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Contract Farming and its impact on Productivity and Income of Farmer in Haryana Evidence from Primary Survey

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Abstract

The main aims of the present study are to analyze the impact and assessment of contract farming on farmer income and productivity in Haryana, India. There are lots studies at international level as well as national which explain that the contract farming has raised the income and productivity of farmers. There may be three main reasons of high income and productivity of contract farmers such as better price, crop diversification from transitional crops to vegetable crops and higher crop intensity. Therefore through this study we are trying to compares the income and productivity of contract farmers and non-contracted farmers and also finds out the determinants of Contract Farming.

Keywords: ***Contract Farming, Retail Chain, Income, Productivity***.

1. Introduction

The importance of agriculture sector in Indian has assessed by its contribution in employment and gross domestic product (GDP). The agricultural sector is one of the major sources of income and employment in India. Although, the share of agriculture sector in GDP has been declined from 32 per cent in 1993–94 to 19.9 per cent in 2020-21, therefore this sector is also the major source of livelihood and employment particularly in rural India. In terms of income; it contributes to 60 per cent of the households income from rural area, (NABARD; Annual Report 2012-13). The scenario in Haryana, which is an agricultural based state, is not different. The agriculture sector contributed to 40.4 per cent in 1993–1994, which declined to 32 per cent in 1999–2000 and further to 19.1 per cent in 2020-2021(Table: 1).

In Indian perspective, the per farmer land holding is very low and it is decreasing continuously therefore farmers are unable to arrange all types of resources for a small size of land holding. In this situation when a farmer is unable to manage all resources due to small land holding; contract farming provides them with all the facilities to increase the production and improve the quality of the agricultural produce. Due to the rapid income growth peoples are shifting their consumption habits from traditional and staple grains to high-value and processed food commodities such as meat, fish, dairy, horticultural products and processed foods. In this situation the new concept contract farming in India as well as in Haryana is very useful to both farmers and companies. The companies are obtaining the high-quality agricultural product at pre-agreed prices and under reasonable purchasing conditions by the contracted farmers. On the other hand the contracted farmers

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obtain better quality seeds, all modern input and technical know-how from the companies. Therefore the contract farming plays dual role in agriculture, first it provides technological know-how during cultivation and second it provides assured marketing and price to the farmers.

Table 1: Contribution of different Sector to Gross State Domestic Product in Haryana (in %)

Sectors	1993–1994	1999–2000	2004–2005	2009–2010	2020-21
Agriculture	40.4	32	22.2	18.9	19.1
Industry	26.6	28.4	29.8	28.8	30.0
Services	32.9	39.5	48	52.3	50.9
All	100.0	100.0	100.0	100.0	100.0

Source: Central Statistics Office.

Background of Contract Farming and its farmer impact on Income and Productivity

Many studies which find out that contract farming has increased farmer's income and net returns (Dileep at al. 2002; Kumar 2006; Singh 2004; Kumar and Kumar 2008). The literature shows that the both yields and productivity are high of contracted farming than non-contract farming. Per hectare yield and gross returns of contracted farmers were double than that of non-contracted farmers (Dileep at al. 2002). The average farm value of output per acre was almost double of direct contracted farmers as compare to non-contracted farmers in Punjab, (Kumar 2006). The study by Kumar and Kumar (2008) in Tumkur district of Karnataka has also analyzed the impact of contract farming on farmer's income, which stating that the average farm gross income of contract farmers is 96 per cent high than the non-contracted farmers.

Contract farming has increased the productivity in agriculture sector in all aspects, viz. labour productivity, capital productivity, and land productivity. There are many studies in different states of India which find that contracted farming has increases farm productivity (Dileep et. al. 2002; Kumar 2006; Kumar and Kumar 2008; Singh 2004). There are three keys factors that increase farm productivity: one, contract farming provides better seeds and inputs; second, it provides timely supervision to the farmers; and finally, it helps farmers to diversify from low-value crops to high-value crops.

Contract farming increases the productivity in all aspects, labour productivity, capital productivity and land productivity. The study of Kumar (2006) shows that contract farming has increased the framer's income and land productivity. Per hectare yield and gross returns under contract farming was double than that of non-contract farming. According to Korovkin (1992), in developing countries contract farming played a very important role. In these countries, the size of land holding is very small and farmer income is very low. They cannot afford the expenses of modern techniques at their own risks. Contract farming provides them all these and it enhances the farmer income and farm productivity. A study by Singh 2004, found that the contracted farming in Punjab, the Pepsi project was able to raise the yield of tomatoes from mere 7.5 tons to 20 tons per hectare.

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Contract farming enhances the agricultural productivity and efficiency of poor farmers also by introducing improved farming practices through the provision of inputs, transportation, extension services, and, most importantly, market access. It also brings investments and technical expertise to rural areas, facilitates cross border quality control, contributes to employment, and fosters sustainability. Therefore, it is argued from many studies that the contracted farming is playing an important role in increasing farm productivity significantly. Therefore the present study is to trying to analysis the impact of contract farming on net operated area per acre and potato productivity per acre separately between contracted and non-contracted farmers.

Objectives

1. To analyze the productivity of net operative area per acre between Contract farmers and Non-Contract farmers
2. To analyze the productivity of potato per acre between contract farmers and Non-Contract farmers
3. To find out the factors which are responsible for contract farming
4. To examine and compare the income of Contracted farmers and Non-Contracted farmers

2. Data Source and Methodology

The study is based on primary data and the data is collected through a field survey of two districts Karnal and Kurukshetra for the cropping year of 2012-13. Karnal and Kurukshetra are selected for sample survey because both the districts have similar geographical and climatic conditions. Both the districts are agriculturally advanced and most of the farmers have all the farming equipments. Both districts are laid on National Highway No 1. It is found that the contract farming in Haryana grew only in those districts which are laid on national highway, e.g. Panipat, Sonepat, Karnal, Kurukshetra and Ambala. There could be two main reasons for this trend; first, all the districts are fertile and agriculturally advanced. Second reason has to do with the districts connectivity with National Highway.

Table 2: Sample Size of contract and non-contract farmers for Primary Survey

Categories of farmers	Karnal (1)		Kurukshetra (2)		Aggregate(1+2)	
	Contract	Non-Contract	Contract	Non-Contract	Contract	Non-Contract
Small	6	18	4	11	10	29
Medium	7	20	7	17	14	37
Large	37	55	29	39	66	94
All	50	93	40	67	90	160

Sources: Primary Survey Based

Table 2, provides the basic information of sample households of contract and non-contract farmers of all farm sizes in Karnal and Kurukshetra. It consists of a quantitative household survey of 250 farmers (including 90 Contract and 160 Non-Contract). The household survey consists of questions

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including indicators of household characteristics, farm income, nature and type of contract, term and condition of contract, the facilities provides by company, cost of cultivation and nature of employment.

2.1 Sampling Designing for Contracted Farmers

There are three main companies, M/S DCM Sreeram (DCM), Marino and PapsiCo which are involve in contract farming in potato. But two companies M/S DCM Sreeram (DCM) and Marino are in seed business of potato. The contracted firms preferred to large farmers in both districts because they were well resourceful. Among the three companies, the PapsiCo has covered a large area of Karnal and Kurukshetra therefore PapsiCo is selected for the study. A census survey method is adopted for contract farmers.

A sample of 90 farmers who are involved in contract farming has taken for primary survey. There are 50 farmers from Karnal district and 40 farmers are from Kurukshetra district. The data from both the districts shows that the majority of farmers are large in size (73 per cent) followed by medium (15.5 per cent) and small scale are only 11 per cent (Table 3). The data also shows that the companies gave their preference to medium and large farmers over small. The same trend is found in Punjab too, where the contracted firms give their preference to the medium and large farmers (Kumar 2006). As usually the potato is sown by the medium and large farmers because cultivation cost of potato is high and small farmers cannot afford its cost. The company is ignored the small farmers.

The main reason to ignore the small farmers by the contract farming companies is that the small farmers having of lack in resources needed for cultivation and credits facilities. Small farmers are generally short of capital and unable to make required investments in land improvement and modern inputs (RCDC 2011[1]). The cultivation cost of potato is comparatively higher than the traditional crops. Its average cultivation cost of potato is approximately Rs. 35000 to 45000 per acre, which small farmer cannot bear. In addition, the medium and large farmers are able to change their cropping pattern as per the market demand while small farmers find it difficult to change their cropping pattern. Secondly the companies are not interested in contract with small farmers because the cultivation of potato needs modern sophisticated equipments and those equipments are costly which small farmers cannot afford.

Table 3: Category of farmers under contract farming

Categories of farmers	Karnal (1)		Kurukshetra (2)		Aggregate (1+2)	
	No	%	No	%	No	(%)
Small	6	12	4	10	10	11.1
Medium	7	14	7	17.5	14	15.5
Large	37	74	29	72.5	66	73.3
All	50	100	40	100	90	100

Sources: Primary Survey Based

[1] Contract farming in Odisha 2011

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2.2 Factors influencing the participation into Contract Farming

Contract farming is useful both for farmers and companies. Companies may obtain the necessary high-quality agricultural produce at certain prices and under reasonable purchasing conditions. In the case of farmers, it provides good seeds, inputs, technological know-how and assured market price. Contract farmers could solve many of the problems involved in contract arrangements by establishing organizations to undertake cooperative bargaining on their behalf (Rehber 2004). In this aspect there are many factors that attract farmers to adopt contract farming. To identify the factors which influence the farmers to enter into contract farming, a logit model is used. When the dependent variable is a 0-1 binary variable, the logit model estimation methods can be used. The logit model has the following functional form (Greene 1993; Gujarati 1995; Ramanathan 1995)

The Logit Regression Function

$$Pi = E(Y = 1/Xi) = 1/1+e^{-(zi)}$$

Where $Z_i=\beta 1 +\beta 2\ Xi.$

Explanatory variables are

X^1 = Age of households (in number of years)

X^2 = Education of households (in number of years)

X^3 = Family Members (in No.)

X^4= Net operated area (in acres)

X^5= Market Distance (in Km.)

X^4 = Dummy road connectivity (if the farm has road connectivity then 1, otherwise = 0)

Tractor = (in No.)

Pi = Probability of farmer of participating in contract farming

In the logit model, for the dependent variable (Y), if the farmers are under contract farming, the dependent variable takes the value 1, otherwise 0. Xi is a vector of explanatory variables of the contracted farmers and β is the vector of estimated coefficients. Positive coefficients increase the probability that a farmer increases his/ her participation in contract farming. For the logit model, the most suitable estimation technique is maximum likelihood, where the maximum likelihood coefficient is consistent and asymptotically normally distributed (Bierens 2004). The function guarantees that the probabilities will fall within the (0, 1) range. The logit model includes household's characteristic such as age, education, net operated area and tractor and farm characteristics such as road connectivity and market distance.

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3. RESULTS AND DISCUSSION

3.1 Determinants of Contract Farming

We know that contract farming is not only marketing chain but it is also a tool of technical know-how for the farmers. This chain is beneficial to both, company as well as farmers. Therefore there are many factors which affect the farmers to adopt these new agricultural arrangements. The results of the logit model are shown in Table: 3.1. The likelihood ratio test indicates that the model is statistically significant. Three variables in this model are statistically significant at 1 per cent.

The results of the logit estimation indicate that all the variables have positive relationship with dependent variable except age and market distance. Age and market distance having negative relationship with contract farmers. It indicates that young farmers relatively having more probability to adopt the concept of contract farming as compared to old farmers. Many studies find the same trends that the age of head of the household has a significantly negative effect, such as Simmons et al. (2005) and Bellemare (2015). Education level has a positively significant impact on contract farming, which indicts that the higher level of education of farmers are more likely to involve in contract farming.

Market distance has significantly negative relationship with contract farming, which shows that when market distance is increasing the tendency of contract farming significantly decreases. Level of education of households and road connectivity has statistically significantly positive relationship with participation into contract farming. The results indicate that the higher educated farmers are more adopt the new concept of contract farming as compared to low educated farmers. There are many studies which find the same trends that the education level of the head of the household has significantly positive effect (Zhu and Wang 2007 and Hu 2012).

Table: 3.1 Factor influencing the Contract Farming: Logit Model Estimates

Dependent Variables CF = 1 other = 0			
LR chi2(11)	122.53		
Pseudo R2	**0.37*** **		
Prob > chi2	00		
Log likelihood	-102.08		
Number of obs	250		
	Coefficient	**Std. error**	**z-statistic**
Age	-0.015	0.021	-0.73
Education	0.105**	0.057	1.88
Family Member (in no.)	0.063	0.115	0.55
Net Operated Area	0.005	0.013	0.46
No of Tractors	0.241	0.447	0.54
Market Distance	-0.537***	0.086	-6.26
Road Connectivity	1.674***	0.494	3.39
Constant	2.07	1.490	1.39

Source: Based on Primary Survey; Significance levels: *** = 1, ** = 5, and * = 10 %.

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Net operated area show the positive relationship with contract farming, which shows that when farm size increases there is more probability to adopt contract farming. Large farmers prefer to adopt contract farming as compare to small farmers. There are many studies which shows the same relationship between farm size and contract farming,(Zhu and Wang (2007), Wang et al. (2011), Bellemare (2012), Freguin-Gresh (2012).

4.1 Contract farming and Productivity

Productivity per acre of land of net operated among all farm sizes is higher of contract farmers. The productivity per acre of net operated area is Rs. 98703, Rs. 97638 and Rs. 93024 of small, medium and large farmers respectively of contract farmers; while it is Rs.87840, Rs.83036 and Rs.80731 of small farmers, medium farmers and large respectively of non-contract farmers. The average farm productivity per acre of net operated area of contract farmers is Rs 93998 whereas it is Rs. 81495 of non-contracted farmers. An average there is 12.4 per cent, 17.6 per cent and 15.2 per cent of higher productivity of small, medium and large farmers respectively of contracted farmers than that of non-contracted farmers. The average net operated area per acre productivity is 15.3 per cent higher of contracted farmers than that of non-contracted farmers (Table: 4.1). The results are consistent with the finding of Dileep et al. 2002; Kumar, 2006; Ramswami et al. 2005; Chang et al. 2006.

Table: 4.1 Productivity of Contracted and Non-Contracted Farmers Per Acre of Net operated Area (in Rs)

Farm Size	Contracted	Non-Contracted	Higher Productivity over Non-Contracted	Higher Productivity over Non-Contracted (in %)
Small	98703	87840	10863	12.4
Medium	97638	83036	14602	17.6
Large	93024	80731	12293	15.2
Aggregate	93998	81495	12503	15.3

Source: Based on Primary Survey.

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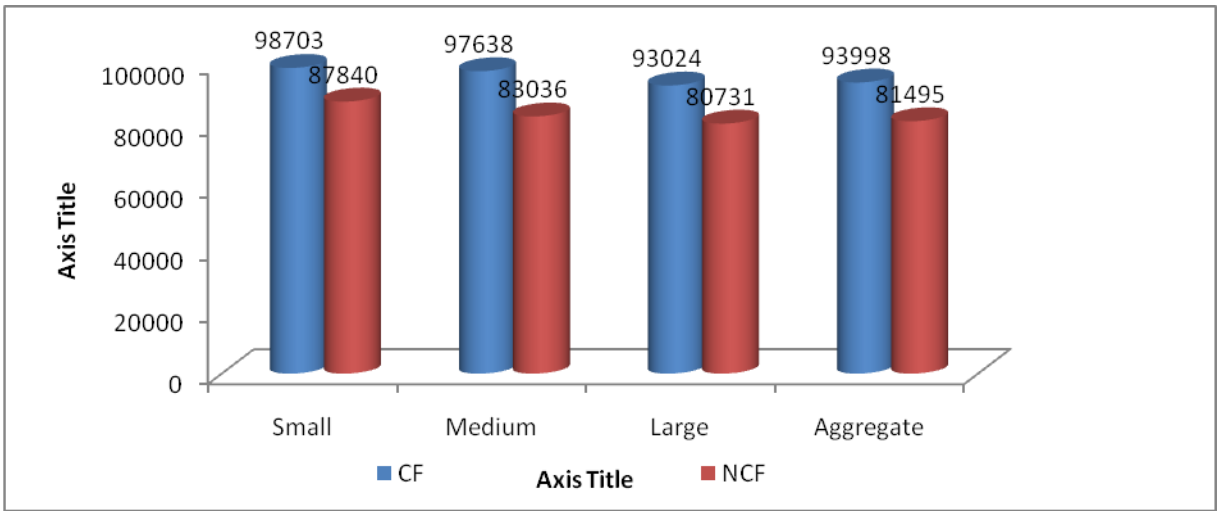
Figure: 4.1 Productivity of Contracted and Non-Contracted Farmers per Acre of Net operated Area (in Rs)



Source: Based on Primary Survey.

4.2 Productivity of Potato a contracted crop

It is observed from the field survey that contract farming has very positive impact on productivity. It provides better seed and timely suggestion by the expert supervisor and comparatively higher price for potato enhance the productivity. Table: 4.2, depicts potato productivity per acre of contracted and non-contracted. The productivity of potato per acre in value term is high in contract farming of all farm size. The average value of output of potato per acre is 23.4 percent higher in case of contract farmers (Rs 80446) as compared to non-contracted farmers (Rs 61599). There is no doubt that the contract farming increase the small farmer's productivity also.

The study also shows that the productivity of small farmer is Rs.83076 and Rs. 66964 of contracted and non-contracted respectively; which is 19.4 per cent higher than that of non-contracted. The productivity per acre is measured as Rs.82651 on medium contracted farmers while it is Rs. 64683 on non-contracted medium farmers. The productivity of medium contracted farmers is (Rs. 17968) 21.7 per cent higher as compared to non-contracted medium farmers. The productivity of per acre of potato of large farmer is Rs 80265 under contract while it is Rs 61200 in case of non-contract farmers which are (Rs.19065) 23.8 percent high than the non-contract farmer. The statistical result shows that the productivity is higher under contract farming of all size of farmers. There are many studies such as, Dileep et al., 2002; Kumar 2006, Tripathi et al. 2005, find high productivity of contracted farmers as compare to non-contracted farmers.

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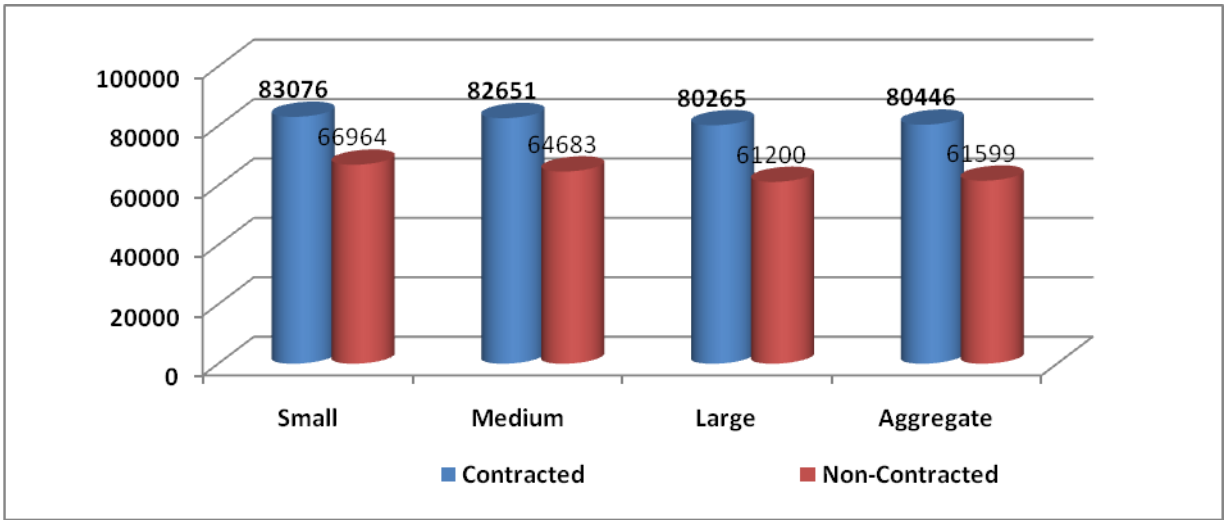
Table 4.2 Productivity of Potato of Contracted and Non-Contracted Farmers Per Acre (in Rs)

Farm Size	Contracted	Non-Contracted	Higher Productivity over Non-Contracted	Higher Productivity over Non-Contracted (in %)
Small	83076	66964	16112	19.4
Medium	82651	64683	17968	21.7
Large	80265	61200	19065	23.8
Aggregate	80446	61599	18847	23.4

Source: Based on Primary Survey.

Figure 4.2 Productivity of Potato of Contract and Non-Contract Farmers Per Acre (in Rs)



Source: Based on Primary Survey.

5. Contract farming and Farmers Income

This section of the study compares the farm income between contract and noncontract farmers. There are many studies which found out that contract farming has increased the farm income (Kumar, 2006; Kumar and Kumar, 2008; Nagraj at al, 2008). There are two aspects of farmer's income; one farm income and second farm business income. Farm income is the gross income from all the crop and net income from leased-in and leased-out of land while farm business income measure the net farm income of the farmers.

Farm Business Income (FBY) is the gross output minus total cost C2. Table 5.1, depicts the farm income, total cost, family labour cost and net farm business income between contract and non-contract farmers. It reveals that the gross farm income is higher on contract (Rs.3056136) than non-contract farmers (Rs 1465943) by about 108 per cent. The gross farm income (GFY) of per household of contract is higher across all size of farms. Even there is a controversial in the literature

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that contract farming improves the large farmer's income and it avoids the small farmers. But in the present study it is found that the contract farming enhances small farmer's income also.

Table 5.1 Gross farm Income and farm business Income of contract and Non-Contract Farmers (Rs.)

Contract				
	Small	Medium	Large	Aggregate
Gross Farm Income (GFY)	455130	753207	4287434	3056136
Farm Business Income (FBI)	59078	98311	854224	606025
Non- Contract				
	Small	Medium	Large	Aggregate
Gross Farm Income (GFY)	304606	680895	1971207	1465943
Farm Business Income (FBI)	33364	82875	306254	219002
Higher Income over Non- Contract (in %)				
Gross Farm Income (GFY)	49.4	10.6	117.5	108.5
Farm Business Income (FBI)	77.1	18.6	178.9	176.7

Source: Based on Primary Survey.

Gross Farm Income (GFY) of small contract farmers is higher (Rs.455130) than non-contract farmers (Rs.304606) by about 49.4 per cent. Table 5.1 shows that the farm business income of per household of contract is also higher than that of non-contract farmers. The farm business income of per households is higher of contract (Rs.606025) than non-contract farmers (Rs.219002) farms, which is 176 per cent higher of contract than that of non-contract farmers. The farm business income is higher of all the farm size, but it is highest of large farmers. The main reason is large contract farmers have almost double net operated area as compared to large non-contract farmers. The study shows that the contract farming enhances the small farmer's income also. The results are consistent with the finding of Kumar and Kumar (2008) Nagraj at al. (2008)

6. Conclusions and Findings

While, summarizing the results of the logit estimation shows that all the variables have positive relationship with dependent variable except age and market distance. Age and market distance having negative relationship with contract farmers; which indicates that young farmers relatively having more probability to adopt the concept of contract farming as compared to old farmers. Education level has a positively significant effect on contract farming, which indicates that farmers with higher level of education level are more likely to involve in this new agricultural marketing arrangement of contract farming. Market distance has negative relationship with contract farming, which shows that when market distance is increasing the tendency of contract farming significantly decreases.

The productivity is higher in both aspects such as net operated area per acre and productivity of potato as a contracted crop. The study also indicates that contract farming has played an important

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role in enhancing the productivity and income of farmers. The study also find out that the productivity per acre of land of net operated among all farm sizes is higher of contracted farmers as compare to non-contracted farmers. The productivity per acre of net operated area is Rs. 98703, Rs. 97638 and Rs. 93024 of small, medium and large farmers respectively of contract farmers; while it is Rs.87840, Rs.83036 and Rs.80731 of small, medium and large respectively of non-contract farmers.

The average productivity per acre of net operated area of contract farmers is Rs 93998 whereas it is Rs. 81495 of non-contract farmers. An average there is 12.4 per cent, 17.6 per cent and 15.2 per cent of higher productivity of small, medium and large farmers respectively of contract farmers than that of non-contract farmers. The average net operated area per acre productivity is 15.3 per cent higher of contract farmers than that of non-contract farmers. Productivity of potato per acre is Rs. 80446 and Rs. 61599 of contracted and non-contracted farmers respectively which is 23.4 per cent higher of contracted farmers. It is found that there are two reasons behind it, one contract firm provides higher price of the contracted crops to the farmers and second it helps farmers for better quality of produce.

Contract farming is helpful in enhancing farm income also. The farm income of contract farmers is higher for all categories as compared to non-contract farmers. Farm Business Income (FBY) is the gross output minus total cost C2. It is found that the gross farm income is higher on contract (Rs.3056136) than non-contract farmers (Rs 1465943) by about 108 per cent. The gross farm income (GFY) of per household of contract is higher across all size of farms. Even there is a controversial in the literature that contract farming improves the large farmer's income and it avoids the small farmers. However the contract farming has increased the farmers income all size of land but the participation of small farmers in contract farming is very low.

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