of other subsidiary factors in agriculture in India and in different countries as well. Further, reviews flaunts the majority of the farmers are marginal in India having a very little tiny piece of land to cultivate that will be further fragment with the passage of time. Considering the notable cruciality of this prime factor *i.e*. land input, its significance can not be denied. It plays significant role in empowering farmers for collective bargaining for better

price and generation of sustained income. Hence, the profitability and income-generating capacity of farmers has been declining in its size of scale with the ongoing division of land fragmentation. This declining trend in the operation of scale promotes the exploitation of inputs that raises productivity in the short period but the annoying aspect might be seen in the long run that endangered the steady growth in the agrarian output. However, the concerned issues of land fragmentation and shrink in the absolute land size had been already addressed by Dr. Ambedkar during nineties. Therefore the second segment of the reviews articulated Dr. Ambedkar's Agrarian theoretical approach. In accordance with him, there is a crucial role played by the input factor such as land in agriculture development.

Therefore, the second chapter provides the theoretical background for establishing pertinence of Ambedkar views in developing the Indian agrarian sector in modern era over other renowned theories. This work has been beautifully articulated by re-linking and reframing Dr. Ambedkar's agrarian views for the overall development of Indian economy. In light of the reviewed literature and Dr. Ambedkar's agricultural theoretical approach, few important agrarian development theories have been assimilated and at last Dr. Ambedkar's theoretical approach has been mentioned in the theoretical framework. The principally overall theoretical framework of the study comprises of agricultural development theories and its comparison with Dr. Ambedkar's agrarian theory. With the assimilation of various agriculture theories & models, agrarian development and its significance in the growth process cannot be deniable. All agrarian theories principally confide to some basic economic propositions that amplify the agrarian development. Therefore, the second chapter draws a comparison of Dr. Ambedkar's theoretical approach with other agriculture development theories also have been divulging that theoretical approach of Dr. Ambedkar is most suitable and appropriate in present Indian agriculture scenario. It comprises of all essential instruments that trigger the agricultural advancement. Therefore Dr. Ambedkar's comprehensive theoretical approach is well fitted in India. The foremost theories are associated with agriculture development which takes agriculture as a subsistence or traditional sector in the process of economic growth. Theories are taken into account for consideration in theoretical framework is Francis Quesnay's theory of economic growth: (1694-1774), Adam Smith's Theory of Economic Growth (1723-1790) and David Ricardo (1772-1823) theory of economic growth. Another canonical model expounds agriculture sectoral development such as Lewis model (1954), Ranis and Fei model (1961). Schultz (1964),

Kuznets' (1966), Johnston and Mellor (1961), Jorgenson's model (1967) Marx Theory (1859) The Johnston-Mellor Theory Harris-Todaro model (1970) Boserup Model (1965) Malthus theory of development (1798), Conservation model, Location model, Diffusion Model, High - payoff input model. These theories are well-built evidence that reinforces the value of marketing in agrarian based economy. But the economists' attention in context of agrarian development particularly for developing economy is confined to some paradigms only. Therefore, Dr. Ambedkar's theoretical line of approach has been thoroughly evaluated. The theory was found to be more familiar to economy like India. Dr. Ambedkar's Model seems to be more relevant as it comprehensively discusses about the role of state in order to provide Investment and Subsidies, restraining population for reaching optimum population, technological changes governing the mechanization, agrarian land consolidation, availability of inputs and transformation of surplus labor into productive labor from agrarian sector to industrial and service sector, etc. Moreover the role of the state has to be found more significant as the allocation of the resources and its distribution is regularized by government efficaciously. Further his article on small holdings in India and their remedies, 1918, conversed about the key impediment persisting in agriculture was the small and fragmented land parcels, which affects the application of other subsidiary inputs as well as technical farm support. Dr. Ambedkar introduced the concepts of economic holding and according to him this concept was ascertained by production perspective. This is inferred if the farmers have a good volume of produce, it implies that he may get some produce to sell in the market and in return he receives some reward. Nevertheless, the extent of this reward or accrued income has wholly relied upon the total output produced by the farmers. Subsequently, the total output depends upon the land possessed by them. Therefore the concept of economic holding has its own importance in bestowing the sustainable income-generating capacity of the farmers.

In order to highlight the economies associated with the land size. The third chapter explains comparative analysis between small and large band farmers for the foodgrain crops in India in order to determine the minimum optimum size of agricultural land with the help of ARMA technique. The small band farm comprises land below the 2 hectare and large band farms comprise of land above the 2 hectares. Therefore the ARMA procedure has been applied for each band of production. It may be found that ARMA $(0, 1) \times (0, 0)$ is the best fit model for the forecasting of small band production and ARMA $(1, 0) \times (0, 0)$ AR1 process is chosen for the forecasting of large band production. Further, the ARMA procedure also divulges the clear drift

in the production for both the groups of land. The forecasted production for foodgrain has been absolutely up-surging in case of large band of production with the grater magnitude as compared to the small band production. Therefore, higher the land, higher the production due to large scale economies. Hence, the holding size of more than two hectares can be called the economic holding for agriculture production. In other words the farm size of fewer than 2 hectares does not provide adequate produce to the farmers due to high diminution of the land and diseconomies associated with them. Hence, these two are the core findings come forth in this chapter. These core findings demand further detailed exploration as there are few boundation associated with the secondary data i.e. unavailability of farm wise input-output data in agriculture. The entire study cannot be possible to execute at the India level due to time, finance and other constraints. Therefore, this study specifically deals in the economies associated with the different farm sizes in the Uttar Pradesh state. Thus, the fourth chapter articulates the profile of Uttar Pradesh, as the chosen study area. The purpose of chapter 5 is to overcome the limitations associated with the secondary data i.e. unavailability of farm wise input-output data and produce concrete findings on the basis of primary data collected from Uttar Pradesh. Uttar Pradesh State is cataloged mainly into four agro-ecological or economic regions, therefore one village picked from each economic region of Uttar Pradesh. For instance, Jonai village which comes under Agra district is chosen from western economic region of UP and in a similar way Sithauli village from Faizabad District selected under the eastern region of the state. On the other hand, from Bundelkhand region, Charsoni village is picked which comes under the Jalaun District and at last Jansar village from Unnao district is picked from central economic region. This sample collection procedure is followed by multistage random sampling method. Therefore, the cataloging of surveyed area is justified itself and zero chance of gatherization of data purposively. Further, equal sample size is determined from each village followed by different economic regions of UP and the sample size is 80. Hence each village expounds 80 samples and in totality this resultant with the total 320 samples from UP. The major findings of this chapter are classified into two parts. Initial part of the chapter analyses the farmers' potential in terms of land fragmentation Index, return on investment, production, income, expenditure, and savings for each farm size while the later part analyses the farmers' participation in Agricultural program. The detailed findings of the fifth chapter have been mentioned below

Foremost, primary data was collected from each region of Uttar Pradesh this large state is bifurcated mainly into four regions such as western, eastern, central & Bundelkhand regions. One village has chosen from each region & 80 samples have been collected from each village. Formerly, the study deals with the agrarian activities of farmers and measurement of their welfare in terms of agricultural production, income and subset of farm income. Overall the comprehensive analysis has been presented in terms of socio-economic profile, farmers' distress, sustainability Ratio, Lorenz Curve, Land fragmentation Index, farm wise return on investment, farm wise total income & savings analysis, farmers participation in the agricultural program and basic amenities availed by the farmers. A noteworthy fact on the primary ground that under the Hindu religion, the dominance of the SC community (48.43%) followed by OBC (27.81%) and General Community (13.4%) have been traced. On the other hand, Muslim community farmers have found to be relatively lesser as under the OBC community the highest percent of Muslim farmers stood at around 9.1 percent followed by SC (0.94%) and General (0.31%) respectively.

Further, the distribution of farmers on the primary ground shows that overall 72.8 percent of farmers traced are the marginal farmers followed by small (13.4%), semi-medium (7.5%) and medium (6.25%) farmers respectively. Hence this clarifies from the surveyed area that maximum numbers of farmers with the 233 observations are coming under marginal category of farms while 43 farmers out of total samples are possessing small farms. On the other hand, semi-medium farms cover 24 farmers & remaining 20 farmers experiencing medium farms. Besides, classification of farmers under the four categories of farms follows the real characteristics of Uttar Pradesh Agriculture.

The study reveals the distress among farmers in the surveyed area regarding the continuation of the traditional occupation of farming. It shows that proportion of the farmers from all four selected villages for continuing agricultural occupation are relatively lower as compared to the farmers who do not want to continue farming. It has been observed that 41.25 percent farmers from Jonai village are willing to continue farming in future, followed by Jansar (38.75%), Charsoni (33.75%) and Sitholi (26.25%) respectively. The highest percent of farmers are not willing to continue agriculture in future have been found from the Sitholi village followed by Charsoni (66.25%), Jansar (61.25%) and Jonai (58.7%) village respectively. Overall 35 percent farmers have responded in order to continue agriculture occupation in future while 65

percent farmers are not willing to continue their traditional occupation farming. Moreover, irregular income followed by sluggish job and low profitability is the key reasons behind causing the disinterest in agriculture. Further, the study describes the ancestral occupation of farmers. The table reflects that in all four picked villages, ancestors' occupation as farming had been perceived. It indicates that for the last decades' households' ancestors have been working as peasants. Engagement of the ancestors in other occupation could not find in the study area. Further, the present scenario of occupation and further diversion has been analyzed in subsequent part of the chapter. A noteworthy fact expounds farm wise sustainability and un-sustainability rate for carrying the agriculture occupation in future. It indicates clearly that how the farmers' disinterest has risen in agriculture occupation as time passes. The intensity to depend on agriculture occupation has been gradually declining. The first farm category is marginal farmers, under which 68.24percent un-sustainability rate has been detected while sustainability rate stood at 31.76 percent. This datum implies that marginal farmers in the chosen villages are not willing to continue agriculture operation in future which acts as a causal factor to explain the un-sustaining rate among the marginal farms. In case of small farmers un-sustaining rate stands at 81.4 percent while sustaining rate observed at 18.6 percent. It implies that farmers owing small farms are more instable in order to continue this occupation in future. On the other hand, semi-medium flaunts an equal ratio for sustaining & un-sustaining rates in agriculture occupation. Lastly, the sustaining rate for the medium farm estimated around 90 percent while un-sustaining rate has been observed at 10percent. Therefore it may be resolved that medium farms are having greater scope from the farmers' perspective and sustainable income perspective for carrying this occupation as they have higher sustaining rate. This interpretation is important from the point of view of continuing agriculture occupation and for its dependent economic player *i.e.* farmers.

Land statistics is an important interpretation in evaluating agriculture activity stature. The first village exhibits maximum range of fragmentation up to five numbers of parcels where mean of the total land stood at 0.67 hectares with the median value of 0.50 hectares. The average size of the total land in Sithauli village is 0.52 hectare with the median value of 0.45 hectare and farmers' land shows the maximum division of land into four numbers of Parcels. Furthermore, the highest number of parcels detected is three because majority of farmers interviewed in the survey are marginal farmers. The third village Charsoni shows the average of total land of around 0.48 hectares while the Jonai village from the western region flaunts a

different picture as the highest average value of total land around 3.3758 hectares have noticed from this village.

The farm wise land statistics are more interpretable and inferential. The marginal farms reveal that average size of total land under this category of farm stood at 0.48 hectares with a closer mean value of 0.452 hectares. The average size of parcels from the range of lf1to lf3 (0.28 ha, 0.17ha and 0.3 ha.) is different and gradually declined as number of parcels has been increasing. The small farms' land analysis reveals that average land size is stood at 1.41 hectares with a closer median value of 1.357 hectares. Moreover land fragmentation in maximum five numbers of parcels (0.61ha, 0.48ha, 0.62ha, 0.11ha and 0.05 ha) has been observed. Now coming to the semi-medium category of farms, average size of total land is 3.170 hectares. Semi-medium farms exhibit maximum six numbers of parcels. Lastly the medium farmland distribution is shown in the table. The medium farm size lying between the range of 4.12 hectares to 9.75 hectares in the surveyed area. Despite having comparatively large size o land, land fragmentation comprises four numbers of parcels. Another interesting fact here is that medium farms are fragmented but their average size of parcels is relatively greater in contrast with another category of farms which pushes it to perform well in agrarian operations. Average parcel size is highly tiny in case of marginal & small farms which have been generally said to be a barrier in agrarian production and consequently affecting farmers' income-generating capacity. On the contrary, semi-medium & medium farms reveal slightly large average parcel size. Therefore the difference in the total land possesses and its further fragmentation will reflect in the total farm production & productivity and cost as well. Therefore, consequently the perception of the farmers to participate in the land consolidation scheme has been traced and study reveals that around 73.13 percent farmers opined to land consolidation for the advancement of their agriculture operations in future. In order to measure inequality in the distribution of land, Gini coefficient is computed and it shows the unequal distribution of the land in surveyed area. The study reveals that the marginal farms with the 0.24 Gini coefficients have the highest inequality as compared to the small, semi-medium and medium farms with 0.12, 0 .1 and 0.12 respectively. However, when it comes to inequality in general for all the farms, Lorenz curve shows greater inequality with Gini coefficient value 0.56. Therefore, it may be perceived from the above analysis that unequal distribution of land has been still persisting in the villages and especially in case of marginal farms.

Further, in order to make a more in-depth analysis and to capture the real scenario of land fragmentation in surveyed area, land fragmentation index has been estimated. Study clear that majority of the marginal farms have been appearing in the low range of fragmentation index and the main reason behind that these farms have highly lesser volume of land. So, as the average size of land is getting shrink then it would be difficult to find a high fragmentation index for these kinds of tiny marginal farms. Nevertheless, as we move from marginal farms to small farms, degree of fragmentation inclined for these farms samples lies in the medium fragmentation index. In case of semi medium farms around 50 percent farms appear in the medium range of index, which is similar to the small farms but the percentage of the farms lies under the medium fragmentation get high when it comes to semi-medium farms. Besides these true datum, medium farm is the exception which explicating a different picture of land fragmentation index. Data shows that majority of medium farms with 75 percent belong to the low range of fragmentation index whereas 15 percent farms come under medium range of index and only 10 percent of the medium farms belong to the high range of fragmentation index. This observation referring that medium farms may carry their agrarian operations on the consolidated piece of land or the less fragmentation land that directly associated with raising productivity and revealing least wastage of land.

The land fragmentation has still a dominant feature of agriculture in chosen villages. Fragmentation hampers the production and profitability which crates due to differences in the operated farm size for different segments of farmers. Hence, after the computation of Land Fragmentation Index, return on investment is computed for the crops produced in surveyed areas. Study exhibits that the gross yield per hectare has found to be minimal with 28 quintals/ha in marginal holdings followed by 23 quintal yield under small landholdings. On the other hand, gross yield of semi-medium holdings is 41 quintals/ha & highest gross yield has observed for medium size holdings which stood at 42 quintals per hectare. The study flaunts that ‘return on investment 1’ in case of wheat crop for the marginal and small farms stood at around 18.06 percent, 19.48 percent as compared to ROI of semi-medium (51.16%) and medium farms (62.25%) return on investment respectively. Further, the same pattern of the return on investment (ROI) has been perceived for the crop rice & millet. Therefore, Return on Investment analysis for the crop wheat, rice and millet signify that net benefit for the semi- medium, medium farm have traced to be relatively high as compared to marginal & small farm net benefit from

agriculture operation. Medium farmers are maintaining the good performances as their holding are proven to be an economic holding. Further it may also justify the distribution of economic holdings as defined by the Dr. Ambedkar in his paper in 1918. It implies that semi-medium and medium farms perform relatively better in terms of gross yield, production and return on Investment and consequently it raise the profitability of farmers too. However, the return on investment is guided by the source of selling agricultural produce. Better the means of selling produce, better will be the price received by the farmers for their produce. The study shows that majority of the marginal farmers around 94.85 percent sell their produce to intermediaries and remaining 5.15 percent sell their produce in mandis. The majority of the farmers do not prefer to trade their produce in Mandi as it is time taking and not fulfilling needs of liquid money at immediate. In case of small farms, 69.7 percent farmers trade their produce to intermediaries whereas only 30.23 percent farmers sell produce in mandis. Hence, the proportion of the farmers selling their produce in mandis is relatively lesser in case of marginal and small farmers. Now coming to the semi medium farmers these farmers are selling agricultural produce with the two major selling sources; one is intermediate and the second is Mandi. Around 50 percent semi-medium farmers visit mandi to sell their agricultural produce while remaining 50 percent prefer intermediaries for selling the agricultural produce. However, the study exhibits that medium farmers selling their agricultural produce to Mandi followed by intermediaries (50%) and direct final consumers (50%) but in case of rice crop around 95 percent farmers visit mandis to sell their produce. Therefore semi-medium and medium farmers are selling their produce in mandis while marginal and small farmers primarily depend upon intermediaries to sell their agricultural produce. The study reflects the dominance of intermediaries in selling agricultural produce. Hence, farmers received the unreasonably low prices for their crops and it further bounds their income generation capacity. This low-income generation capacity further endorsed the low investment in agriculture.

The study divulges that lesser proportion of the farmers have utilized the loan facility for agriculture purposes. It expounds that around 23.18 percent marginal farmers are availing loans from different sources. On the other hand, in the category of small farmers; 20.9 percent avail loan on the name of agriculture while around 20 percent semi-medium farmers obtain agricultural loan and lastly, around 35 percent of the medium farm's avail loans for agricultural purposes from the Jonai village. Further, those who have taken loan earlier, their loans are

weaved by the government but this is a matter of grief that amount taken as agricultural loan has not been utilized for the same purpose, it has just used to fulfill the routine consumption need of the farmers such as Construction, education, Machine & equipment, medical treatment, social ceremony, thus, with the low agricultural income and investment, farmers survival supposed to be very tough. So, they eventually rely upon the other source of income. Study shows that marginal farmers earn highest mean income around 51370Rs under the IFS1 from 'nonfarm activity' followed by 'wages & salary' (Rs.42415) and 'livestock' (Rs.44933). In addition to this, marginal farmers obtain the highest mean income from 'nonfarm activity' (Rs.37500) followed by 'wages & salary' (Rs.31689) and 'livestock' (Rs.14203) under IFS2. The second category of farmer is small farmers, and they have earned highest mean income from 'Non-farm activity' (Rs.60,000) followed by 'livestock' (Rs.53685) and 'wages &Salary' (Rs.52,052). Moreover, IFS2 shows that small farmers have earned income around Rs.26250 from 'livestock'. Now coming to the semi-medium farmers, and it shows that farmers obtain highest mean income from the 'wages & salary' (Rs.247500) followed by 'non-farm activity' (Rs.132214) and livestock (Rs.71433) under the IFS1 while IFS2 exhibits that farmers earn highest mean income of around 168000Rs from 'wages & salary' and Rs.34500 earn from livestock. Further, the income under IFS1 and IFS2 has been computed for the medium farmers. It expounds that under the IFS1, highest mean income of around 324000 Rs. earn from 'wages & salary' followed by 'non-farm activity' (Rs.257,500) and 'livestock' (Rs.60,250). Further the IFS2 segment of income exhibits that medium farmers earn income from wages and salary only. Hence, it may be concluded from the above analysis, that major source of income other than agriculture for the marginal and small farmers is non-farm activities but in case of semi-medium and medium farmers, highest income is earned from wages and salary. Finally, study computes the farm wise income and expenditure analysis in order to calculate the savings level for the different farm size and it shows that with the increase in the farm size, income & saving is also move parallel towards it. Therefore there is a positive relation has been found between the farm size and income & saving of the farmers.

The second part of this chapter reveals the access to the facilities provided under various agricultural programs to the farmers for augmenting the production and agricultural development in the surveyed area. It exhibits that majority of the farmers in the chosen villages are not even aware of the agricultural programs and their benefits, particularly marginal and small farmers are

those who have minimal assertiveness towards the agricultural programs and their utility. The study perceived that most of the farmers are unacquainted with the agricultural schemes such as facility of godown & cold storage, assistance for horticulture and organic farming(MIDH & PKVY), model training courses, loan through agri-clinics & business centre scheme, awareness for the use of pesticide in Food crop under SMPP, Seed Production Activity under SMPP etc. Nevertheless, we observe that the responses of the marginal and small farmers are relatively more disappointing as either they are not cognizant about the ongoing agricultural schemes such as soil health card, crop insurance, godown & cold storage facility or they have not been informed appropriately regarding the current schemes and its utility. Moreover, it also may be witnessed that there is an improper functioning from the supply side for the specific facility such as Kisan Call Centre and Farmer friend, etc. Farmers share this fact that there are no grievances provided by the call center as workers are not responding to the call of farmers. Thus the non-picking call cases have found to be high in this scheme. Therefore, overall utilization of the agricultural programs running for agriculture development have inspected to be lesser active and here the role of state become more crucial in order to manage the proper delivery of these program to the farmers' doorstep. Further, basic amenities are essential foundation for a decent living as it enhances economic growth and quality of life. The basic amenities such as using individual toilets, housing taps, electricity connection, government hospital facility, availability of doctors and medicines have been analyzed in the study. The general basic amenities stature flaunts that farmers are still not sensitized towards the use of toilets. Basic amenities in terms of using toilets, housing tap, electricity connection, government hospital and medicinal facilities are still lagging in the selected villages. It directly affects the standard of living of the farmers and ease of living life. These facilities are essential components of rural infrastructure; it signifies the poor stature of rural infrastructure in the villages that hinders the real potential of the farmers and keeping them far behind from participating as an active economic payer with greater instability. Hence, the dedicated and effective role of the state is urging in the present time for the betterment of the rural society and its stakeholders.

Chapter 6 analyses the farm-specific technical inefficiency existing in wheat production in surveyed area. This chapter evaluates major inefficiency factor responsible for nonattainment of highest possible output especially due to deterioration in farm size and rising number of

fragmented land. "The diminutive size of holdings is said to be greatly harmful to Indian Agriculture. The evils of small holdings no doubt are many (Dr. Ambedkar, 1918), well quoted by Dr. Ambedkar in his article "Small Holdings in India and Their Remedies". Therefore as the fragmentation has risen up and absolute farm size getting smaller with the passage of time, this becomes imperative to examine the theoretical notion of Dr. Ambedkar. Thus, the study draws stochastic production function approach in order to determine the inefficiency factors among different kinds of farms such as marginal, small, semi medium and medium farms. Study shows that the independent variables considered have positive coefficients except irrigation and fertilizers. Land (0.77), Seeds (1.35), Pesticides (1.51), Equipment (0.75) and human labor (0.06) were positively significant. These positive significant values indicate that there is scope for increasing production of wheat by increasing the expenditure on these inputs. The coefficient value of irrigation and fertilizers was -1.04, -2.7 respectively which is significant at 1 percent level. It implies that 10 percent reduction in the expenditure of irrigation will raise farm production by 10.4 percent. Likewise, with reduction in the expenditure on fertilizer by 10 percent will raise farm production by 27 percent. The negative value of these coefficients in the model shows that model allows the reduction in the expenditure incurred on fertilizer will raise the production (M.L. Jalan, 1987, Chandrakant Kale, 2013, Tanvi Desh Pandey, 2017, Jules Pretty, 2007). Farmers have this misconception that if they use more fertilisers the production will be more. Overuse of Fertilizers was also warned by M.S. Swaminathan in 1968. Further, in case of irrigation, majortity of the farmers are relying on custom hiring as they don't have their own irrigation source. Hence, it is costlier for the marginal farmers as compared to the medium farmers. However, it is not the question of investment alone but efficiency in water management is more important. India uses three times the water used to produce one tonne of grain in countries such as Brazil China and U.S. it shows the over-usage of water. (S. M. Dev & C. Rangrajan, 2018) and simultaneously it also provides the scope to increase the expenditure on other inputs in order to raise the wheat production by the farmers. Therefore, in order to reach at the best fit frontier there is need to minimize the expenditure on irrigation and fertilizers and upward movement in the expenditure of other remaining inputs will leads to the best fit frontier at which the farmers will obtain the higher agricultural produce. It doesn't imply the reduction in irrigation units but the expenditure on it must be minimized. So the marginal and small farmers will be able to gain the economies. Furthermore, the specified reason for technical inefficiency in

farms was determined with the stochastic frontier model in single-stage maximum likelihood estimation. From the estimated coefficients of the inefficiency variables, such as soil fertility problem (SFP) and inaccessibility to certified seeds (ICS) are statistically significant and divulging the positive relation with technical inefficiency. On the other hand, farm-size (FS), awareness spread by Panchayat (ASP) and land fragmentation index (LFI) is statistically significant and revealing negative or inverse association ship with technical inefficiency in the frontier production. A possible reason is that the static conditions of traditional agriculture and minimal learning will have little profound effect in order to improve productivity by mitigating inefficiency. The Technical inefficiency for the whole 320 samples ranged between 2 to 91 percent with a mean value of 23.5. Therefore, Dr. Ambedkar's economic notion (1918) regarding the farm size and productivity is pertinent in the 21st century too. If the farm size will continue to diminutive in future, it will harm the total productivity as well as profitability of the farmers, particularly marginal and small farmers.

Conclusion:

It is evident from the study that there is a significant discrepancy exists in the small band production and large band production. The land size of above the 2 hectares has relatively higher production as compared to the small band production. Thus, the landholding above 2 hectares can be called as true economic holdings. Similarly the primary study also concludes that there are significant differences find out between the marginal, small, semi-medium and medium group farms in the agricultural productivity, income and savings return on investment and even in technical inefficiencies. Further, it is also inferential that the inequality in the land distribution has witnessed with the noticeable land fragmentation index in the study. Thus it is clear that land is the most crucial factor for determining the economies of scale in agriculture sector. Dr. Ambedkar's economic notions have found to be germane in this contemporary time. Therefore, it calls for immediate measures on the part of state to prevent the increasing trend of the number of marginal farms and further diminution of the cultivated land. Further, the accessibility and awareness regarding various agricultural programs have been also witnessed to be very poor and the basic amenities availed by the farmers are also showing their substandard. Hence, the role of state is essential in order to build the comprehensive development of the farmers and agriculture sector as well.

State Farming Model

The management and exploitation of land are done through state enactments and policies. After the nationalization of all the land resources the agriculture production is done through large-scale farms mostly mechanized and under full state administration through bureaucracy under direct state control. In Russia's totalitarian regime, the state farms virtually failed to achieve their objectives and later policy was to convert them into collective farms. In India, it is doubtful whether state farms could be run on a commercial basis by the agricultural departments. However, a limited number of state farms could be established for research purposes or for some considerations other than profit. This model of farming system can be found in several countries like Poland, Germany and there are some in India as well. This system of farming typically exists in the USSR where the experiment has been attempted on a large scale.

Collective Farming Model

Collective farming is farming where number of farmers organized as a unit of worked by a community under the supervision of state. Since 1930's collective farms became feasible and to some magnitude, it popularize as a good mode of agricultural organization especially after the Russian experiment of transmuting the small farmers into large-scale collectives via mechanization of agriculture. Collective farming has been practiced in some countries such as the USSR, Palestine, Mexico, Ethiopia and Tanzania. In India, Collective farming was designed under the framework of State Socialism. Therefore, the role of state is important to operate collective farming successfully. Under collective farming ownership of all the material resources including the land vests in the community as a whole. In this model, cultivation is carried on the whole farm as one unit of organization, via elected group of members who handle and supervise the performance of agricultural operations. Hence, the means of agricultural production are collectively owned and exploited in this farming system. Further, the remuneration is ranked according to the degree of skills and efficiency of the individual workers. This kind of socialist collectivization was characterized by five features which had especially negative outcomes: coercive pooling of small peasant farms, compulsory requisitioning of produce, vast sizes of production enterprises, farmers' lack of voice in management decisions, and, hidden as well as explicit, forms of socio-economic inequality, including gender inequality (Bina Agarwal, 2010).

In the collective farms, the advantages and disadvantages are of a similar nature as in the case of the state farms. In India, if collectives are to be organized, the landlords should either voluntarily surrender their rights inland, or these have to be confiscated by law, or land should be taken away by "violent armies of the liberators." Moreover, this type of farming organization is perhaps only possible in socialist State, where on principle; the individual's right to private property is restricted. In India, where the constitution grants each individual the right to own property and to get compensation in case any property was taken over by the State (Article 31, 31-A and 31-B of the Constitution of India), "collective farming" as a national policy, perhaps, cannot be implemented due to its financial and other implications. Apart from the political and financial considerations, collective farming has still to prove its economic superiority over the other models of farming organization (Amit Singh, 2019).

Co-operative Farming Model

Countries such as Eastern Europe, Meximo, China are trialed with the cooperative farming. This farming model is considered as the solution to the agrarian obstruction such as small and uneconomic land holdings in India and in other nations too. Co-operative farming means a kind of farming operation where agricultural practices were conducted by individuals on their own holdings jointly with certain common agencies formed on their behalf for the collective action and purchase of agricultural inputs like seeds, fertilizers, equipment etc. and also for the sale of their agricultural produce. This model of farming system organization was very popular at the initial stage of economic planning in India. In order to develop co-operative farming various facilities and incentives in the form of financial assistance, subsidies, additional facilities to supply high yielding seeds, fertilizers and other inputs were advanced by the government. But the progress of co-operative farming was very much disappointing. The above mentioned models of the farming system have not applied uniformly among all the states as one state distinguished from another. Furthermore, in order to accentuate the profitability of the real tiller of the soil *i.e.* farmers, the government of India decided to allow private participation in agriculture sector by making an agricultural policy 2000. This policy articulates two other farming system models to overcome the problem of inefficiency of production and small size of holdings. These introduced models are contract farming model and corporate farming model.

Contract Farming Model

The contract farming broadly refers to situations in which a farmer raises or grows an agricultural product for a vertically integrated corporation under a forward contract. Existence of one of the following conditions leads to the emergence of the contract farming: (1) high value specialty crops with lucrative 'niche' market; (2) the need for consistent and reliable supplies on the part of the buyer; (3) a system of input and output market which cannot be met through open market purchases and (4) a labor-intensive commodity which smallholders can produce efficiently (Little and Watts, 1994). Under contract farming, farmer is required to plant the contractors' crop on his land and is supposed to sell the contractor, an agreed quantity of produce with prescribed quality norms at a pre-agreed price. The contractor, on the other hand, may supply the farmer with selected inputs, including the required technical advice (Glover, 1990). The contract can be classified according to the operations of the contracting agency. Normally contracting agencies or firms carry two types of operations. One, they act as marketing channels between the farmers and any other big firm at national and international levels. On the other hand, they may be involved in the processing of the farm produce. These two categories of firms are not mutually exclusive and there are instances where a firm is involved in both kinds of operations at different stages (Porter and Phillips, 1997). Contracts are practiced by some multinationals like PepsiCo falls under this category. The terms and nature of the contract may differ according to variations in the nature of crops to be grown and the context in which they are practiced.

A set of studies looked into the functioning of contract farming of the different contracting firms, and it may expound that contracting agencies deal with relatively large producers and their contracts are purely biased against the farmers. Such model of contracting perpetuates the existing problems of farm sector rather than solving them. No doubt, such contracts lead to increase in income of the farmers but they are accompanied by the problems of high input intensity and social differentiation. There exist an inherent contradiction in the objectives of contracting parties and local stakeholders. Rangi and Sidhu (2000) have resolved that contract farming bestows better returns for tomato crops than the traditional-contracted crops like wheat and paddy but the real profits were grasped by the top contracting parties. Though, contracting poses problems for both the parties still it seems beneficial for both the farmers and the companies. The prime advantage is that the company will purchase all the produce grown,

within specified quality and quantity parameters. The contract can also provide farmers with access to a wide range of managerial, technical and extension services that otherwise may be unobtainable (Eaton and Shepherd, 2001). One of the major attractions of contract farming for farmers is the availability of credit provided either directly by company or through a third party. However, farmers can face considerable indebtedness if they are confronted with production problems if the company provides poor technical advice. If advances are uncontrolled, the indebtedness of farmers can increase to uneconomic levels. This system of farming is also not benefiting the real tiller of the soil, as farmers will consider such contract farming unprofitable.

Corporate Farming Model

Corporate agriculture farming (CAF), presently called as agribusiness. It delineates the business of agriculture where the mega-corporations or enterprises are involved in food production on a very large scale. It is a modern food industry and encompasses not only the farm itself, but also the entire chain of agriculture-related business, including seed supply, agrichemicals, food processing, machinery, storage, transport, distribution, marketing, advertising, and retail sales (Sukhpal Singh, 2016). The eventual aim of corporate farming is to vertically integrate the entire process of food production, up to the point of sale of food to final consumers. Some corporations are deliberated well on the path of accomplishing this objective and have become very large in the process, such as Archer Daniels Midland, Monsanto Company, and the privately held Cargill, with 2004 revenues of $62.9 billion (Corporate Watch, 2009). One major difference between independent traditional farming and corporate farming is that a corporate farmer is usually a contracted employee, rather than the owner of the farm. However, as a matter of fact, ownership itself does not mean independence. An owner-operated farm today faces many constraints that are completely out of the owner's control.

India allowed the corporate sector in the agriculture sector. Ghosh has analyzed the effects of corporate agriculture farming and trade liberalization on small farmers. Gosh argues that Multi-National Companies (MNCs) monopolize markets with large farms and dictate prices in less competitive environments. The MNCs dominate the market through a combination of horizontal and vertical integration. As these corporations have a large resource base and worldwide network, they have no compulsion to buy from particular markets and sellers. In such situations of monopoly and monopsony, the small farmers get worse off. She also explained that

MNCs consolidated their position by integrating the various stages of the agriculture system. (Jayati Ghosh, 2003).

This is difficult to aspire one particular farming system in the present time, where the marginal & small farmers are up-surging continuously. Farmers' centric approach is required to entertain at the time of selection of farming systems. Cultivation costs have raised manifold since the mid-1990s, but the farmers Income has stagnated or declined. The National Crime Record Bureau logged over the 300000 farmers' suicides in India during the period of 1995-2015. Therefore, the stress among the farmers has been sharply getting intensive day by day. We need a farming system that meets the necessitate profitability & reasonable income to the farmers without disturbing their right to ownership of land. Besides, this manifestation can't be possible to realize with the instrument of Contract farming and corporate farming. In contract farming, farmer has to work as per the order of the producer and nature of the crop and quantum and its standard will be decided by the producer. If the cultivated crop doesn't meet the pre-decided standards, farmers will get nothing. Therefore, farmers will not be benefitted from contract farming. On the other hand, in case of corporate farming ownership will be transferred to the producer for a certain period and they will use the land as they want. This system of farming also not acts as elemental weapon in order to raise the small & marginal farmers' income and productive capacity. Corporate exploits the land as maximum as possible, while keeping in mind their huge profits buckets that never concerns land resource. They exploit the agricultural land and after the year's farmers get unfertile and eroded land. Hence, eventually poor farmers are still at the loss. Therefore, in 1918 Dr. Ambedkar had evolved the concept of collective farming. In this farming system agriculture operations carried out by pooling the resources combinedly. The state will play a major role in order to provide the agricultural subsidiary inputs to the collectives. Farmers' ownership right remains with them.

Presently, Farmers Producer Organizations are nothing but the extended and modified version of collective farming as described by Dr. Ambedkar in 1918. Dr Ambedkar favors the collective action but the state support is elemental (Small holdings in India & their remedies, 1918) factor behind his economic conception of agricultural development. The formation and development of FPOs will be actively encouraged and supported by the Central and State Governments and their agencies, using financial resources from various centrally sponsored and

State-funded schemes in the agriculture sector agencies. It established with a vision to build a prosperous and sustainable agriculture sector by promoting and supporting member-owned Producer Organizations that enable farmers to enhance productivity through efficient, cost-effective and sustainable resource use and realize higher returns for their produce, through collective action supported by the government (Rama Mohana R Turaga, 2018)

Under the FPO model collective action is supported by state government. Eventually its main emphasis is on the consolidation of the resources of marginal and small farmers in India. Compulsory consolidation of land holdings alongside the land development activities could enhance the income/livelihood of the poor farmers in India. (B.S. Minhas (1970). The consolidation of land holdings will lead to raising agricultural productivity in India (K.Parikh & H.K.Nagarajan, 2004). In order to remove the roots of farmer distress there is an urgent need for the consolidation of land in India (S. Mahendra Dev & C. Rangrajan, 2018). Thus, collective farming has little relevance in India. Therefore, Farmers Producer Organization is the multi-sided model of farming that emphasized on the consolidation of the agrarian inputs in order to gain the efficiency in the production and consequently augment the income generating capacity of the farmers. This model functions on the principle of collectivities. Some successful stories of FPOs are mentioned here such as a) Kudumbashree Collective Farming (Kerala),b) The Andhra Pradesh Mahila Samatha Society: Women's Group Farming, c) Gambhira Farmer's Collectives: Gujarat d) Gaudaguda & Kaudakuda village Collectives: Pre Production Collectives & Post Production Collectives: Odisha- Vegetables (Brinjal & Tomato), e) Women Farming collectives-The Maharashtra Story (Ratnagiri District)- Organic Farming, f) Tharaibosan Collective Farming (Odisha).

Recommendations

A set of recommendations is urged in order to augment the scale of economies for the different farm sizes. The size of the land is affecting the usage of land as well as the profitability of the farmers. Hence, there is an urgent need to implement some suggestions for making Indian agriculture a more versatile and growth driven sector.

1. There is a need to increase the input-output ratio. It states that farming requires adequate capital supported by the state to increase the technical farm support.

2. There is a need to reduce the technical inefficiency of factors to obtain maximum attainable agriculture produce.

3. The economic holdings are to be redefined in the lines of Dr. Ambedkar's theoretical approach in current scenario of India.

4. The Consolidation of land holdings is a viable solution to wipe-out the stumbling-block of diminutive land holdings.

5. A suitable farming system that allows for large scale of operation will help in mitigating the ill-effects of fragmented land holdings.

6. The concept of "Doubling Income Farmers" may be realized by an implementation of suitable farming system along with the sagacious modifications as per the need of farmers.

7. There is an urgent need to bring the efficacious and dedicated role of state government in practice, in order to deliver the programs based facilities to the farmers without any loopholes such as asymmetric information.

8. The state has to play the Major role for the development of agriculture and betterment of farmers as Dr. Ambedkar suggested.

9. The state has to play the key role in shifting the agricultural surplus labour by the establishment of small & cottage industries and food processing units in the villages.

References

1. Limaye, M. (1985). *Prime Movers: Role of the Individual in History*. Stosius Incorporated/Advent Books Division.
2. Nurkse, R. (1966). Problems of capital formation in underdeveloped countries.
3. Singh, A. (2019). *Impact of Corporate Farming and Agricultural Development in Uttar Pradesh*. Ph.D. Thesis, Department of Economics, Babasaheb Bhimrao Ambedkar University, Lucknow, India.
4. Turaga, R. M. R., Bikkina, N., & Bhamoriya, V. (2018). Farmer Producer Organizations as Farmer Collectives: A Case Study from India.
5. Minhas, B. S. (1970). Rural poverty, land redistribution and development strategy: facts and policy. *Indian Economic Review*, *5*(1), 97-128.
6. Parikh, K. S., & Nagarajan, H. K. (2004). *How Important is Land Consolidation?: Land Fragmentation and Implications for Productivity: Case Study of Village Nelpathur in Tamil Nadu*. National bank for agriculture and rural development.
7. Rangrajan R., & Dev S.M., January2019. Removing the Roots of Farmers' Distress. *The Hindu*.https://www.thehindu.com/opinion/lead/removing-the-roots-of-farmers distress/article26106031.ece
8. Ghosh, J., & Thorat, A. (2003, December). Corporate agriculture: The implications for Indian farmers. In *All India Conference on Agriculture and Rural Society in Contemporary India held at Barddhman, West Bengal from December* (pp. 17-20).
9. Singh, S. (2016). Rethinking diversification of agriculture in the Indian Punjab: An examination of strategy and mechanisms. In *Economic Transformation of a Developing Economy* (pp. 77-96). Springer, Singapore.
10. Eaton, C., & Shepherd, A. (2001). *Contract farming: partnerships for growth* (No. 145). Food & Agriculture Org.
11. Rangi, P. S., & Sidhu, M. S. (2000). A study on contract farming of tomato in Punjab. *Agricultural Marketing*, *42*(4), 15-23.
12. Porter, G., & Phillips-Howard, K. (1997). Comparing contracts: an evaluation of contract farming schemes in Africa. *World Development*, *25*(2), 227-238.
13. Glover, D., & Kusterer , K.(1990).Small Farmers, Big Business—Contract Farming and Rural Development *Macmillan: London*.

14. Little, P. D., & Watts, M. (Eds.). (1994). *Living under contract: contract farming and agrarian transformation in sub-Saharan Africa*. Univ of Wisconsin Press.
15. Agarwal, B. (2010). Rethinking agricultural production collectivities. *Economic and Political Weekly*, 64-78.
16. Jalan, M. L. (1987). *Marketing of Agricultural Inputs: A Study of Gorakhpur District*. Himalaya Publishing House.
17. Pretty, J. (2007). Agricultural sustainability: concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *363*(1491), 447-465.
18. Deshpande, T. (2017). State of Agriculture in India. *PRS Legislative Research*, 6-7.

Bibliography

- (C-DAP) UNNAO District Planning Committee *Comprehensive District Agriculture Plan.*
- Aayog, N. I. T. I. (2015). Raising agricultural productivity and making farming remunerative for farmers.
- Aayog, N. I. T. I. (2015). Raising agricultural productivity and making farming remunerative for farmers.
- Aayog, N. I. T. I. (2016). Report of the Expert Committee on Land Leasing. *New Delhi*, *6*.
- Aayog, N. I. T. I. (2017). Three Year Action Agenda 2017-18 to 2019-20. *India: NITI Aayog, GoI, nd), http://niti. gov. in/writereaddata/files/coop/ActionPlan.*
- Abraham P., (2002). Ambedkar's Contribution for Economic Planning and Development-Its Relevance.
- Abraham, P. (2002). *Ambedkar's Contribution for Economic Planning and development – its relevance.* New Delhi, India : Kanishka
- Abraham, P. (2002). Notes on Ambedkar's Water Resources Policies. *Economic and Political Weekly*, 4772-4774.
- Abraham, P. (2002). Notes on Ambedkar's Water Resources Policies. *Economic and Political Weekly*, 4772-4774.
- Adhikari, R., & Agrawal, R. K. (2013). An introductory study on time series modeling and forecasting. *arXiv preprint arXiv:1302.6613*.
- Agarwal, B. (2010). Rethinking agricultural production collectivities. *Economic and Political Weekly*, 64-78.
- Agarwal, B. (2010). Rethinking agricultural production collectivities. *Economic and Political Weekly*, 64-78.
- Agarwal, S. K. (1971). Economics of land consolidation in India. *Economics of land consolidation in India.*
- Aigner, D., J. Lovell & P. Schmidt (1977), "Formulation and Estimation of Stochastic Frontier Production Function Models", *Journal of Econometrics*, Vol. 6, No.1, pp. 21-38
- Akram-Lodhi, A. H., & Kay, C. (2010). Surveying the agrarian question (part 2): current debates and beyond. *The Journal of Peasant Studies*, *37*(2), 255-284.

- Alexandra, E., & Jean-Jacques, D. (2011). Agriculture and development: a brief review of the literature. *Policy Research Working Paper Series*.
- Amano, M. (1980). A neoclassical model of the dual economy with capital accumulation in agriculture. *The Review of Economic Studies*, *47*(5), 933-944.
- Ambedkar, B. R. (1918). Small holdings in India and their remedies. *Journal of Indian Economic Society*, *1*, 1900-1945.
- Ambedkar, B. R. (1918). Small holdings in India and their remedies. *Journal of Indian Economic Society*, *1*, 1900-1945.
- Ambedkar, B. R. (1950). Dr Bhimrao Ramji Ambedkar. *Labour*, (24).
- Ambedkar, B. R., & Moon, V. (1979). Dr. Babasaheb Ambedkar: Writings and Speeches. Vol 1.
- Ambirajan, S. (1999). Ambedkar's Contributions to Indian Economics. *Economic and Political Weekly*, 3280-3285.
- Apata, T. (2016). Small farms and agricultural productivity in Nigeria: empirical analysis of the effects of land tenure, fragmentation and property rights. *Academia Journal of Agricultural Research*, *4*(12), 691-697.
- Arya, R. K., & Tapan, C. (2014). The economic thoughts of Dr. Bhimrao Ambedkar with respect to agriculture sector. *Developing Country Studies*, *4*(25), 84-96.
- Ashok Rudra (1983), "Indian Agricultural Economics", Allied Pulications, New Delhi,
- Ashok, R. (1982). Indian Agricultural Economics: Myths and Realities.
- Ayodele, A. E. (2012). A critical analysis of diffusion of innovation theory
- Babu, S. C., Joshi, P. K., Glendenning, C. J., Asenso-Okyere, K., & Rasheed Sulaiman, V. (2013). The State of Agricultural Extension Reforms in India: Strategic Priorities and Policy Options. *Agricultural Economics Research Review*, *26*(2).
- Bag, S., & Gupta, A. (2012). Performance of Indian Economy during 1970-2010: A Productivity Perspective. *Delhi School of Economics*.
- Bagchi, A. K. (1965). Growth of Agricultural Production, Regional Differences in Rates. *Economic Weekly, Annual Number, January1965*.
- Bagga, P. S. (2014), The Practice of Economics by Dr. Ambedkar and its Relevance in Contemporary India, *Journal of Business Management & Social Sciences Research (JBM&SSR)* Volume 3.

- Balakrishnan, P. (2008). Imagining an economy of plenty in Kerala. *Economic and Political Weekly*, 14-16.
- Balanagammal, D., Ranganathan, C. R., & Sundaresan, K. (2000). Forecasting of agricultural scenario in Tamilnadu: A time series analysis. *Journal of Indian Society of Agricultural Statistics*, *53*(3), 273-286.
- Balasubramanian, P., & Dhanavanthan, P. (2002). Seasonal modeling and forecasting of crop production. *Statistics and Applications*, *4*(2), 107-118.
- Bandyopadhyay, R. (1993). Land system in India: A historical review. *Economic and Political Weekly*, A149-A155.
- Bandyopadhyay, R. (1993). Land system in India: A historical review. *Economic and Political Weekly*, A149-A155.
- Barber, W. J. (1967). Urbanization and Economic Growth: The Cases of Two White Settler Territories. *The City in Modern Africa. New York: Frederick A. Praeger*, 91-126.
- Bardhan, P. (1969). Agriculture in China and India: Output, input and prices. *Economic and Political Weekly*, 53-65.
- Barrett, C. B. (2011). The economics of agricultural development: An overview. *Original Essay*, 1-63.
- Bathla, S., Thorat, S. K., Joshi, P. K., & Bingxin, Y. (2017). Where to invest to accelerate agricultural growth and poverty reduction. *Econ Pol Weekly*, *52*(39), 36-45.
- Battese, G. E., & Coelli, T. J. (1992). Frontier production functions, technical efficiency and panel data: with application to paddy farmers in India. *Journal of productivity analysis*, *3*(1-2), 153-169.
- Battese, G.E. & G.S. Corra (1977), "Estimation of a Production Frontier Model with Application to the Pastoral Zone of Eastern Australia", *Australian Journal of Agricultural Economics*, Vol. 21, pp. 169-179.
- Battese, G.E. & T.J. Coelli (1995), "A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data", *Empirical Economics*, Vol.20, pp.325-332.
- Bekele, A., Viljoen, M. F., Ayele, G., & Ali, S. (2009). Effect of farm size on efficiency of wheat production in Moretna-Jirru district in Central Ethiopia. *Indian Journal of Agricultural Economics*, *64*(902-2016-66750).

- Belete, A., J. Dillon & F. Anderson (1991), "Development of Agriculture in Ethiopia since the 1975 Land Reform", *Agricultural Economics*, Vol.6, pp. 159-175.
- Bentley, J. W. (1987). Economic and ecological approaches to land fragmentation: in defense of a much-maligned phenomenon. *Annual review of anthropology*, *16*(1), 31-67.
- Beshir, B., & NISHIKAWA, Y. (2012). Cost-Benefit Analysis of Small-Scale Onion and Tomato Farming in Melkassa Area. *Tropical Agriculture and Development*, *56*(4), 143-150.
- Bhalla, S. S. (1988). Does land quality matter?: Theory and measurement. *Journal of Development Economics*, *29*(1), 45-62.
- Bharadwaj, K. (1974). Notes on farm size and productivity. *Economic and Political Weekly*, A11-A24.
- Bhattacharyya, M., & Bhattacharyya, S. (2007). Agrarian impasse in West Bengal in the liberalisation era. *Economic and Political Weekly*, 65-71.
- Bhullar, A. S., Sidhu, R. S., & Singh, J. (2006). Reformulating Policies for Integrated Land and Water Use for Sustainable Agricultural Development: A Case of Punjab State. In *2006 Annual Meeting, August 12-18, 2006, Queensland, Australia* (No. 25798). International Association of Agricultural Economists.
- Blaikie, P. M. (1971). Spatial organization of agriculture in some North Indian villages: part I. *Transactions of the Institute of British Geographers*, 1-40
- Blaug, M. (1962). Economic Theory in. *Retrospect. 3d ed. Cambridge: Cambridge*.
- Boserup, E. (2005). *The conditions of agricultural growth: The economics of agrarian change under population pressure*. Transaction Publishers.
- Bot, A., & Benites, J. (2001). *Conservation agriculture: case studies in Latin America and Africa* (No. 78). Food & Agriculture Org.
- Brady, M. P., & Sohngen, B. (2008, July). Agricultural Productivity, Technological Change, and Deforestation: A Global Analysis. In *AAEA Annual Meeting, Orlando, FL* (pp. 27-29).
- Bravo-Ureta, B. E., & Evenson, R. E. (1994). Efficiency in agricultural production: the case of peasant farmers in eastern Paraguay. *Agricultural economics*, *10*(1), 27-37.

- Brown, B., Nuberg, I., & Llewellyn, R. (2017). Negative evaluation of conservation agriculture: perspectives from African smallholder farmers. *International Journal of Agricultural Sustainability*, *15*(4), 467-481.
- Buckley, J., & Peterson, H. C. (2012). Preliminary Cost-Benefit Analysis for Urban Agriculture.
- Burton, S. P. (1988). Land consolidation in Cyprus: A vital policy for rural reconstruction. *Land use policy*, *5*(1), 131-147.
- Challam, K. S. (Ed.). (1993). *The relevance of Ambedkarism in India*. Rawat Publications.
- Chand, R. (2014). Dissecting Agricultural Performance since Mid 1990s. *Yojana*,10-15.
- Chand, R. (2017). Doubling Farmers' Income Rationale, Srategy, Prospects and Action Plan.
- Chand, R., Garg, S., & Pandey, L. (2009). Regional variations in agricultural productivity: a district level study. *Publ. NCAP, DPS Marg, Pusa, New Delhi–110012, India*, 1-115.
- Chand, R., Prasanna, P. L., & Singh, A. (2011). Farm size and productivity: Understanding the strengths of smallholders and improving their livelihoods. *Economic and Political Weekly*, *46*(26), 5-11.
- Chand, R., Prasanna, P. L., & Singh, A. (2011). Farm size and productivity: Understanding the strengths of smallholders and improving their livelihoods. *Economic and Political Weekly*, 5-11.
- Chand, R., Raju, S. S., & Pandey, L. M. (2010). Effect of global recession on Indian agriculture. *Indian Journal of Agricultural Economics*, *65*(902-2016-67939).
- Chatterjee, A. (2008). Response to'From Ambedkar to Thakkar and Beyond'. *Economic and Political Weekly*, 73-75.
- Chattopadhyay, M. & A. Sengupta (2001), "Technical Tenancy Inefficiency: A Study Based on West Bengal Agriculture", *Economic and Political Weekly*, Vol. 36, Nos. 5 and 6, February, 3-9/10-16.
- Chattopadhyay, M. (1979). Relative efficiency of owner and tenant cultivation: a case study.

- Chaturvedi, A., Patil, N. G., & Goswami, S. N. (2011). Reorienting Land Use Strategies for Socio-economic Development in Uttar Pradesh. *Economic and Political Weekly*, 169-173.
- Chaturvedi, S. (2015). Comparing Western UP and Bundelkhand. *Economic and Political Weekly*.
- Chaudhry, M. G., Gill, M. A., Chaudhry, G. M., & Aslam, M. M. (1985). Size—Productivity Relationship in Pakistan's Agriculture in the Seventies [with Comments]. *The Pakistan Development Review*, *24*(3/4), 349-361.
- Chenery, H. B., & Watanabe, T. (1958). International comparisons of the structure of production. *Econometrica: Journal of the Econometric Society*, 487-521.
- Chhaya, K. (2016). 'Readings of Dr. Ambedkar's Philosophy for Inclusive Growth: Indian Perspective'. *Ambedkar's Philosophy for Inclusive Growth: Indian Perspective'(April 16, 2016)*.
- Chhaya, K. (2016). 'Readings of Dr. Ambedkar's Philosophy for Inclusive Growth: Indian Perspective'. *Ambedkar's Philosophy for Inclusive Growth: Indian Perspective'(April 16, 2016)*.
- Damayanthi, U. T. (1996). AGRICULTURAL LABOUR IN INDIA—A CONCEPTUAL ANALYSIS. *The Asian Economic Review*, *38*, 124.
- Damji, D. B., & Jamma, A. P. (2012). Dr. BR Ambedkar‟ s thought on agriculture and it‟ s relevance to current agriculture in India. *Review of Research*, *1*.
- Darity Jr, W. A. (1980). The Boserup theory of agricultural growth: a model for anthropological economics. *Journal of Development Economics*, *7*(2), 137-157.
- Das, D.K. (2004), Great Indian Economists- Their Creative Vision for Socio Economic Development , Dr. B.R. Ambedkar Life Sketch and Contribution to Indian Economy, *The Indian Economic Association.* Deep & Deep Publications Pvt. New Delhi Ltd.Vol3.
- Dayal, E. (1984). Agricultural productivity in India: a spatial analysis. *Annals of the Association of American Geographers*, *74*(1), 98-123.
- De Roy, S. (2017). Economic reforms and agricultural growth in India. *Economic & Political Weekly*, *52*(9), 67-72.
- Debnath, K. (2018). Ambedkar's ideas of nation-building in India. *Studies in People's History*, *5*(1), 104-110.

- Demetriou, D., Stillwell, J., & See, L. (2013). A new methodology for measuring land fragmentation. *Computers, Environment and Urban Systems*, *39*, 71-80.
- Derpsch, R., & Friedrich, T. (2009, February). Global overview of conservation agriculture no-till adoption. In *4th World Congress on Conservation Agriculture New Delhi, India* (pp. 4-7).
- Desai, B. M., & Namboodiri, N. V. (1997). Determinants of total factor productivity in Indian agriculture. *Economic and Political Weekly*, A165-A171.
- Deshpande, T. (2017). State of Agriculture in India. *PRS Legislative Research*, 6-7.
- Dethier, J. J., & Effenberger, A. (2011). *Agriculture and development: A brief review of the literature*. The World Bank.
- Dethier, J. J., & Effenberger, A. (2012). Agriculture and development: A brief review of the literature. *Economic Systems*, *36*(2), 175-205.
- Dev, S. M. (2003). Agriculture, Employment and Social Sector Neglected. *Economic and Political Weekly*, 1353-1356.
- Dev, S. M. (2008). Challenges for the revival of Indian agriculture.
- Dev, S. M., Parikh, K. S., & Suryanarayan, M. H. (1991). *Rural poverty in India: Incidence, issues, and policies*. Indira Gandhi Institute of Development Research.
- Dewett, K. K. (1966). *Modern Economic Theory (ME)*. S. Chand.
- Dogra, B. (2002). Land reforms, productivity and farm size. *Economic and Political Weekly*, 532-533.
- Dogra, B. (2002). Land reforms, productivity and farm size. *Economic and Political Weekly*, 532-533.
- Doraiswamy, P. (1992), "Effect of Education and Extension Contacts on Agricultural Production", *Indian Journal of Agricultural Economics*, Vol. 47, No. 2, April-June, pp. 205-214.
- Dovring, F. (1960). Land and labor in Europe, 1900-1950.
- Dr. Ambedkar Writings and Speeches, Govt. of Maharashtra-1989 vol.no.2 *pp*. 88-89, 96-100, 129-137.
- Dyer, G. (1997). Class, State and Agricultural Productivity in Egypt: A Study of the Inverse Relationship between Farm Size and Land Productivity (London: Frank Cass Publishers).

- Eaton, C., & Shepherd, A. (2001). *Contract farming: partnerships for growth* (No. 145). Food & Agriculture Org.
- Ercolani, M. G., & Wei, Z. (2010). An empirical analysis of the Lewis-Ranis-Fei theory of dualistic economic development for China. *Discussion Papers*, 10-06.
- Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A (General)*, *120*(3), 253-281.
- Fenga, L. (2017). Bootstrap Order Determination for ARMA Models: A Comparison between Different Model Selection Criteria. *Journal of Probability and Statistics*, *2017*.
- Ferroni, M., & Zhou, Y. (2012). Achievements and challenges in agricultural extension in India. *Global Journal of Emerging Market Economies*, *4*(3), 319-346.
- Foster, A., & Rosenzweig, M. R. (2010, September). Barriers to farm profitability in India: mechanization, scale and credit markets. In *Conference Agriculture for Development-Revisited, University of California at Berkeley. October* (Vol. 24, pp. 1-2).
- Gadekar D. R., (2009). Socio economic thought of B.R. Ambedkar. *Ambedkar and Nation Building, 23-28.*
- Gautam, M. (2016). Making Indian agriculture more resilient: Some policy priorities. *Economic and Political Weekly*, *51*(8), 24-27.
- Gautam, M., & Yu, B. (2015). Agricultural productivity growth and drivers: a comparative study of China and India. *China Agricultural Economic Review*, *7*(4), 573-600.
- Gawai, V.M. (2017). Dr. B.R. Ambedkar's Multidimentional Approaches towards the Economic Development of India. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Building*, Volume 1, pp.390-397.
- Ghatak, M., & Roy, S. (2007). Land reform and agricultural productivity in India: a review of the evidence. *Oxford Review of Economic Policy*, *23*(2), 251-269.
- Ghosh, J., & Thorat, A. (2003, December). Corporate agriculture: The implications for Indian farmers. In *All India Conference on Agriculture and Rural Society in Contemporary India held at Barddhman, West Bengal from December* (pp. 17-20).
- Ghosh, M. (1986). Farm Size-Productivity Nexus Under Alternative Technology. *Indian Journal of Agricultural Economics*, *41*(902-2018-2428), 17-28.

- Glover, D., & Kusterer , K.(1990).Small Farmers, Big Business—Contract Farming and Rural Development *Macmillan: London*.
- Goi, N. A. (2016). *Raising Agricultural Productivity and Making Farming Remunerative for Farmers* (No. id: 8429).
- Goswami, B. (2016). Overcoming land size induced constraints through endogenous institutional innovations: Findings from a field study in Assam plains, India. *Economics Bulletin*, *36*(1), 411-428.
- Goswami, C. (2002). Agricultural Land Use in the Plains of Assam. *Economic and Political Weekly*, 4891-4893.
- Goswami, C. (2003). Land use in Assam_ a spatio_temporal study.
- Govind, R. (2018). Ambedkar's Lessons, Ambedkar's Challenges. *Economic & Political Weekly*, *53*(4), 81.
- Goyal, A. K., & Kumar, S. (2013). Agricultural Production Trends and Cropping Pattern in Uttar Pradesh: An Overview. *International Journal of Agriculture Innovations and Research*, *2*(2), 229-235.
- Grammatikopoulou, I., Myyrä, S., & Pouta, E. (2013). The proximity of a field plot and land-use choice: implications for land consolidation. *Journal of land use science*, *8*(4), 383-402.
- Granberg, L. (1986). Small production and state intervention in agriculture. *Acta Sociologica*, *29*(3), 243-253.
- Gulati, A. (1989). Input subsidies in Indian agriculture: A statewise analysis. *Economic and Political Weekly*, A57-A65.
- Gupta, M.S., & Singh, J.B. (2017). Ambedkar & his Economic Thought.*The Indian Economic JournalDr.B.R. Ambedkar Contribution to Nation Buiding*, Volume 1, pp.1-7.
- Gupta, S. P. (1995). Economic reform and its impact on poor. *Economic and Political Weekly*, 1295-1313.
- Haque, T. (2012). Impact of land leasing restrictions on agricultural efficiency and equity in India. *An unpublished paper*.
- Hartvigsen, M. (2014). Land reform and land fragmentation in Central and Eastern Europe. *Land use policy*, *36*, 330-341.

- Hirsch, R. M., & Slack, J. R. (1984). A nonparametric trend test for seasonal data with serial dependence. *Water Resources Research*, *20*(6), 727-732.
- Hoque, A. (1988). Farm size and economic-allocative efficiency in Bangladesh agriculture. *Applied Economics*, *20*(10), 1353-1368.
- Houston, J. M. (1953). Social geography of Europe. *Japanese Journal of Human Geography*, *7*(1), 76-76.
- Hristov, J. (2009). Assessment of the impact of high fragmented land upon the productivity and profitability of the farms.
- Huang, C.J. & J.T. Liu (1994), "Estimation of a Non-Neutral Stochastic Frontier Production Function", *Journal of Productivity Analysis*, Vol. 4, pp. 171-180.
- Ingole K.S. (2006). Ambedkarian Perspective For Economic Development In *Social Justice : Gandhi, Nehru and Ambedkar*, Lucknow.
- Ioffe, G., Nefedova, T., & Zaslavsky, I. (2004). From spatial continuity to fragmentation: the case of Russian farming. *Annals of the Association of American Geographers*, *94*(4), 913-943.
- Jadhav, N. (1991). Neglected economic thought of Babasaheb Ambedkar. *Economic and Political Weekly*, 980-982.
- Jaffrelot, C., & Kumar, S. (2012). The Marginalisation of the Savarnas in Uttar Pradesh?. In *Rise of the Plebeians?* (pp. 63-100). Routledge India.
- Jalan, M. L. (1987). *Marketing of Agricultural Inputs: A Study of Gorakhpur District*. Himalaya Publishing House.
- Jodhka, S. S. (2002). Nation and village: Images of rural India in Gandhi, Nehru and Ambedkar. *Economic and Political Weekly*, 3343-3353.
- Jondrow, J.C, C.A.K. Lovell, I.S. Materov & P. Schmidt (1982), "On the Estimation of the Technical Efficiency in the Stochastic Frontier Production", *Journal of Econometrics*, Vol.19, No.1, pp.233-238.
- Jose, M., & Padmanabhan, M. (2016). Dynamics of agricultural land use change in Kerala: a policy and social-ecological perspective. *International Journal of Agricultural Sustainability*, *14*(3), 307-324.

- K. P. Chandran & Prajneshu,, "Nonparametric regression with jump points methodology for describing country's oilseed yield data," *Journal of the Indian Society of Agricultural Statistics*, vol. 59, no. 2, pp. 126–130, 2005.
- K. S. Thorat, (2009).Agriculture's thoughts on Economic Development and Planning. *Ambedkar and Nation Building*, 77-98.
- Kadapatti, R. G., & Bagalkoti, S. T. (2014). Small Farms and Agricultural Productivity-A Macro Analysis. *International Journal of Social Science Studies*, *2*(3), 123-135.
- Kannan, E., & Sundaram, S. (2011). *Analysis of trends in India's Agricultural Growth*. Institute for Social and Economic Change.
- Karouzis, G. (1977). Land ownership in Cyprus; past and present (with special reference to Greek and Turkish ownerships).
- Karouzis, G. (1980). Report on aspects of land tenure in Cyprus. *Report on aspects of land tenure in Cyprus.*, (Ed. 2).
- Khan, I., & Afzal, M. (2012). Production uncertainty and technical inefficiency of textile manufacturing and exporting firms in Pakistan. *International Journal of Research in Social Sciences*, *2*(4), 567.
- Kharat, G. D. (2016). ECONOMICS OF AMBEDKAR SOLUTION TO THE PROBLEMS OF INDIAN ECONOMY. *RESEARCH JOURNEY*, 92.
- Khusro, A. M. (1964). Returns to scale in Indian agriculture. *Indian Journal of Agricultural Economics*, *19*(902-2016-67093), 51-80.
- Khusro, A. M. (1973). Economics of land reform and farm size in India.
- Kilkenny, M. (1998). Transport costs, the new economic geography, and rural development. *Growth and Change*, *29*(3), 259-280.
- King, R., & Burton, S. (1982). Land fragmentation: notes on a fundamental rural spatial problem. *Progress in Geography*, *6*(4), 475-494.
- Krishnaji, N. (1981). Cobb-Douglas Production Functions: A Sceptical Note with Special Reference to Agriculture. *Economic and Political Weekly*, PE45-PE51.
- Kuber, W. N. (1991). *Ambedkar, a critical study*. South Asia Books.
- Kumar, A. G. (1992). Falling agricultural investment and its consequences. *Economic and Political weekly*, 2307-2312.

- Kumar, N. P. (2010). Uttar Pradesh's Manufacturing Sector State, Structure and Performance. *Internet article. Accessed on*, *30*(10), 2014. Kumar, N. P. (2010). Uttar Pradesh's Manufacturing Sector State, Structure and Performance. *Internet article. Accessed on*, *30*(10), 2014.
- Kumar, S. (2019). Ambedkar's Economic Ideas & Contributions. *IOSR Journal Of Humanities And Social Science,24* (3), 50-54
- Kumbhakar, S., S.C. Ghosh and J.T. Mcguckin (1991), "A Generalised Production Frontier Approachfor Estimating Determinants of Inefficiency in U.S. Dairy Farms", *Journal of Business, Economicsand Statistics,* Vol.9, pp. 279-286.
- Laha, A. (2013). Technical efficiency in agricultural production and access to credit in West Bengal, India: a stochastic frontier approach. *International Journal of Food and Agricultural Economics (IJFAEC)*, *1*(1128-2016-92010), 53-62.
- Lanza, V. (2012). The classical approach to capital accumulation: Classical theory of economic growth.
- Lanza, V. (2012). The classical approach to capital accumulation: Classical theory of economic growth.
- LAU, K. C., & HERRERA, R. (2018). The Convergence of Peasant Struggles Worldwide. *Economic and Political Weekly*, *53*(11), 42-49.
- Lekhi, R. K., & Singh, J. (1996). *Agricultural Economics: An Indian Perspective*. Kalayani Publishers.
- Limaye, M. (1985). *Prime Movers: Role of the Individual in History*. Stosius Incorporated/Advent Books Division.
- Little, P. D., & Watts, M. (Eds.). (1994). *Living under contract: contract farming and agrarian transformation in sub-Saharan Africa*. Univ of Wisconsin Press.
- Lundahl, M. (1987). 'Efficient but Poor',—schultz', theory of traditional agriculture. *Scandinavian Economic History Review*, *35*(1), 108-129.
- Majumdar, K. (2017). Indian Agriculture in the Vision of Dr. Ambedkar. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding,* Volume 1, pp.130-136.
- Mallaiah, L. C. (2006). *The relevance of Dr. BR Ambedkar's views on Indian agricultural development*. Abhijeet Publications.

- Mann, H. B. (1945). Nonparametric tests against trend. *Econometrica: Journal of the Econometric Society*, 245-259.
- Marquette, C. (1997). Turning but not toppling Malthus: Boserupian theory on population and the environment relationships.
- Maske, M., & Jain, B. C. (2013). Compound growth rate (CGR) of area, production and productivity of papaya in Raipur district of Chhattisgarh. *International Journal of Agriculture, Environment and Biotechnology*, *6*(1), 139-143.
- Masterson, T. (2007). Productivity, technical efficiency, and farm size in Paraguayan agriculture.
- Mathew, T. (1992). Ambedkar and Marxism. *Economic and Political Weekly*, 1283-1283.
- Mathur, A. S., Das, S., & Sircar, S. (2006). Status of agriculture in India: trends and prospects. *Economic and political weekly*, 5327-5336.

- Mathur, A. S., Das, S., & Sircar, S. (2006). Status of agriculture in India: trends and prospects. *Economic and political weekly*, 5327-5336.

- Maynard, J. (1936). Collective Farming in the USSR. *The Slavonic and East European Review*, *15*(43), 47-69.
- Mazumdar, D. (1963). On the economics of relative efficiency of small farmers. *Economic Weekly*, *15*(28-30), 1259-63.
- McPherson, M. F. (1982). *Land fragmentation: a selected literature review* (No. 141). Harvard University, Harvard Institute for International Development.
- McRoberts, N., & Franke, A. C. (2008). A diffusion model for the adoption of agricultural innovations in structured adopting populations (No. 61117).
- Mearns, R., & Sinha, S. (1999). *Social exclusion and land administration in Orissa, India*. The World Bank.
- Mellor, J. W. (1968). *The economics of agricultural development, John W. Mellor*.
- Millar, J., & Roots, J. (2012). Changes in Australian agriculture and land use: implications for future food security. *International journal of agricultural sustainability*, *10*(1), 25-39.
- Minhas, B. S. (1970). Rural poverty, land redistribution and development strategy: facts and policy. *Indian Economic Review*, *5*(1), 97-128.

- Mishra, S. N. (Ed.). (2010). *Socio-economic and Political Vision of Dr. BR Ambedkar*. Concept Publishing Company.
- Modi, R. K. (2017). Contribution of Agricultural Sector in the Economic Development of the Country: An Overview. *THE INDIAN JOURNAL OF COMMERCE*, *70*(3).
- Mohanty, B. B. (2001). Land distribution among scheduled castes and tribes. *Economic and Political Weekly*, 3857-3868.
- Mohanty, B. B. (2018). *Agrarian Transformation in Western India: Economic Gains and Social Costs*. Routledge India.`
- Mondal, P., & Basu, M. (2009). Adoption of precision agriculture technologies in India and in some developing countries: Scope, present status and strategies. *Progress in Natural Science*, *19*(6), 659-666.
- Mukerji, S. (2012). Industrialization and Socio-Economic Inclusion: Rethinking Dr. Ambedkar's Economic Philosophy. *Contemporary Voice of Dalit*, *5*(2), 201-214.
- Mungekar, B. L. (1997). Terms of trade, technology and agricultural development. *Agricultural Development Paradigm for the Ninth Plan under New Economic Environment, ibid*.
- Mungekar, B.L. (1992), *India's Agrarian problem*, In *Ambedkar and Social Justice,* Publications Division, Ministry of Information and Broadcasting, *Vol.II*, New Delhi.
- Myrdal, G. (1968). Asian Drama, Vol. 1-3. *New York: The Twentieth Century Fund*.
- N. Saeed, A. Saeed, M. Zakria, and T. M. Bajwa, "Forecasting of wheat production in Pakistan using ARIMA models," *International Journal of Agricultural Biology*, vol. 2, no. 4, pp. 352–353,2000.
- Nancharaiah, G. (2012). Land, Labour and Dalits: Post Independence Period. *IASSI-Quarterly*, *31*(3and4), 95-110
- Nanchraiah G., 'Dr. B.R. Ambedkar strategy of Economic Development and it's Relevance', *Dr. B.R. Ambedkar Trust*, Hyderabad, 1995.
- Narain, D. (1977). Growth of productivity in Indian agriculture. *Indian Journal of Agricultural Economics*, *32*(902-2018-1332), 1-44.
- Narayanamoorthy, A. (2017). Farm Income in India: Myths and Realities. *Indian Journal of Agricultural Economics*, *72*(1), 49-75.

- Nurkse, R. (1966). Problems of capital formation in underdeveloped countries.
- Nyong'o, P. A. (2013). The land question, land grabbing and agriculture in Africa. *International Journal of African Renaissance Studies-Multi-, Inter-and Transdisciplinarity*, *8*(2), 23-31.
- Oldenburg, P. (1990). Land consolidation as land reform, in India. *World Development*, *18*(2), 183-195.
- O'Leary, G., & Watson, A. (1982). The production responsibility system and the future of collective farming. *The Australian Journal of Chinese Affairs*, (8), 1-34.
- Omvedt, G. (2017). *Ambedkar: towards an enlightened India*. Penguin UK.
- P. K. Sen, "Estimates of the regression coefcient based on Kendall's tau," *Journal of American Statistical Association*, vol. 39, pp. 1379–1389, 1968.
- Padhi, S. P., & Nair, K. N. (1993). Dynamics of land distribution: an alternative approach and analysis with reference to Kerala. *Economic and Political Weekly*, A29-A36.
- Pal, S. (2008). Agricultural R&D policy and institutional reforms: Learning from the Experiences of India and China. *Economic and Political Weekly*, 145-155.
- Pal, S., & Byerlee, D. (2006). India: the funding and organization of agricultural R&D—evolution and emerging policy issues. *Agricultural R&D in the Developing World: Too Little, Too Late?*, 155.
- Palshikar, S. (1996). Gandhi-Ambedkar Interface. *Economic and Political Weekly*, *31*(31), 2070-72.
- Papageorgiou, E. (1956). Fragmentation of land holdings and measures for consolidation in Greece. *Land tenure*, 543-547.
- Paranjape, M. (2007). Imagining India: Aurobindo, Ambedkar, and After. *South Asian Review*, *28*(1), 159-185.
- Parikh, K. S., & Nagarajan, H. K. (2004). *How Important is Land Consolidation?: Land Fragmentation and Implications for Productivity: Case Study of Village Nelpathur in Tamil Nadu*. National bank for agriculture and rural development.
- Parmeter, C. F., & Kumbhakar, S. C. (2014). Efficiency analysis: a primer on recent advances. *Foundations and Trends® in Econometrics*, *7*(3–4), 191-385.
- Pascoe, S., Gréboval, D., Kirkley, J., & Lindebo, E. (2004). Measuring and appraising capacity in fisheries: framework, analytical tools and data aggregation.

- Paul, M., & wa Gĩthĩnji, M. (2018). Small farms, smaller plots: land size, fragmentation, and productivity in Ethiopia. *The Journal of Peasant Studies*, *45*(4), 757-775.
- Peter, B. G., Messina, J. P., & Snapp, S. S. (2018). A Multiscalar Approach to Mapping Marginal Agricultural Land: Smallholder Agriculture in Malawi. *Annals of the American Association of Geographers*, *108*(4), 989-1005.
- Peters, W. (1977). "The Impact of Urban-Industrial Development on Agricultural Incomes and Productivity in Finland": Comment. *Land Economics*, *53*(2), 253-255.
- Porcelli, F. (2009). Measurement of Technical Efficiency. A brief survey on parametric and non-parametric techniques. *University of Warwick*, *11*, 1-27.
- Porter, G., & Phillips-Howard, K. (1997). Comparing contracts: an evaluation of contract farming schemes in Africa. *World Development*, *25*(2), 227-238.
- Pretty, J. (2007). Agricultural sustainability: concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *363*(1491), 447-465.
- Purushothaman, S., & Patil, S. (2019). Agriculture in the Era of Urbanisation. In *Agrarian Change and Urbanization in Southern India* (pp. 101-117). Springer, Singapore.
- Radhakrishnan, P. (1982). Land reforms and changes in land system: Study of a Kerala village. *Economic and Political Weekly*, A107-A119.
- Raghavan, M. (2001). Public Sector Investment and Agricultural Growth. *Economic and Political Weekly*, *36*(31), 2980-2981.
- Raghavan, M. (2008). Changing pattern of input use and cost of cultivation. *Economic and Political Weekly*, 123-129.
- Rahman, S., & Rahman, M. (2009). Impact of land fragmentation and resource ownership on productivity and efficiency: The case of rice producers in Bangladesh. *Land Use Policy*, *26*(1), 95-103.
- Rajaraman, I., & Datta, A. (2003). Univariate forecasting of state-level agricultural production. *Economic and Political weekly*, 1800-1803.
- Raman, R., & Kumari, R. (2013). Performance of Agriculture in Uttar Pradesh-A District-level Analysis. *Journal of Global Economy (ISSN Print-0975-3931, Online-2278-1277)*, *9*(1).

- Ramasamy, C. (2004). Constraints to growth in Indian agriculture: Needed technology, resource management and trade strategies. *Indian Journal of Agricultural Economics*, *59*(902-2016-68037).
- Ramasamy, C. (2004). Constraints to growth in Indian agriculture: Needed technology, resource management and trade strategies. *Indian Journal of Agricultural Economics*, *59*(902-2016-68037).
- Ranganathan, T. C. A. (2015). Agricultural oddities. *Economic and Political Weekly*, *50*(21), 16–19.
- Rangi, P. S., & Sidhu, M. S. (2000). A study on contract farming of tomato in Punjab. *Agricultural Marketing*, *42*(4), 15-23.
- Rangrajan R., & Dev S.M., January2019. Removing the Roots of Farmers' Distress. *The Hindu*.https://www.thehindu.com/opinion/lead/removing-the-roots-of-farmers distress/article26106031.ece
- Rao A.P. (1974). Size of Holding and Prductivity. *Economic and Political Weekly*,
- Rao, C. H. (1966). Alternative explanations of the inverse relationship between farm size and output per acre in India. *Indian Economic Review*, *1*(2), 1-12.
- Rao, C. H., & Rao, C. H. (2005). *Agriculture, food security, poverty, and environment: essays on post-reform India*. New Delhi, India: Oxford University Press.
- Rao, G. N., & Rajasekhar, D. (1994). Land Use Pattern and Agrarian Expansion in a Semi-Arid Region: Case of Rayalaseema in Andhra, 1886-1939. *Economic and Political Weekly*, A80-A88.
- Rao, S. (2017). Caste discrimination and agricultural performance in India. *Economic and Political Weekly*, *52*(25), 32-38.
- Rao, S. K. (1971). Inter-Regional Variations in Agricultural Growth, 1952-53 to 1964-65: A Tentative Analysis in Relation to Irrigation. *Economic and Political Weekly*, 1333-1346.
- Rao, V. M., & Deshpande, R. S. (1986). Agricultural growth in India: a review of experiences and prospects. *Economic and Political Weekly*, A101-A112.
- Rausser, G. C., Chalfant, J. A., Love, H. A., & Stamoulis, K. G. (1986). Macroeconomic linkages, taxes, and subsidies in the US agricultural sector. *American Journal of Agricultural Economics*, *68*(2), 399-412.

- Ray, I. A., & Ray, S. (2011). BR Ambedkar and his philosophy of Land Reform: An evaluation. *Afro Asian Journal of Social Sciences*, *2*(2.1).
- Razack, A., Devadoss, S., & Holland, D. (2009). A general equilibrium analysis of production subsidy in a Harris-Todaro developing economy: an application to India. *Applied Economics*, *41*(21), 2767-2777.
- Reddy, A. A. (2009). Pulses production technology: Status and way forward. *Economic and Political weekly*, 73-80.
- Reddy, A. A. (2015). Regional Disparities in Profitability of Rice Production: Where Small Farmers Stand?. *Indian Journal of Agricultural Economics*, *70*(902-2016-68395), 259-271.
- Reddy, A. R., & Sen, C. (2004). Technical inefficiency in rice production and its relationship with farm-specific socio-economic characteristics. *Indian Journal of Agricultural Economics*, *59*(902-2016-68050).
- Roy, R. (2013). *Assessment of Pre and Post Harvest Losses in Wheat and Paddy Crops in Uttar Pradesh*. Research Report Agro-Economic Research Centre University of Allahabad.
- Roy, R., & Ahmad, H. (2015). State agricultural profile of Uttar Pradesh. *Agro-Economic Research Centre, University of Allahabad*.
- Rudra, A. (1978). Class Relations in Indian Agriculture: I. *Economic and Political Weekly*, 916-923.
- Rudra, A., & Sen, A. (1980). Farm size and labour use: analysis and policy. *Economic and Political Weekly*, 391-394.
- Russell, J. (1942). Collective Farming in Russia and the Ukraine. *Science (New York, NY)*, *96*(2481), 47.
- Ruttan, V. W. (1968). *Growth Stage Theories Dual Economy Models and Agricultural Development Policy* (No. 1620-2016-134771).
- Ruttan, V. W. (1978). The international agricultural research institute as a source of agricultural development. *Agricultural Administration*, *5*(4), 293-308.
- Ruttan, V. W. (1985). Technical and institutional change in agricultural development: Two lectures. *Bulletin Number*, *85*, 1.

- Ruttan, V. W., & Hayami, Y. (1972). *Strategies for agricultural development*. Food Research Institute, Stanford University.
- Ruttan, V. W., & Hayami, Y. (2011). Induced innovation theory and agricultural development. *Can Economic Growth Be Sustained? The Collected Papers of Vernon W. Ruttan and Yujiro Hayami*, 10.
- Saini, G. R. (1969). Farm size, productivity and returns to scale. *Economic and Political Weekly*, A119-A122.
- Saini, G. R. (1971). Holding size, productivity, and some related aspects of Indian agriculture. *Economic and Political Weekly*, A79-A85.
- Sanwal, M. (1987). The implementation of decentralization: A case study of district planning in Agra District, Uttar Pradesh, India. *Public Administration and Development*, *7*(4), 383-397.
- Sarika, M. I., & Chattopadhyay, C. (2011). Modelling and forecasting of pigeonpea (Cajanus cajan) production using autoregressive integrated moving average methodology. *Indian Journal of Agricultural Sciences*, *81*(6), 520-523.
- Sarker, D., & De, S. (2004). High technical efficiency of farms in two different agricultural lands: A study under deterministic production frontier approach. *Indian Journal of Agricultural Economics*, *59*, 197-208.
- Scaria, S. (2010). Changes in land relations: The political economy of land reforms in a Kerala village. *Economic and Political Weekly*, 191-198.
- Schultz, T. W. (1964). Transforming traditional agriculture. *Transforming traditional agriculture.*
- Sekhri, S. (2012). Caste-based clustering of land parcels in two villages in Uttar Pradesh. *Economic and Political Weekly*, 106-109.
- Sen, A. (1964). Size of holdings and productivity. *Economic Weekly*.
- Sen, A. K. (1962). An aspect of Indian agriculture. *Economic Weekly*, *14*(4-6), 243-246.
- Shandilya, T.K. (2017). The Economic Thoughts of Dr.B.R. Ambedkar. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding*, Volume 1, pp.101-107.
- Sharma, H. R. (1995). Agrarian relations in India: patterns and implications. *Agrarian relations in India: patterns and implications.*

- SHARMA, L. (2015). DR. AMBEDKAR'S VISION ON INDIAN FARMING. *CLEAR International Journal of Research in Commerce & Management*, *6*(1).
- Shinde, S.B. (2017). Dr.B.R. Ambedkar's Contribution in Economic Thought. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding,* Volume 1, pp.176-182.
- Shuhao, T. A. N., Heerink, N., Kruseman, G., & Futian, Q. U. (2008). Do fragmented landholdings have higher production costs? Evidence from rice farmers in Northeastern Jiangxi province, PR China. *China Economic Review*, *19*(3), 347-358.
- Shukla, A., & Srinivasan, R. (2005). Uttar Pradesh Housing and Development Board: A Journey Towards Becoming A World-Class Organization. *Asian Journal of Management Cases*, *2*(1), 87-109.
- Simar, L., & Wilson, P. W. (2009). Inferences from cross-sectional, stochastic frontier models. *Econometric Reviews*, *29*(1), 62-98.
- Simmons, A. J. (1964). *An index of farm structure with a Nottinghamshire example*. Department of Geography university of Nottingham.
- Singariya, M. R. (2013). Dr. BR Ambedkar: As an Economist. *International Journal of Humanities and Social Science Invention*, *2*(3), 24-27.
- Singariya, M. R. (2013). Dr. BR Ambedkar: As an Economist. *International Journal of Humanities and Social Science Invention*, *2*(3), 24-27.
- Singh Joginder & Jindal B.R. (1989), "Relation of farm size and productivity", *The Economic Tmes*, Jan 23.
- Singh Joginder & Jindal B.R. (1994), "Tractorization of Punjab Agriculture: Socio-Economic Considerations" *PAU Report.*
- Singh, A. (2019). *Impact of Corporate Farming and Agricultural Development in Uttar Pradesh*. Ph.D. Thesis, Department of Economics, Babasaheb Bhimrao Ambedkar University, Lucknow, India.
- Singh, K. M., Singh, R. K. P. K. M., & Kumar, A. (2014). Adoption of Modern Agricultural Technologies in Bihar: A Farm Level Study. *Environment & Ecology*, *32*(4), 1342-1346.
- Singh, P. (2014). Population and agro climatic zones in India: an analytical analysis. *Procedia-Social and Behavioral Sciences*, *120*, 268-278.

- Singh, R., & Patel, R. K. (1973). Returns to scale, farm size and productivity in Meerut District. *Indian Journal of Agricultural Economics*, *28*(902-2018-2202), 43-49.
- Singh, S. (2016). Rethinking diversification of agriculture in the Indian Punjab: An examination of strategy and mechanisms. In *Economic Transformation of a Developing Economy* (pp. 77-96). Springer, Singapore.
- Sitko, N. J., & Jayne, T. S. (2014). Structural transformation or elite land capture? The growth of "emergent" farmers in Zambia. *Food Policy*, *48*, 194-202.
- Srivastava, S. C., Sharma, U. C., Singh, B. K., & Yadava, H. S. (2012). A profile of Garlic production in India: Facts, trends and opportunities. *International Journal of Agriculture, Environment and Biotechnology*, *5*(4), 477-482.
- Subramanian, A. (2018). Transforming Indian agriculture: By loving some agriculture less and the rest more. *Lecture series at Indian Institute of Technology Delhi*.
- Suresh, K. K., & Priya, S. K. (2011). Forecasting sugarcane yield of Tamilnadu using ARIMA models. *Sugar Tech*, *13*(1), 23-26.
- Tagar, H. K., & Shah, S. R. A. (2012). Agricultural Development: Meanings, Modes and Models (A Feasible Model for Sindh-pakistan). *International Journal of Innovative Research and Development, ISSN 2278–0211, 1*(8), 54-75.
- Tamma, K. R. (2017). Dr. Ambedkar Perspective on Agriculture & Its Relevance to Current Agriculture in India. *The Indian Economic Journal Dr.B.R. Ambedkar Contribution to Nation Buiding*, Volume 1, pp.25-32.
- Tan, S. (2005). *Land fragmentation and rice production: a case study of small farms in Jiangxi Province, PR China*. Wageningen University.
- Taylor, G.T. & J.S. Shonkwiler (1986), "Alternative Stochastic Specifications of the Frontier Production Function in the Analysis of Agricultural Credit Programmes and Technical Efficiency", *Journal of Development Economics*, Vol. 21, pp. 149-160.
- Teltumbde Anand. (2015). *Organiser* on Ambedkar Repeating a Big IIT-M Lie**.** *Economic and Political Weekly*, 28,10-11
- Thapa, G., & Gaiha, R. (2011, January). Smallholder farming in Asia and the Pacific: Challenges and opportunities. In *IFAD Conference on New Directions for Smallholder Agriculture*, (Vol. 25). International Fund for Agricultural Development Rome.

- Thapa, S. (2007). The relationship between farm size and productivity: empirical evidence from the Nepalese mid-hills.
- Thapa, S. (2007). The relationship between farm size and productivity: empirical evidence from the Nepalese mid-hills.
- Thirlwal, A. P., (1989). *Growth and development: with special reference to developing economies*. Springer.
- Thomas, J. (2006). Property rights, land fragmentation and the emerging structure of agriculture in Central and Eastern European countries. *eJADE: electronic Journal of Agricultural and Development Economics*, *3*(853-2016-56129), 225-275.
- Thomas, K. & R. Sundaresan (2000), "Economic Efficiency of Rice Production in Kerala", *The Bihar Journal of Agricultural Marketing*, Vol. 8, No. 3, pp. 310-315.
- Thompson, K. (1963). Farm fragmentation in Greece. *Centre of Economic Research,* Monograph Series 5, Athens.
- Thorat, S. (2006). *Ambedkar's Role in Economic Planning, Water and Power Policy*. Shipra Publications.
- Thorat, S. (2006). *Ambedkar's Role in Economic Planning, Water and Power Policy*. Shipra Publications.
- Thorat, S. (2007). *Ambedkar in retrospect: essays on economics, politics, and society*. Rawat Pubns.
- Thorat, S. (2008). *BR Ambedkar: Perspectives on social exclusion and inclusive policies*. Oxford University Press, USA.
- Timmer, C. P. (1988). The agricultural transformation. *Handbook of development economics*, *1*, 275-331.
- Turaga, R. M. R., Bikkina, N., & Bhamoriya, V. (2018). Farmer Producer Organizations as Farmer Collectives: A Case Study from India.
- Udemezu, J.C., Osegbue E.G. (2018). *Theories and Models of Agricultural Development.* The Annals of Reviews & Research. Juniper Publishers.
- Udemezue, J. C., & Osegbue, E. G. (2018). Theories and models of agricultural development. *Ann. Rev. Res*, *1*(5), 1-4.
- V. K. Boken, "Forecasting spring wheat yield using time series analysis: a case study for the Canadian prairies," *Agronomy Journal*, vol. 92, no. 6, pp. 1047–1053, 2000.

- Vanderpol, P. R. (1956). Reallocations of land in the Netherlands. *Land tenure*, 548-553.
- Venkatasubramanian, K. (2000). Land reforms remain an unfinished business. *Planning Commission Discussion Paper. Government of India, New Delhi*.
- Venkatesh, P. (2013). Recent trends in rural employment and wages in India: has the growth benefitted the agricultural labours?. *Agricultural Economics Research Review*, *26*(347-2016-17099), 13-20.
- Venkatesh, P., & Nithyashree, M. L. (2014). Institutional Changes in Delivery of Agricultural Inputs and Services to Farm Households in India. *Agricultural Economics Research Review*, *27*(347-2016-17158), 85-92.
- Verma, V. (1999). Colonialism and Liberation: Ambedkar's Quest for Distributive Justice. *Economic and political weekly*, 2804-2810.
- Waghmare, P. D. DR. BR AMBEDKAR'S CONTRIBUTION TO INDIAN LABOUR MOVEMENT: A HISTORICAL STUDY. *A Peer Reviewed, Refereed & Quarterly Journal*, 63.
- Wang, J., Chen, K. Z., Das Gupta, S., & Huang, Z. (2015). Is small still beautiful? A comparative study of rice farm size and productivity in China and India. *China Agricultural Economic Review*, *7*(3), 484-509.
- Wiggins, S., Farrington, J., Henley, G., Grist, N., & Locke, A. (2013). Agricultural development policy: a contemporary agenda. *Overseas Development Institute ODA, UK*.
- Wilson, K. (2002). Small cultivators in Bihar and'new'technology: choice or compulsion?. *Economic and Political Weekly*, 1229-1238.
- Yengde, S., & Teltumbde, A. (2018). The Radical in Ambedkar: Critical Reflections.

Appendix I

Pictures of the Field Survey

Appendix II

Plagiarism Report

URKUND

Urkund Analysis Result

Analysed Document: Parul Verma.docx (D54739693)
Submitted: 08/08/2019 08:26:00
Submitted By: shodhganga.bbau@gmail.com
Significance: 1 %

Sources included in the report:

Final Draft.doc (D41731830)
S_Sivachandran_Econmics.pdf (D38036166)
Gaikwad P. S..pdf (D41441201)
http://www.im4change.org/news-alerts/where-are-punjab039s-famous-small-farmers-4673171.html
http://oldror.lbp.world/UploadedData/6695.pdf

Instances where selected sources appear:

35