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An Economic Viability of Custom Hiring on Paddy Machinery and Implements by Farmers in Telangana State

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A B S T R A C T

Agricultural labour scarcity is the main problem faced by farmers in rural India. Number of Draft animals is dwindling in rural areas because of high maintenance cost. The farm mechanization plays an important role to take up timely agricultural operations. Custom hiring is seen as an alternative to ownership of expensive farm machinery. In Telangana state, the farmers are earnings profits through hiring besides facilitating in mechanizing other farms who are unable to purchase on their own. Hence the study is proposed to ascertain the economic viability of investment in machinery for custom hiring. The study is conducted in the Karimnagar of Telangana state, the district is purposively selected as it is one of the major paddy producing districts. To perform the analysis, data was collected through personal interviews from the selected farmers, with the help of structured questionnaire/schedule. The results revealed that the mechanization levels are 100 per cent in terms of operations like preparation of land and harvesting in paddy crop. The result indicated that it was found that the Net Present Value over the economic life period was ₹ 1536724, ₹ 710611, ₹ 2045612 and ₹ 1858782, for tractor with other operations, tractor with rotavator, paddy transplanter, combine harvester. The Internal Rate of Return on machineries and implements worked out to be 46 per cent, 48 per cent and 23 per cent for tractor with other operations, tractor with rotavator, paddy transplanter, combine harvester. The Profitable Index worked out were 3.6, 3.5, 2.5 and 2.1. It is found that Break-Even Point for the selected farm machineries and implements were 140 hours, 129 hours, 186 hours and 320 hours for tractor with other operations, tractor with rotavator, for paddy transplanter and combine harvester.

***Key words*:** NPV, IRR, Paddy transplanter, Combine harvester, Rotavator, Machinery

Agriculture is the main occupation of most of the Indian families and also an important sector of Indian economy. This sector provides livelihood to about 58 per cent of the rural population [1]. Food grain production rose from 50 Mt in 1951-52 to 291.95 Mt in 2019-20 [2] mainly because of the improved package of practices and new agricultural technologies including mechanization. Farm mechanization has been well-received throughout the world as one of the most important elements of modernizing agriculture. The level and appropriate selection of agricultural machinery has a direct impact on land and labour productivity, farm output and income, environmental safety and the quality of life of farmers in India. Agricultural machines also ensure the timeliness of farm operations and increase work output per unit time. Suitability to small and medium farms, simple design and technology, versatility for use in several farm operations, affordability in terms of cost and profitability and most important, repair and maintenance services are the basic requirement for the expansion of farm mechanization in India. Improved agricultural tools and equipment are estimated to contribute to the food and agricultural production in India by savings in seeds (15-20%), fertilizers (20-25%), time (20-30%), and labour (20-30%), by increase in cropping intensity (5-20%) and productivity (10-15%) [3].

Agricultural labour scarcity is the main problem faced by farmers in rural India. Number of draft animals is dwindling in rural areas because of high maintenance cost. Hence, farm mechanization plays an important role to take up timely agricultural operations. Farm power availability from human and animal sources has reduced over the past 20-years and availability of farm power from tractors, mechanical and electrical sources availability increased 20 folds in the same period [4]. So, mechanization of agricultural field operations is the need of hour in the present Indian agriculture. But at present in most of the crops, tractor is used for land leveling and ploughing operations. Mechanical threshing is also common in

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these days, but most of the other operations are carried out by agricultural labour like sowing, weeding, transplanting etc. Inadequacy of farm power is the major constraint in the agriculture production and productivity. The average farm power needs to be increased from current 1.43 kW/ha to at least 2 kW/ha in order to get timeliness and quality in farm operations [5].

Agricultural mechanization in India

The adaption of agricultural mechanization in India is increasing continuously. There are 22 tractor, 5 power tiller, 200 diesel engine, 600 irrigation pump, 48 combine harvester and 188 earth moving machinery manufacturers in India. Major farm machinery used in India includes tractors, threshers and power tillers. Among these, the biggest market in terms of annual sales is that of tractors (around 6 lakh units annually), threshers (around 1 lakh units annually) and power tillers (around 56,000 units annually). Among farm machinery, tractors are most widely used by the farmers with a total market size is 34,000 crores annually. Today, India is recognized as a leading country in the world for the development and manufacture of agricultural implements and equipment's. The range of equipment includes tractors, harvesting and threshing equipment, plant protection machines, irrigation and drainage pumps, sprinkler systems, land development machinery, dairy and agro-processing equipment etc. India is exporting increasing volumes of these to various countries including USA, Africa and Asia [6].

Table 1 Farm power sources in India

Year	Number of farm power sources (million)					
	Agricultural workers	Draught animal power	Tractors	Power tillers	Diesel engines	Electric motors
1960-61	131	80.4	0.04	0	0.23	0.20
1970-71	126	82.6	0.17	0.01	1.70	1.60
1980-81	148	73.4	0.53	0.02	2.88	3.35
1990-91	185	70.9	1.19	0.03	4.80	8.07
2000-01	234	60.3	2.55	0.12	6.23	13.25
2010-11	263	51.3	4.43	0.29	8.13	17.49
2011-12	266	50.4	4.84	0.34	8.21	17.87
2012-13	269	49.5	5.21	0.38	8.29	18.25
2013-14	272	48.6	5.65	0.42	8.37	18.60
2019-20	291	43.8	8.37	0.70	8.86	21.07
CAGR (%)	1.13	-1.79	8.49	10.34	0.95	2.09

Sources: Singh [7]

Data depicted in (Table 1) regarding farm power sources in India. In 1960-61, the availability of agricultural workers, draught animals, tractors, power tillers, diesel engines and electric motors were 131 million, 80.4 million, 0.037 million, 0 million, 0.23 million and 0.23 million respectively. During 1960-61, there were no power tillers in India and were introduced in the year of 1963. In 2019-20 it is expected to grow at 291 million, 43.8 million, 8.37 million, 0.70 million, 8.86 million and 21.07 million of agricultural workers, draught animals, tractors, power tillers, diesel engines and electric motors respectively.

Farm mechanization levels in India

The farm mechanization levels for major cereals, pulses, oil-seeds, millets and cash crops are given in (Table 2). It indicates that the seedbed preparation operation is highly mechanized (more than 50%) for major crops whereas harvesting and threshing operation is the least mechanized (lower than 30%) for major crops except for rice and wheat crops. In seedbed preparation, mechanization level is higher in rice and wheat crops as compared to other crops. However, mechanization level for sowing operation is the highest for wheat crop (60%). The mechanization levels in planting / transplanting operation for sugarcane and rice crops are only 10 and 20%, respectively. In case of harvesting and threshing, the mechanization levels in rice and wheat crops are more than 60% and there is no mechanization in cotton crop. The overall farm mechanization levels for paddy, wheat, maize, sorghum and millets, pulses, oil-seeds, cotton and sugarcane crops are 45, 63, 40, 26, 34, 34, 26 and 24 per cent respectively. The overall farm mechanization level of the country is 40% which is lower than other developing countries such as China - 59.5% [8] and Brazil - 75% [6].

Table 2 Level of mechanization crop and operation

Crop	Seed bed preparation (%)	Sowing/planting/transplanting (%)	Weed and pest control (%)	Harvesting and threshing (%)
Paddy	85-90	5-10	80-90	70-80
Wheat	90-95	80-90	70-80	80-90
Potato	90-95	80-90	80-90	70-80
Maize	90-95	80-90	70-80	50-60
Cotton	90-95	50-60	50-60	0
Sorghum	80-90	30-50	60-70	20-30
Gram	90-95	50-60	60-70	30-40
Oil seeds	80-90	30-40	60-80	20-30
Millets	80-90	30-40	60-70	20-30
Sunflower	80-90	40-50	80-90	60-70
Fodder crop	80-90	20-40	80-90	10-20
Horticultural crops	60-70	30-40	40-50	<1
Vegetable crops	70-80	5-10	80-90	<1

Source: Tiwari *et al.* [3]

Data in (Table 2) shows level of mechanization in different crops. In paddy, the operations like seed bed preparation, weed and pest control and harvesting, the level of mechanization is more than 70% whereas in transplanting, mechanization level is low upto 10%, still transplanting of paddy takes place manually. In cotton, harvesting is completely done by manually, whereas in horticultural and vegetable crops the level of mechanization in harvesting operation is very less i.e., <1%.

Benefits of agricultural mechanization

Higher productivity and greater output are the two major contributions of farm mechanization. Tractors and farm equipment's form an integral part of farm mechanization and have a crucial role to play in increasing agricultural productivity. Tractor is a highly versatile multi-purpose machine used in agriculture both for land reclamation and for carrying out various crop cultivation operations and activities. Farm mechanization in India aims at integrating the use of available human and animal power with the mechanical sources of power for increasing the agricultural productivity. The mechanization of agriculture, to drive an increased volume of economic surplus not only helps the farmers to develop their agricultural farm but also helps towards industrial development and infrastructural development in a country. Large scale farming has become possible due to agriculture mechanization which has reduced the cost of production. Farm mechanization can solve the labour bottlenecks faced by the farm during the peak period. Mechanization made the intensive cultivation successful and helped the farmers to follow multiple cropping properly [9] (Reddy, 2020).

Limitations in Indian agricultural mechanization

Some of the limitations of mechanization in Indian agriculture are: Low annual use of tractors (only 500-600 hrs./year against recommended 1000 hrs./year), non-availability of matching equipment, cumbersome and energy inefficient designs, poor reliability, frequent breakdowns and high repair and maintenance cost, low quality. Inadequate user education, lack of standardization and non-availability of relevant literature like operator's manual, parts catalogues etc. [10]

Government initiatives on farm mechanization

The Government of India has also taken initiatives and programmes like Rashtriya Krishi Vikas Yojana (RKVY), National Food Security Mission (NFSM), National Horticulture Mission (NHM), Gramin Bhandaran Yojana (GBY), Sub-Mission on Agricultural Mechanization (SMAM), scheme on Promotion of Agricultural Mechanization and Machinery for In-situ Management of Crop Residue in the States of Punjab, Haryana, Uttar Pradesh and NCT of Delhi, etc. The major objectives of SMAM are to demonstrate the agricultural machinery on the farmers' fields to increase farm mechanization and productivity, test and evaluate machines through identified testing centres to ensure quality and performance, support the custom hiring centres of agricultural machinery and hi-tech hubs to ensure the availability of agricultural machinery, increase trained and skilled personnel, etc. The concept of 'Custom Hiring' assures the distribution of mechanical power beyond large holding to small/marginal land holdings. It also facilitates availability of farm machinery/equipment on hire and assists in enhancing mechanization status. The estimated budget proposed for the SMAM scheme for three years (2017-20) is USD 1.05 billion. This includes a share of 60 and 40% by Central Government and State Governments, respectively. However, a share of 90 and 10% was borne by Central Government and State Governments, respectively for North Eastern and Himalayan states. During the period from 2014-15 to 2016-17, 38074 persons have been trained in different parts of country by testing centres under SMAM.

The target under SMAM was to establish 19883, 613 and 22338 numbers of custom hiring centres, Hi-tech hubs for management of high value crops and farm machinery banks at village level, respectively for 2019- 20. This was expected to increase farm power availability and average level of mechanization for different farm operations to 2.45 kW/ha and 50%, respectively for 2020 [11].

The objectives of the new scheme on Promotion of Agricultural Mechanization and Machinery for Insitu Management of Crop Residue in the states of Punjab, Haryana, Uttar Pradesh and NCT of Delhi are to provide financial assistance to establish Farm Machinery banks or Custom hiring centres of in-situ crop residue management machinery, to procure agriculture machinery and equipment for in-situ crop residue management and to execute Information, Education and Communication strategies to create awareness on in-situ crop residue management among farmers, users and stakeholders. Under central sector component of the scheme, 100% cost of USD 168 million will be met by the Central Government. The scheme was implemented during two years (2018-19 and 2019-20) to check burning of crop residue in field and thus address the issues/ problem of air pollution in Punjab, Haryana, Uttar Pradesh and NCT of Delhi.

Mechanization in Telangana sate

With the aim to promote farm mechanization, a new scheme is being implemented by Telangana government to provide farm equipment at subsidized rates to farmers. The state government aims to double the farm mechanization from the existing 45 percent to 90 percent in the state during three to four years (from 2014-18) to tackle the problem of farm laborers. Farm cluster-wise inventory is being prepared to identify the needs of farmers for every 5000 acres. Accordingly, the state government supplied the farm equipment under the scheme, such as harvesters, threshers, reapers, and winnowers, through custom hiring centres. With the help of custom hiring centre, new employment avenues opened for rural youth. The state government spent Rs. 951.28 crore for farm mechanization over the last few years which benefitted 6.66 lakh farmers. The government has earned Rs 1500 crore for farm mechanization by providing a 50 percent subsidy on farm equipment. The government has allocated Rs. 300 crore towards subsidy of farm equipment and tractors. It was planned to distribute a total of 3,900 tractors and farm machinery, under the scheme to SC/ST farmers with 100 percent subsidy, while for others with 50 per cent subsidy. Setting up of the processing units in the areas where the production of the particular crop was high would help farmers get remunerative prices and create employment [2].

Custom hiring services (CHS) of farm machineries

Custom hiring of farm machineries was first introduced in Indian agriculture in 19th century [12]. Steam thresher was used for the first time to rent out. Thresher was taken to about 10 different places working for two days at one place and moving to another place. Agro Industries Corporation (AIC) was the one which started an organized custom hiring to promote farm mechanization in mid-1960. From 1970s-1990s, AICs concentrated mainly on land development, tillage operation aspects and other field operations were neglected. Custom hiring services got further boost when Government of

India launched a scheme to set up Agro Services Centers all over the country in 1971. Under National Agriculture Technology Project (NATP) and National Agricultural Innovation Project (NAIP) schemes, custom hiring was also given importance, but in a limited preference. Custom hiring had limited success because of smaller number of staff concentrated on small pockets of India. But in 2010, under National Innovations on Climate Resilient Agriculture (NICRA), by bringing in 100 Krishi Vigyan Kendras (KVKs) spread over drought/flood/hill area and other difficult situations of agriculture, the man power utilization and technical expertise of KVKs, is harnessed to popularize custom hiring services [13]. Custom Hiring in India faces constraints like high initial cost of equipment's, lack of knowledge in the aspects of operation, maintenance and repair of equipment, repair and maintenance under individual ownership coupled with lack of space for shelter, orientation towards the use of tractors and allied equipment's, suboptimal asset capacity utilization on account of crop specific requirements. To overcome this, virtual or real consolidation of the widely fragmented and scattered land holdings in many parts of the country, extension of benefits of mechanization to all cropping systems including horticultural crops, enhancement of the average farm power availability to minimum 2.5 kW/ha to assure timeliness and quality in field operations and use of precision and efficient equipment's to improve the quality of operations is required (Sub-mission on agricultural mechanization, 2016-17).

Importance of custom hiring of farm machinery in India

One of the major constraints of increasing agricultural production and productivity is the inadequacy of farm power and machinery with the farmers in India. The average farm power availability needs to be increased from the current 1.43 kW/ha to at least 2 kW/ha to assure timeliness and quality in field operations, undertake heavy field operations like sub soiling, chiselling, deep ploughing, summer ploughing, etc. All these agricultural operations are possible only when adequate agricultural mechanization infrastructure is created. Even farmers with small holdings utilize selected improved farm equipment through custom hiring. Establishment of such facilities has potential for adoption of mechanization system.

MATERIALS AND METHODS

The study was carried out in Karimnagar district. Karimnagar district is one of the major paddy producing districts in Telangana state. where most of the farmers are utilizing machines in most of the production and processing operations and also there is more scope for custom hiring activities. From Karimnagar district, farm machineries and implements like tractor, rotavator, paddy transplanter and combine harvester had been selected, as they are mostly utilized on custom hiring basis. For this study, data was collected from 40 farmers owning tractors, 40 farmers owning rotavators, 20 farmers owning paddy transplanters, 40 farmers owning combine harvesters. The sample farmers/entrepreneurs with respect to tractors, rotavators, paddy transplanters and combine harvesters were selected from Karimnagar district. Both primary and secondary data was collected to fulfill the objectives of the study. Tabular presentation was used to compile the socio-economic characteristics of farmers providing custom hiring services, costs, returns and profits in operationalization of custom hiring services. The economic viability of custom hiring of machinery and implements were calculated by using the discounting techniques like NPV, IRR and PI. To take decision on hiring of farm machinery and implements whether profitable or not was found by using Break-even analysis.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondent farmers

Socio-economic profile of respondent farmers was studied in terms of age, education and experience in custom hiring services. It was found that the majority of the respondents belong to the age group of 30-50 years (68%) and small proportion of farmers are above 50 years of age (6%). The study revealed that the majority of respondent farmers belong to secondary school educational status. It was found that all the respondent farmers were literates and all had completed their primary education. It was observed that the average experience of respondent in custom hiring services was 5 years [14]. Majority of the respondent farmers have more than 5 years of experience (90%).

It was found that the majority of respondent farmers are dependent entirely on agriculture alone (77.5%), only few (22.5%) are dependent on other occupations like private jobs and business in addition to agriculture. Large proportion of respondents are medium farmers (38%) i.e., having an area of 5-10 acres of landholdings, while only few belong to marginal category (1%) i.e., having an area of less than 2.5 acres of landholdings. And also found that field operations like preparation of land (100%), Transplanting (26%) and harvesting (100%) of paddy crop were done through mechanization. The majority of selected respondents owned tractor, rotavator, cultivator, plough and trailer paddy for custom hiring. Only few farers had paddy transplanters as well as combine harvesters and observed that custom hiring services was offered for different agricultural operations like preparation of land, transplanting and harvesting in paddy and transplanting. Majority of operations covered under custom hiring services was for harvesting of paddy [15].

Table 3 Investment particulars of machinery and equipment's

Type of machinery/equipment	Life span (years)	Cost of machinery (₹)	Depreciation/annum (₹)
Tractor with other operations	10	7,55,763	44,371
Tractor with rotavator	8	6,88,563	32,502
Paddy transplanter	10	13,60,769	1,22,469
Combine harvester	7	16,68,063	2,10,154

Economic viability of custom hiring of machinery and implements

Investment cost of selected farm machinery and implements

The (Table 3) shows investment cost of hired out machineries. Tractor is used for multiple operations like ploughing, puddling levelling and haulage. Hence, investment is apportioned for tractor with rotavator (30% investment) and tractor with other operations (70% of investment) and depreciation is also apportioned based on hourly usage in a year. From the (Table 4) it can be seen that the investment cost of combine harvester (₹1668063) is highest among the selected machineries, followed by paddy transplanter (₹1360769), tractor with other operations like ploughing, haulage and levelling (₹755763), tractor with rotavator (₹688563), and

Depreciation (per annum) of combine harvester (₹210154) is also more among the selected machinery, followed by paddy transplanter (₹122469), tractor with other operations (₹44371).

Investment particulars of shelter for machinery/implements

The (Table 4) shows investment cost for shelter. There are two types of shelters in the study area like temporary structure (Kucha) and permanent structure (Pacca). Permanent type structure cost is more (₹80000) compared to temporary one (₹25000).

Table 4 Investment particulars of shelter for machinery/implements

Type of shed (Permanent/temporary)	Cost of construction (₹)	Life span (Years)	Depreciation / annum (₹)
Permanent	80000	15	4800
Temporary	25000	5	1500

Total annual cost of selected paddy machinery

The data depicted in (Table 5) shows total annual cost of hired out paddy machineries. From the table it can be seen that the total annual cost of tractor with other operations like ploughing, levelling and haulage, tractor with rotavator, paddy transplanter and combine harvester were ₹455971, ₹372236, ₹56754 and ₹888885, respectively. The cost incurred for fuel was most prominent variable cost among all paddy hired out machineries. Fuel cost accounted for ₹255563 (56%), ₹173988 (46.7%), ₹126615 (22.3%) and ₹373113 (42%) of total cost of tractor with other operations, tractor with rotavator, paddy transplanter and combine harvester respectively. Whereas, operator/labour wages accounted for ₹62375 (13.6%), labour for providing custom hiring services is hired only for four months during the operations (2 months during Kharif and 2 months during Rabi), ₹56875 (15.3%), ₹109077 (19.2%) and ₹116125 (13%) in the same order [16]. Repair and maintenance cost accounted for ₹48040 (10.5%), ₹59513 (16%), ₹117385 (20.7%) and ₹62000 (7%) and lubricating oil cost accounted for ₹11325 (2.8%), ₹7650 (2%), ₹18846 (3.3%) and ₹15174 (1.7%), resulting in total variable cost per year as ₹377303, ₹298026, ₹371923 and ₹566412 for tractor with other operations, tractor with rotavator, paddy transplanter and combine harvester respectively [17-18].

Table 5 Annual cost incurred by respondent farmers for hiring out paddy crop machineries (Rupees/annum)

Particulars	Tractor with other operations	% of total cost	Tractor with rotavator	% of total cost	Paddy transplanter	% of total cost	Combine harvester	% of total cost
			I. Fixed cost					
Registration fee	3,134	0.6	2,134	0.6	0	0	6,275	0.7
Depreciation	44,371	9.7	32,502	8.7	1,22,469	21.6	2,10,154	23.6
Insurance and tax	4,675	1.0	4,400	1.2	0	0	17,588	2.0
Interest on investment	26,488	5.8	35,174	9.5	73,182	12.9	88,456	10.0
Total fixed cost	78,668	17.3	74,210	20	1,95,651	34.5	3,22,473	36.3
			II. Variable cost					
Fuel cost	2,55,563	56.0	1,73,988	46.7	1,26,615	22.3	3,73,113	42.0
Lubrication cost	11,325	2.8	7,650	2.0	18,846	3.3	15,174	1.7
Repair and maintenance	48,040	10.5	59,513	16.0	1,17,385	20.7	62,000	7.0
Operator/labour wages	62,375	13.6	56,875	15.3	1,09,077	19.2	1,16,125	13.0
Total variable cost	3,77,303	82.7	2,98,026	80	3,71,923	65.5	5,66,412	63.7
III. Total cost (I+II)	4,55,971	100	3,72,236	100	5,67,574	100	8,88,885	100

Cost and returns from hiring out of selected farm machineries

It was found that total cost for hiring out of combine harvester (₹8,88,885) is more among all machineries in paddy crop, because the initial cost of combine harvester is more, while tractor with rotavator (₹3,72,236) has lowest. Among the variable costs, fuel cost occupies the first place, followed by operator/labour wages, repair and maintenance and lubricating oil. Among fixed costs, depreciation occupies first place followed by interest on investment and insurance. It was found that returns from the combine harvester (₹4,01,670) is more among all selected machineries, followed by paddy transplanter (₹3,57,932), tractor with other operations (₹2,73,994), tractor with rotavator (₹1,41,556). These observations are in accordance to the results of Satapathy [19].

Table 6 Economic viability of selected machinery and implements

Machinery type	Net present value (₹)	Internal rate of return (%)	Profitability index	Break-even point
Tractor with other operations	15,36,724	46	3.6	140 hours
Tractor with rotavator	7,10,611	48	3.5	129 hours
Paddy transplanter	20,45,612	23	2.5	186 hours
Combine harvester	18,58,782	16	2.1	320 hours

Economic viability of custom hiring of machinery and implements

It was found that the Net Present Value over the economic life period was ₹ 15,36,724, ₹ 7,10,611, ₹ 20,45,612 and ₹ 18,58,782 for tractor with other operations, tractor with rotavator, paddy transplanter, combine harvester show in (Table 6). The Internal Rate of Return for selected farm machineries and implements worked out to be 46 per cent, 48 per cent and 23 per cent for tractor with other operations, tractor with rotavator, paddy transplanter, combine harvester respectively.

The Internal Rate of Return was higher than the discount rate (12%) considered for the evaluation. This criterion ranked the tractor at the top with respect to profitability. However, internal rate of return was higher than the discount rate (12%) for the selected farm machineries and implements and hence, the investment on these machineries and implements were economically feasible and viable. Thus, all the three criteria of economic evaluation viz., Net Present Value, Internal Rate of Return and Profitable Index indicated that, investment on selected machineries and implements were economically feasible [20].

The discounted Profitable Index indicates the net returns realized per rupee of investment during the economic life period of the selected farm machineries and implements. The Profitable Index worked out were 3.6, 3.5, 2.5 and 2.1 for tractor with other operations, tractor with rotavator, paddy transplanter, combine harvester respectively. The Profitable Index is greater than unity for all selected machineries and implements, hence the investment on selected farm machineries and implements were viable and profitable. The Break-Even Point is used to find the number of hours or drums/sims needed to cover the total fixed cost of machinery ownership. Break-Even analysis was used to provide a useful guide to help farmers choose between machinery ownership and custom hiring by calculating Break-Even Point hours for different types of farm machineries and implements. It is found that Break-Even Point for the selected farm machineries and implements were 140 hours for tractor with other operations, 129 hours for tractor with rotavator, 186 hours for paddy transplanter, 320 hours for combine harvester [21-22].

CONCLUSION

From the study, it can be concluded that the majority of the farmers of custom hiring services are well educated with medium landholdings (5-10 acres) with majority having an experience of more than 5 years. It is revealed that the cost of operation of paddy machineries were higher. The total cost is highest for combine harvester, while the lowest cost is for tractor with rotavator. The returns from paddy machineries were higher, the return from the combine harvester was highest, while the least returns from tractor with rotavator. It can be concluded that paddy transplanter provides more income to farmers, if number of hired hours are more thereby reducing the total cost of operation. In order to popularize and strengthen custom hiring services in the study area, some of the suggestions are as follows: Extension machinery should encourage the farmers to form a farmer group for custom hiring opportunities, so that each and every farmer in the village get an opportunity to utilize agricultural machineries. Technical know-how should be provided to the farmers with respect to suitable farm machinery and implements for the situation and for its proper use, policy to exempt the toll gate charges for interstate custom hiring operations and also reduce the insurance charges for farm machinery and Government should extend subsidy to make the purchase of farm machinery and equipment more affordable.

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