International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2020; 8(1): 1470-1478

Received: 18-11-2019
Accepted: 22-12-2019

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A study on farm mechanization level of farmers in Mungeli district of Chhattisgarh in India

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DOI: https://doi.org/10.22271/chemi.2020.v8.i1t.8460

Abstract
The study was conducted in the year 2015 all field work was completed from July, 2015 to November, 2015 for collecting information on mechanization level in Mungeli block of Chhattisgarh. For this purpose, eight village (Charbhatha, Amlidihi, Suretha, Baraidahara, Bhaghamudha, Jhulnakhurd, Ghuthera, Birgaon) of Mungeli block were selected randomly. For the survey Panchayat Pradhan and Farmers were contacted and a pre designed proforma was used for documentation and analysis. Field survey was done for verification. The whole information was subsequently compiled and presented. It is found that majority of the respondents had using the tractor for Ploughing, Feeding, Planting, Cultivation, fertilizer application etc. Perusal of data reveals that maximum numbers responds were falling in the category of low and middle land holding category while minimum number of respondents (23.33%) having big land holding category and reveals that average 26.67% respondents are using the modern implement, 50% respondents are using the modern implement by hiring and on an average 23.33% are depend on traditional system of farming.

Keywords: Survey, Mechanization, Farm Implements, Agriculture and Production

1. Introduction
Mechanization is a key factor for agricultural development and farmers' wellbeing. Not only it helped improving labor productivity up to 500 times in comparison to agriculture without motorization and without chemical application, mechanization provides also the power to ensure that agricultural operations for the soil, the plants and the animals are done precisely in time and with the highest efficiency.

Thereby the quality of agricultural products specified by their ingredients, freshness, maturity and shelf life are improved, leading to higher prices at the market. Furthermore, with the recent development in terms of precision farming technologies, side effects for the environment due to fertilizers and chemicals can be reduced substantially.

This also means that smaller amounts of fertilizers and chemicals are applied and production costs can be reduced.

However, it has to be considered that the level of mechanization and labor productivity in any given area is influenced by several variables and can change considerably from a region to the other. Important variables influencing these changes are: (i) The natural conditions such as rainfall, temperature, climate change, land availability/degradation, and water availability; (ii) The economic status, including technical progress, economic development, energy supply, oil prices and the global agricultural trade; (iii) The demographic conditions in a region/country with factors such as the population growth, aging population in rural areas, urbanization and change in diet, and quality requirements of consumers; and (iv) The political conditions which may be represented by elements such as food security/safety goals, education/training of farm operators, research, subsidies and farm structure development. Technology and other innovative improvements, in particular agricultural mechanization, will have to play an important role in working towards creating a food secure world.

In India there are 29th states which are direct or indirect depends upon agriculture. Agriculture in India is one of the most prominent sectors in its economy. Agriculture and allied sectors account for about 16% of the GDP (Gross Domestic Product) and employed 65% of the country's population. About 43% of India's geographical area is used for agricultural activity.

Despite a steady decline of its shear in the GDP, agriculture is still the largest economy sector and place a significant role in the overall socio-economic development of India. Nearly 80% of the farm population operates small holding, the average size of holding being 1.41 ha. Out of a total geographical area of 329 m ha, about 142 m ha constitute the net sown area. Nearly 63% of this area is rainfed and its contribution to the overall production is 44%. The productivity of rainfed area is very low compared to irrigated areas. food grain production in India has increased from about 45 million tons in 1951-52 to over 232 million tons in 2009-10. Groundwater irrigation has played the lead role in bringing more area under irrigation.

Mechanization in agriculture has enhanced production and productivity of agricultural commodities through timeliness of operation, better management of inputs, and improved quality of work and reduction of post-harvest losses. Increasing land and labor productivity with dignity are the mechanization requirement of developing country like India. Due to agro-ecological diversities, a high population density and socioeconomic disparity, a diverse mechanization scenario is seen in India. Small form holders own about 60% of the land could play major role in increased production and productivity of the crops. These farms could use improved agricultural machinery on custom hire basis to achieve higher land productivity and could contribute in overall improved productivity of the crops at the national level. Farmers, whether in the developed or developing economies, mechanize farm operations when the biological sources of energy, e.g., human and animal labor become more costly than the mechanical sources. There is a secular tendency everywhere for the biological sources to become costlier than the mechanical source. These is due, in part, to the increasing is with which capital can be substituted for labor in agriculture and partly to the rise in the cost of human and animal labor relative to that of machine and fuel. Mechanization helps in increasing crops yield through effective utilization of agricultural inputs, besides reducing drudgery of workers in farm operations, and therefore should be recognized as one of the major inputs though administrative measures for promotion. Appropriate size of farm is must to have economic use of power operated farm machinery. India has made remarkable progress in the development of Agricultural Mechanization technology. The country evolved a Selective Mechanization model using a power-mix based on animate and inanimate power sources. The animate power sources include the human beings and animals and the inanimate power source includes electro mechanical power sources such as diesel engine, tractors, power tillers and electric motors nearly. India produces wide range of agricultural equipment needed to practice modern intensive farming. Indian farm equipment industry has demonstrated its resilience and responsiveness to changing market situations and has come out victorious at the end adopting modernization measures.

The objectives of this project are to; (i) Examine the recent trend and evolution of agricultural mechanization development in Mungeli block (ii) Identify some of the factors driving the future demand for agricultural mechanization at District level.

2. Materials and Methods

The chapter deals with the material used and method adopted to achieve the objective of the present study, the entire chapter is divided into different heads and sub heads. The techniques used for measurement of different variable are presented under separate sub heads. The data collected have been analysed systematically using suitable statistical technique.

Chhattisgarh are known as rice bowl of central India. Chhattisgarh, the 26th state of the Indian Union came into existence on Nov. 1, 2000. Chhattisgarh, a state of India, has 27 administrative districts. The state is geographically situated between 17046' N and 2405 North Latitude and 80015'E and 84020' East Longitude. The total geographical area is around 137.90 lakh ha. of which cultivable land area is 46.77 lakh ha and forest land area being 63.53 lakh ha with more than 2.55 crore population. About 80 percent of the population in the state is engaged in agriculture and 43 percent of the entire arable land is under cultivation. Paddy is the principal crop. The northern and southern parts of the state are hilly, while the central part is a fertile plain The main crops are rice, maize, kodo-kutki and other small millets and pulses (tuar and kulthi) oilseeds, such as groundnuts (peanuts), soybeans and sunflowers, are also grown. In the mid-1990s, most of Chhattisgarh was still a monocrop belt. Only one-fourth to one-fifth of the sown area was double-cropped. When a very substantial portion of the population is dependent on agriculture, a situation where nearly 80% of a state's area is covered only by one crop, immediate attention to turn them into double crop areas is needed. Also, very few cash crops are grown in Chhattisgarh, so there is a need to diversify the agriculture produce towards oilseeds and other cash crops. Chhattisgarh is also called the "rice bowl of central India".

In Chhattisgarh, rice the main crop, is grown on about 77% of the net sown area. Only about 20% of the area is under irrigation; the rest depends on rain of the three agro-climatic.

The soils of Chhattisgarh vary considerably in the three agro-climatic zones. Though the nomenclature is different, the types of the soils especially the physical properties are the same. The different soils that exist in the three agro-climatic zones are as follows:

Chhattisgarh Plains	Bastar Plateau	Northern hills
Bhata (Lateritic)	Marhan (coarse sandy)	Hilly soils
Matasi (Sandy loam)	Tikra (sandy	Tikra
Dorsa (clay loam)	Mal (sandy loam)	Goda chawar
Kanhar (clay)	Gabhar (clay & clay loam)	Bahara

For collecting information on mechanization, the field survey was conducted in the villages of Mungeli block. For this purpose, 8 villages are selected randomly from Mungeli block. For the survey, the panchayat Pradhan and farmers were contacted and information about the implements which are being adopted for farming has been collected. A pre – designed proforma was used for documentation and analysis of different personal characteristics of responds, indigenous rain water, soil water management and use of different implements. Field survey were done for verification. The whole information's were subsequently and are presented.

2.1 Location of study Area

The study was conducted at different villages of Mungeli block. Out of 173 villages 8 were selected randomly. The villages Amlidih, Suretha, Charbhata, Baraidahara, Bhaghamudha, Jhulnakhurdha, Birgaon and Guthera were identified for the purpose of survey.

2.2 Brief Discussion of the study area

Mungeli is one of the newly formed districts of Chhattisgarh. Mungeli was established in January 1, 2012 and it belongs to

Chhattisgarh plain zone. Mungeli is located at 22.070 N 81.68 0E. It has a population of 456724. It has average elevation of 94.4 feet. Total area is about 163942 ha. In which farming land is in rabi 89178 ha and in kharif 116094 ha. Irrigated land is 52.97% and annual rainfall is 956.13mm (288 meter).
Mungeli has three blocks namely – 1. Mungeli block with villages 173, 2. Lormi block with villages 210, 3. Pathariya block with villages 219. Main crops of Mungeli district are Wheat, Paddy, Tuvar, Gram, Sorghum, Groundnut, Alsi and Tiwara etc.

2.3 Cropping system of study area
The survey of the farmers has been carried out in the grown area to check cropping system. Rice is the main crop of Chhattisgarh and it covers nearly 80% of the net sown area. The other crops are also taken in the study area pigeon pea, gram, wheat and maize etc.

2.4 Sampling and Sampling Procedure
Eight villages of Mungeli block from the Mungeli district are selected, as per stratified random sampling procedure. Thirty farmers from each village had survey falling under three different categories of farmers those who are using the implements directly or indirectly.

2.4.1 Selection of Villages
Eight villages were randomly selected from the Mungeli block from Mungeli district of Chhattisgarh. The farmers from each village has been survey falling under three different categories according to the land holding as small, medium and large.

2.4.2 Source of Data
The data was collected from samole of 30 farmers consisting of small, medium and large farmer by interviewing individually of 8 village (Amlidih, suretha, Charbhata, Baraidahara, Bhaghamudha, Jhulnakhurdha, Birgaon and Guthera)

2.5 Type of Data
- Data regarding to father's name and age.
- Data regarding land holding capacity of
- different categories of farmer.
- Data regarding the number of family
- member.
- Data regarding the availability of Implement.
- Data regarding the adoption of different
- idea to mechanization.

2.6 Development of interview Scheduled
To collect information leading to fulfil the objective of this study, each farmer has been interviewed separately.
The information on each activity has been obtained by developing a questionnaire prior to survey. The information had collected by filling up this questionnaire through personal interactions with the farmers. Question pertaining to each method by which application of implements has included in the interviewed schedule (Appendix I) in addition to the basic information about resources. The question has included the information regarding practices by which use of implements.

2.7 Procedure of Data Collection
Data were collected by the researcher himself. The task was accomplished through door to door visit to the selected responds using the structured interview schedule. The researcher could realize it very well that the collected data would be of no value if they are not valid. It also acted in the mind of the researcher that people, particularly in a traditional society, might view an outsider with suspicious. This might have unfavourable effect in obtaining valid and pertinent information from the responds. Having comprehended all these, the researcher had purposively chosen the nearest village to the college to overcome the difficulties. This made the research come closer to the responds easily as he was not regarded as an outsider in almost all cases. In the case where the responds was found unknown individual, the researcher made all possible efforts to establish proper report with him. That was not a difficult task for the researcher since he has well-conversant in the local language. Moreover, as an extra care, the researcher kept two well-known youths ot the villeges with him who assist him in establishing proper rapport with the responds. All possible efforts were made by the researcher to explain the purpose of the study to the responds and their answers were carefully recorded. Whenever any respondent faced difficulty in understanding the question, care was taken to explain the same adequately. Moreover, at the time of data collection, the researcher was also careful about side-talking and tried to avoid the problem tactfully.
In addition to this, actually observation of each activity has recorded during field operation along with other basic information. The interview schedule was prepared considering the objective of the study in mind. The question and statements contained in the schedule was simple, direct and easily understandable by the farmers without giving rise to doubt and misunderstanding in their minds. The scheduled contained both opened and closed form of questions adopting the technique for measuring selected characteristics (age, lands, family type, family size and avaibility of implements) and farmers knowledge about application of implements.
Based on the review of literature and consultation with experts, certain relevant variable was identified and included in the study that fit into the objectives of the study.
The procedure followed to classify and described is as follows:

2.7.1 Selected characteristics of the parameters
By initiating an informal discussion with the respondents, they were asked question on their personal characteristics and are described as under

2.7.1.1 Land holding capacity
It is the actual land owned by the family of farmers in acres. The conversion procedure as specified in the notification brought out by the Government of India. Accordingly, one was one acre of wet land is equated to three acres of dry land. The responds were categories based on procedure followed by Hiramath (2000). (Table.1)

Table 1: Land Holding categories of respondents

Land Holding Category	Charbhatha	Amlidihi	Suretha	Baraidahara	Bhagamuda	Jhulanakhurd	Ghuthera	Birgoan

Higher (>8Acre)	7	6	8	5	7	7	6	6
Middle (3 – 8 Acre)	16	15	12	15	12	9	11	14
Low (<3 Acre)	7	9	10	10	11	14	13	10
Avg. Total	30	30	30	30	30	30	30	30

2.7.1.2 Use of Implements
It refers the use of implements for different work during the farming namely plough, cutting, threshing etc.

Table 2: Use of implement in different study areas

Implement	Charbhatha	Amlidihi	Suretha	Baraidahara	Bhagamuda	Jhulanakhurd	Ghuthera	Birgoan
Those whose have Implement	8	9	5	7	12	3	4	6
Those whose have Hire Implement	15	17	15	10	7	10	11	15
Those whose have not in both condition	7	4	10	13	11	17	15	9

2.8 Documentation of Use of Implements
By initiating an informal discussion with the responds, they were asked question on each practice related to use of implements. During the course of discussion, the responds were requested to give detail of each practice accordingly, the detailed procedure involved in the following such practiced was noted down along with the required inputs dosages and periodicity of administration etc. After completion of the field survey, a comprehensive list of identified traditional technology was prepared. Technologies were shorted out, based on their nature, in consultation with the experts.
Constraints encountered by the farmers while using the Implements and suggestions to overcomes these constraints open ends questions were asked to the farmers to elicit the constraints faced by them. Accordingly, suggestions were also elicited.

2.9 Processing of Data
2.9.1 Editing
The collected raw data were examined thoroughly to detect errors and omissions. As a matter of fact, the researcher made a careful security of the completed interview scheduled to make sure that they were entered as complete as possible and well arranged to facilitate coding and tabulation. Very minor mistakes were detected by doing this
which was corrected promptly.

2.9.2 Categorization of Data
Following coding operation, the collected raw data as well as the respondents were classified into various categories to facilitate the description of the independent and dependent variables. These categories were developed for each of the variable by considering the nature of distribution of the data and extensive literature review.

2.9.3 Analysis of Data
For the purpose of analysis, the collected raw data were tabulated by arranging them into column and row. Analysis was performed using some statistical treatment as described below:
Such statistical measure as number, frequency count, percentage and mean were used in describing the selected dependent and independent variables.

2.9.4 Tools used for Analysis of data
The data were processed and tabulated by using statistical tools like frequency, percentage and mean.

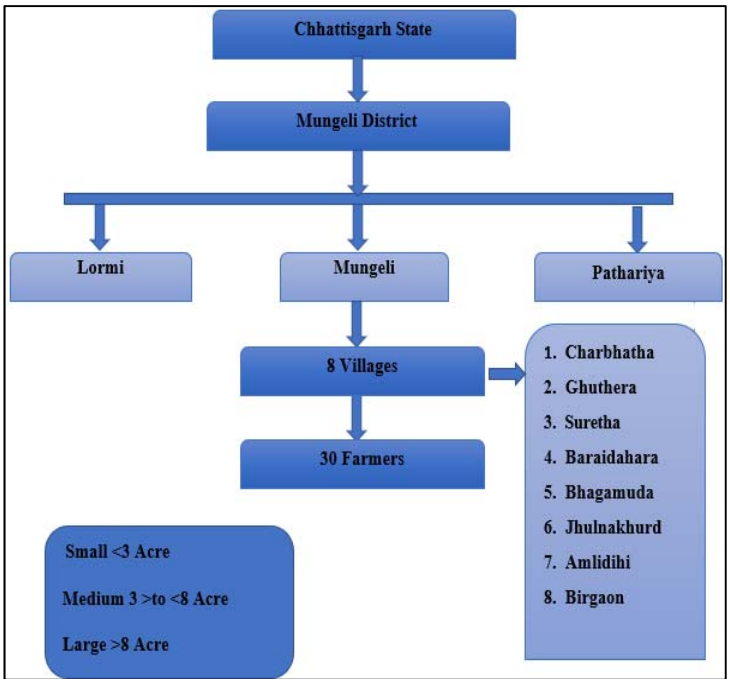


Fig 1: Plan of Work

3. Result and Discussion

This chapter deals with the observation and result obtained during the study on mechanization process opted by the farmer during farming process. In line with the objective laid out, a number of implements have been used by the farmer which includes traditional technology, beliefs and practices passed from generation to generation, as well as, these which are contemporary farmers innovations. The detail of mechanization process (use of implements) documented through field survey are presented in this chapter with the description of location and purpose-

3.1 Selected Characteristics of Farmer

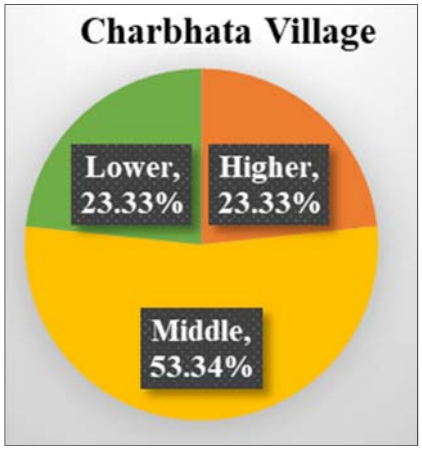
3.1.1 Land holding Size

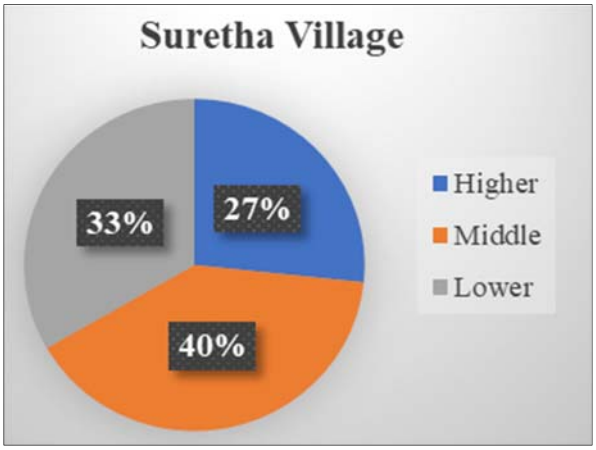
Perusal of data in the table 3.3 reveals that maximum numbers responds were falling in the category of low and middle land holding category while minimum number of respondents (23.33%) having big land holding category.

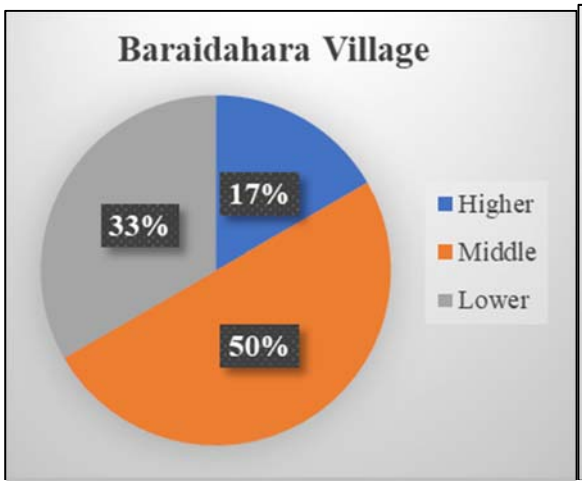
3.1.2 Use of implements

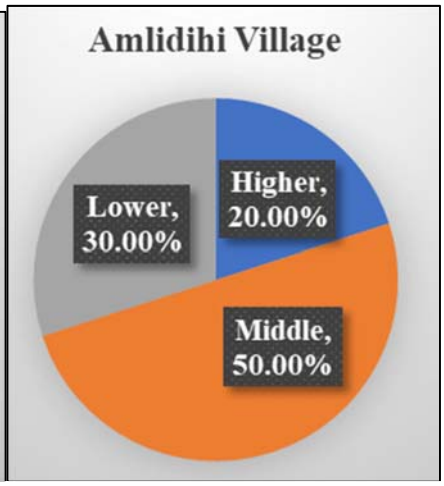
The table 3.4 reveals that average 26.67% respondents are using the modern implement, 50% respondents are using the modern implement by hiring and on an average 23.33% are depend on traditional system of farming.

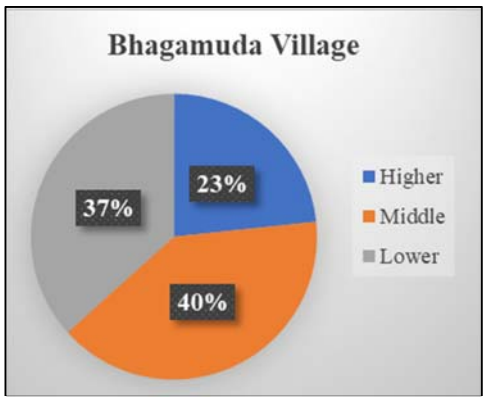
Some bar and pie diagrams on following above data in numbers and percentages

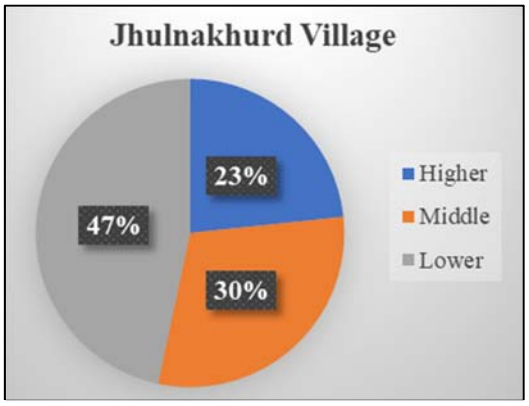












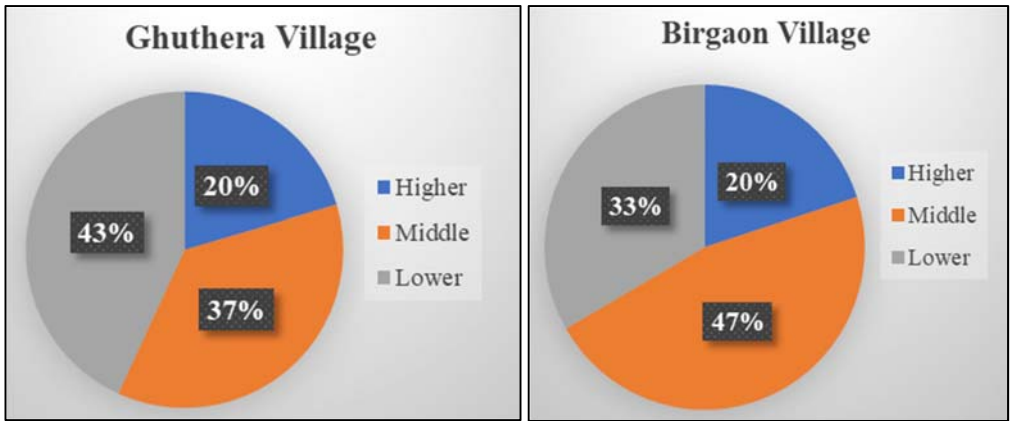


Fig 2: Bar and Pie Diagram

3.2 Implements

1. Tillage

It is mechanical manipulation of soil to provide favourable condition for crop production.

- Mould Board Plough
- Disc Plough
- Rotavator
- Cultivator
- Harrow

Paddy Weeder

Power Tiller

Seeding and sowing

Paddy Transplanter

Seed Cum Fertilizer Drill

Cagewheel

Leveller

Pump for irrigation

Plant protection implements

Sprayer

Power Sprayer

Duster

Harvesting and threshing implements

Sickle

Multicrop Thresher

Reaper

Winnower

Combine Harvester

Mower

Thresher

Processing implements

Chaffcutter

3.2.1 Advantage of farm mechanization:

1. Saves time/Work gets done faster.
2. Reduces labour.
3. Allows a farmer to work over a much larger area.
4. Able to work longer hours.
5. Can be more efficient and effective in a task than manual work.
6. Increase in volume of production.
7. Reduces dependence upon animal power.
8. Increase in labour productivity.
9. Timely water supply, spray etc.
10. Reduction of cost.
11. Increase in income.
12. It provides off farm employment to the population living in rural areas.
13. Self-sufficiency in food.
14. Greater area under cultivation. (Preparation of land easy)
15. Diversion of land from growing fodder.
16. Encourages multiple cropping.
17. Including the development of new crop varieties (The use of pesticides and fertilizers)
18. Reduction of loss of crops and food products.
19. Improved dignity of farmer.
20. Progress and prosperity in rural areas.
21. Increased productivity of land.

3.2.2. Disadvantages of farm mechanization:

1. Attract or retain farm staff.
2. Adoption of certain machines will lead to unemployment.
3. The initial cost of a machine is high. An idle machine is a waste. This wastage is greater, if the machine is costly.
4. Machines are subject to break-down and lie idle when electricity fails (if it is electrically operated).
5. Certain types of machines may become obsolete within a short span of time.

6. Depreciation charges are high; this will reduce the profit.
7. If the operator, who works on the machine, is not an expert, then its result will be useless.
8. They can be dangerous.
9. Transportation is difficult.
10. Needs of fuels.
11. Important of maintenance.
12. Lack of trained man power.
13. Lack of repair and servicing facilities for machines.
14. Lack of suitable farm machines for different operation.

4. Conclusion

Overall it was noted that all implements are available in the study area for farming and it is found that the farmers are aware about the all implements/ modern technology. Some implements are so costly but some farmers those who are the upper level farmer has also purchased that implement. The present study of documentation has defined bearing on the course of action in farming new proposals. The added advantages will be including the use of modern technique in farming. This form a basis for formulating research programme for validation and refinement of the use of implements in agriculture. Based on the study the following conclusion were made:

*The maximum farmers are using the different types of implements/modern
technologies in agriculture in all the villages and the save their time/money and
solve their labour problem.

*By using the modern implements directly or indirectly they are rising in everywhere.

5. References

1. Arora, Kumar R. “Diagnostic Study Report on Agricultural Implements Industry at Kernel (Haryana)” Govt. of India, Min. of SSI, 2005, 1-74.
2. Birajdar VM. Study on knowledge level of the farmers and extension personnel about the ill effect of agricultural chemicals. M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad. Biswas, I. and Sinha, B., 2008, Status of use of Modern Implement and Farm Machinery and hand tools, Indian science & technology. 2002, 1-9.
3. Dhingra IC. The Indian Economy, Environment and Policy, Sultan Chand and Sons, Educational Publishers, New Delhi, 2010.
4. Ghose BK. Determinants of Farm Mechanization in Modern Agriculture: A case study of Burdwan Districts of west Bengal, International Journal of Agricultural Research. 2010; 5(12):1107-1115.
5. Hiremath NS. Participation of rural youth in farm and non – farm activities. M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad, 2000.
6. Jorgensen MH. Agricultural field machinery for the future – from an engineering perspective, Agronomy Research Bio System engineering, Special. 2012; 1:109-113.
7. Karthikeyan C, Veeraragavathatham D, Karpagam D, Ayisha Firdouse S. Traditional tools in Agricultural practices, Indian Journal of Traditional Knowledge, 2009; 8(2):212-217.
8. Kumar S. Indian Agriculture and the Globalization, Agriculture under Globalization, Dominant Publishers and Distributors, New Delhi-2, 2008, 10.
9. Manchikanti P, Mahasweta S. Agricultural Machinery in India: IPR Perspective, Journal of Intellectual property Rights, March, 2011; 16:163-169.
10. Mishra DK, Pandey RN, Pandey VK. Economic costs of Bullock and tractor power use in Uttar Pradesh Agriculture, Indian Journal of Agricultural Economics 1976; 31(3):193.
11. Mohammed R. Modern Agriculture and Sustainable Farming, Peninsular Economist, 2009; XXI(1):234-235.
12. Mohammed R. Lack of Technology and Awareness, Southern Economist. 2010; 48(24):5-6.
13. Mukhopadhya AM, Sarkar GK. Economic Aspect of Cropping pattern, Proceedings of the symposium on cropping pattern in India, Indian council of Agricultural Research, New Delhi, 1972, 582.
14. Rao S. Rate of growth of power irrigation in Madras Agriculture, Indian Journal of Agricultural Economics. 2009; 33(1):209-217.
15. Sahay J. Elements of Agricultural Engineering, Published by A. K. Jain (Prop.) for Standard publishers Distributors, fourth Edition, ISBN: 81-8014 – 044 – X, 2004, 1-16.
16. Sharma VK, Sharma AN. Economical use of bullock power, Indian Agricultural News Digest 1975; 4(8, 9):265-267.
17. Singh BB, Singh R. Mechanization of Farms in India, Seminar paper on Agricultural Mechanization, Anand, Indian Society of Agricultural Economics, 30(3). Singh, Jonginder, 2006, Scope and constrains of farm mechanization in India, 1975; 1:48-56.
18. Singh R, Patel RK. Returns to scale, Farm size of productivity in Meerut District” Indian Journal of Agricultural Economics. 1973; 28(2):48,
19. Singh S. Agriculture Machinery Industry in India: A study of Growth, Market Structures, and Business strategies, CMA Publication, 2009; 230:1-228.
20. Nitin S, Kakra A. Farm Mechanization in India: A status paper, IARI, PUSA, New Delhi, India. 2009, 1-34.
21. Vanetha KP, Senthil A. A study in utilization of farm equipment in Tamil Naidu, International Journal of Advanced Research, 2013; 1(5):284-288.
22. Vanitha, Rexalin A. Agriculture and Globalization, Agriculture under Globalization, Dominant Publishers and Distributors, New Delhi – 2, 2008, 55.
23. Mehta CR, Chandel NS, Jena PK, Jha A. “Indian Agriculture Counting on Farm Mechanization”, Agricultural Mechanization in Asia, Africa & Latin America. 2019; 50(1):84-89.
24. Shoba H, Rajeshwari N, Yogeeshappa H. A Study on Farm Mechanization Level of Farmers in North Karnataka, India, Int. J. Curr. Microbiol. App. Sci. 2018; 7(2):652-657.
25. Naresh, Kumar N, Ashok T. An Study on the Status of Agricultural Mechanization and its Need in Bundelkhand Region of Uttar Pradesh”, Thesis in Krishikosh, 2017, 1-130.
26. Singh G. Agricultural Mechanisation Development in India, Ind. Jn. Of Agri. Econ. 2015; 70(1):64-82.
27. Sengar SH, Sonawane AV, Burbade RG. “Study of Farm Mechanization Gaps in The Cultivation of Cotton Crop,” International Research Journal of Advanced Engineering and Science, 2016; 1(4):77-78