AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF VEGETABLES UNDER CONTRACT FARMING IN PUNJAB

Thesis submitted to the Central University of Punjab

For the award of

Doctor of Philosophy

In

Development Economics

By

Pavneet

Supervisor

Dr. Naresh Singla

Centre for Economic Studies

School of Social Sciences

Central University of Punjab, Bathinda

September, 2017

CERTIFICATE

I declare that the thesis entitled “AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF VEGETABLES UNDER CONTRACT FARMING IN PUNJAB” has been prepared by me under the guidance of Dr. Naresh Singla, Assistant Professor, Centre for Economic Studies, School of Social Sciences, Central University of Punjab. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

Pavneet

Centre for Economic Studies,

School of Social Sciences,

Central University of Punjab, Bathinda- 151001.

Date:

CERTIFICATE

I certify that PAVNEET has prepared her thesis entitled “AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF VEGETABLES UNDER CONTRACT FARMING IN PUNJAB”, for the award of Ph.D. degree of the Central University of Punjab, under my guidance. She has carried out this work at the Centre for Economic Studies, School of Social Sciences, Central University of Punjab.

Dr. Naresh Singla

Centre for Economic Studies,

School of Social Sciences,

Central University of Punjab, Bathinda- 151001.

Date:

ACKNOWLEDGEMENT

I bow with reverence and gratitude to thank "*Waheguru"* for giving me an opportunity to commence this work and strength to successfully complete it.

I express my deep sense of gratitude to my esteemed teacher and supervisor, Dr. Naresh Singla, Assistant Professor, Centre for Economic Studies, Central University of Punjab, Bathinda for his valuable suggestion, masterly guidance and healthy criticism that has brought this manuscript to see the light of the day. I appreciate all his contributions of time and ideas to make my Ph.D. experience productive.

I would like to express my sincere thanks to Prof. Sukhpal Singh, Indian Institute of Management, Ahmedabad for providing me round the clock guidance about my Ph.D. thesis.

I am also grateful for the good advice and valuable suggestions by Prof. (Dr.) P. Ramarao, Dean Academic Affairs, Central University of Punjab, Bathinda. My sincere thanks to all the faculty members of the Centre for Economic Studies, for their indispensable support.

I would like to acknowledge my debt to Mr. Amrik Buttar, General Manager of Rana Sugars Limited, Mr. Beant Singh, Field Manager of PepsiCo and farmers who were extremely kind to offer their assistance in the collection of field data.

I have no words to acknowledge the contribution of my father S. Gurbinder Singh, who has been a constant source of encouragement. I could never have completed my work without the moral support of my mother Gurpinder Kaur and brother Nimrat Jot Singh. Special thanks to my uncle Prof. Baldev Singh Dhaliwal, who has motivated me to start this project.

Pavneet

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES, PHOTOS AND MAP

LIST OF APPENDICES

LIST OF ABBREVIATIONS

Sr. No.	Full Form	Abbreviation
1.	Asia, Middle East and Africa	AMEA
2.	Agricultural Produce Marketing Committee	APMC
3.	Contract Farming Commission	CFC
4.	Constant Returns to Scale	CRS
5.	Data Envelopment Analysis Programme	DEAP
6.	Food Corporation of India	FCI
7.	Fruits and Vegetables	F&Vs
8.	Gross Cropped Area	GCA
9.	Gross State Domestic Product	GSDP
10.	Hindustan Lever Limited	HLL
11.	Industrial Development Bank of India	IDBI
12.	Multi-National Corporation	MNC
13.	Minimum Support Price	MSP
14.	Non Governmental Organisation	NGO
15.	Non-Resident Indian	NRI
16.	Overall Technical Efficiency	OTE
17.	Punjab Agro Food grains Corporation	PAFC
18.	Punjab Agricultural University	PAU
19.	Pure Technical Efficiency	PTE
20.	Rana Sugars Limited	RSL
21.	Scale Efficiency	SE
22.	Simpson Index of Diversification	SID
23.	Variable Returns to Scale	VRS
24.	Technical Efficiency	TE

CHAPTER 1
INTRODUCTION

1.1 Role of Punjab's Agriculture in Indian Economy

Notwithstanding, the rapid decline in share of agriculture and allied sector in Gross State Domestic Product (GSDP) in Punjab, the sector continues to be a leading employment generator as about 61 per cent of the rural population is directly and indirectly dependent on it for their livelihoods. Punjab was one of the pioneer states in green revolution launched during mid-sixties with the help of high yielding varieties of seeds coupled with intensive application of fertilizers, pesticides and intensive usage of farm machinery, which made the country surplus in food-grain production from being food deficient. The state still plays a major role towards the production of food-grains in Indian basket. Punjab produces about 11 per cent of the total food-grains produced in India (GoI, 2015). The state is still engaged in ensuring food security of the nation as it contributes 41.5 per cent of wheat and 24.2 per cent of rice to central pool (GoP, 2015-16). It also accounts for 18 per cent of wheat, 11 per cent of rice, 75 per cent of *kinnows* and oranges and 10 per cent of cotton produced in India, despite the fact that it comprises only 1.53 per cent of the total geographical area of the nation (GoP, 2013-14). The state also possesses highest yield in crops like- paddy (39.5 quintals/hectare), wheat (50.2 quintals/hectare) and cotton (7.50 quintals/hectare) in India (GoP, 2015). In allied agricultural sectors such as dairying, Punjab produces about 7 per cent of the total milk produced in India (GoI, 2015).

1.2 Crises in Punjab's Economy

The Punjab's model of agricultural development is always considered as closely related with the green revolution and its development process is contemplated as the best suitable path for increasing productivity of major crops in the other parts of the country. But, this impression of development has not remained true after 1980's (Chand, 1999). During 1980's, green revolution started to show signs of deceleration in growth due to stagnation in yield level of major food-grain crops accompanied by increase in cost of cultivation and thus, agrarian crisis penetrated deep into Punjab's agriculture (Singh, 2007). The share of agriculture and allied sectors in the Punjab's state gross domestic product has decreased from 47.87

per cent in 1980-81 to about 21 per cent in 2015-16 (Singh, 2008; NABARD, 2015-16). Since the introduction of high yielding varieties, the monoculture of wheat and paddy crop rotation has altered the cropping pattern resulting in serious economic and ecological problems such as deceleration in productivity growth, overexploitation of groundwater resources and decline in soil fertility (Singh and Sidhu, 2004). The extreme form of the agrarian crises is now manifested in the form of farmer suicides. Thus, Punjab's agrarian model of development which was earlier recommended to be replicated in other states is now studied from the various perspectives of agrarian crises.

1.3 Horticulture Scenario in Punjab vis-à-vis India

The policy makers argue that in order to revive the agrarian economy of the Punjab, there is need to shift towards the demand driven horticultural crops from the supply driven traditional crops such as wheat and paddy (Gulati *et al*., 2009). Such horticultural crops not only provide the additional employment opportunities, but also provide the regular flow of the income. Horticulture sector is contributing around 10 per cent of GSDP out of total contribution of crop husbandry in state's GSDP. Besides, these crops also have huge export potential. India is the second largest producer of fruits and vegetables (F&Vs) next to China (GoI, 2016). The total production of F&Vs in India is 86.28 million tonnes and 167.06 million tonnes from an area of 6.24 million hectare and 9.49 million hectare respectively in 2014-15. India has 5.05 per cent of gross cropped area (GCA) under F&Vs in 2012-13 (GoI, 2015). Punjab produces 1.74 million tonnes and 4.05 million tonnes of F&Vs from an area of 0.08 million hectare and 0.20 million hectare respectively (GoI, 2016). Thus, the contribution of Punjab in production of F&Vs in India stands at 2.28 per cent only. This is in sharp contrast to the contribution of food-grains in India, which stands at 10.87 per cent (GoI, 2015). However, there exist great potential in Punjab for the production of the F&Vs. It is evident from the fact that productivity of many F&Vs is of very high order as compared to that at India level (Table 1.1).

Table 1.1
Productivity of Fruits and Vegetables (in metric tonnes/ha)

Fruits and Vegetables	Punjab	India
Citrus	20.7	10.3
Mosambi	8.0	11.6
Mango	16.05	8.35
Orange	21.6	10.4
Guava	22.0	13.7
Litchi	15.1	7.0
Peas	10.50	9.43
Onion	19.65	16.03
Potato	25.39	21.79
Tomato	24.59	21.99

Source: GoI, 2014; GoI, 2016

Horticultural commodities are susceptible to both production and price risks and the lack of risk-mitigating measures such as crop insurance and uncertain market situations further compound these risks. Since 1948, only government bodies have been controlling the F&Vs trade under market regulation Act in India. The traditional marketing of F&Vs is quite complex and risky phenomenon in India as there is high transaction cost due to small marketable surplus, lack of transparency in pricing policy, lack of infrastructure for grading, non-availability of cold chain, poor linkages within marketing channel and thin and fragmented markets as compared to food-grains that results into massive post-harvest losses and quality deterioration (Gandhi and Namboodiri, n.d.; Mittal, 2007; Grover *et al.*, 2012; Singla, 2012). The chain of intermediaries in the marketing of F&Vs is long and leads to very small fraction of every rupee of profit to the farmer (Pingali and Khwaja, 2004). Further, minimum support prices (MSP)and regulated markets for paddy and wheat acts as a major deterrent for farmers to shift from traditional cereal crops to high value crops (Joshi *et al*., 2006; Gulati *et al*., 2009). Thus, farmers will shift their cropping pattern in favour of high value crops only if they realize assured price and market for their produce. Realizing these problems in traditional F&V markets, a model Agricultural Produce Market Committee (APMC) Act was first circulated to states during 2003 for contract farming agreement.

Though 20 states have amended the legislation, only 12 have so far notified rules for its implementation. Though Punjab has enacted a separate law i.e. 'Punjab Contract Farming Act, 2013', yet, the government has not implemented it (GoI, 2016; GoI, 2017). Thus, the governments have realized the need to create separate markets for perishable produce. In this context, the alternative institutional arrangements such as contract farming can play a vital role to minimize production and market constraints through the provision of financial and technical assistance along with quality inputs associated with high value crops (Da Silva, 2005; Chand and Singh, 2016).

1.4 Concept of Contract Farming

Contract farming is an arrangement between farmers and agro-processing and/or marketing or exporting firm for the production and marketing of agricultural produce under advance agreement, the essence of such agreement is to timely purchase the pre-determined quantity and quality from the farmer at pre-determined price (Eaton and Shepherd, 2001; Singh, 2002; Bellemare, 2012; Sharma, 2016). The terms of contract vary from crop to crop and region to region. It specifies about the quantity to be procured, price, inputs, technical guidance and credit facility to the farmer. It can also be described as a midway between independent farm production and corporate farming (Singh, 2005). Under contract farming buyer has a substantial control over the raw material production without any landownership. In contract arrangements there is an organized connection between product and factor markets as the contracting firms require definite quality of product and for it there is requirement of specific inputs (Singh, 2002). Virtually, every commodity such as crops, livestock, aquaculture and forestry can be produced under contract farming for industrial raw material as well as for human and animal consumption (UNIDROIT, 2014).

Contracting firms are relatively large processors, exporters or supermarket chains; rarely small-scale traders or even wholesalers execute pre-planned contracts with the farmers. As to start contract farming operation, firms have to create a network of trained field agronomists who guides the farmers about crop operations along with monitoring compliance and organizing the collection of harvest. Due to large fixed cost associated with contracting only large firms have a bigger incentive to

ensure a steady supply of raw materials, availability of credit and greater capacity to absorb risk associated with offering a fixed price (Minot and Ronchi, 2014).

In many developing countries, contract farming is playing an increasingly important role and there has been long debate about its impacts in these countries. Critics of contract farming believe that firms use contracts to transfer production risk to farmers. For others, contract farming is a way for small farmers to involve into growing markets for processed foods in domestic and foreign markets (Narayanan, 2013). The government of India's national policy on agriculture has also assigned a key role to the private sector through promotion of contract farming. Contracting is perceived as the risk distribution measure between the farmer and the buyer, where farmer takes on the risk associated with agricultural production and buyer bears the risk of marketing and distribution (Rangi and Sidhu, 2007; Singh, 2007). So, there is considerable interdependence between the two parties and the transfer of risk is not always equitable. Thus, basic purpose of adoption of such a policy is to provide a proper linkage between the farm and the market by giving farmer an assured price and procuring the farm produce on the one hand and insuring timely and adequate input supply to the agro-based and food industry on the other.

1.5 Rationale of Contract Farming

Need for emerging agricultural marketing practices such as contract farming has its beginning in the demand and supply disequilibrium that agriculture faces, where farmers have to dump their produce for the want of buyers on the one hand and agro-based industries face difficulties in procuring quality raw material on the other (Dhillon and Singh, 2006). Further, agri-business companies in India can not own and cultivate land for their raw material requirements due to Ceiling on Land Holding Act (Singh, 2005). Thus, the agri-business firms have only option to procure their specific quality-quantity raw materials from the farmers is contract farming. Further, contracting with small farmers gives positive image to the company as it may work for the betterment of farmers and helps it to qualify for funding (Baumann, 2000). Thus, the contract farming can be considered as a way out to accomplish the demands of both the farmers and the companies.

Contract farming in the context of Punjab is seen as one of the ways to abate agrarian crises as it may enable the producers to maximize their profits by reducing costs. Thus, the prevalence of contract farming in Punjab is associated with the profit maximizing and cost reducing factor in the deep penetrated agrarian economy. Consequently, contract farming is not only considered as a solution for abating state's agrarian crisis, but also a way-out to consumer's diversifying diets. With the advent of liberalization reforms in 1990s, the food demand structure of India has been shifted away from cereals towards high value products and processed food. The share of high value food products in food expenditure has increased from 30.4 per cent to 57.14 per cent in rural areas and from 45.4 per cent to 64.94 per cent in urban areas over the period of 1983 to 2011-12 (GoI, 2014a; Birthal, n.d.). These changes take place due to increase in female work participation rate, higher disposable income, urbanization and increasing awareness about product safety standards (Pingali and Khwaja, 2004; World Bank, 2008; Grover *et al*., 2014; Sharma, 2016). Moreover, due to rapidly change in consumer's taste preferences especially regarding the timing of production and marketing of crops gave an enumerative stimulus for the synchronization of production, processing and distribution (Singh, 2005). These dramatic transformations in the lifestyle of India have also created a space for agri-business.

1.6 Practice of Contract Farming

Due to diverse nature of contract farming, there is possibility of diverse outcomes even when crops under contract are same and similar contracting conditions. Key and Runsten (1999) argue that firms can choose to contract for different reasons and their motivations will reflect in the type of contract adoption. Different contract models are available to farmers and agri-business firms according to the number of parties involved, sharing of the risks, specification of contractual terms, etc. (Singh, 2007; Sharma, 2008).

From the production decisions point of view, there exist two types of contracts:

i. **Limited management contracts**: There is not any real guarantee for the price. The farmer enters into contract agreement to get some inputs.

ii. **Full management contracts**: The farmer has to follow conditions specified under the contract and in turn, the farmer gets guaranteed market for his produce (Rehber, 2007).

The conventional approach classifies the contracts into market specification, resource providing and production management (Key and Runsten, 1999; Rehber, 2007; Bijman, 2008; Will, 2013; Sharma, 2014).

i. **Market specification contracts**: These contracts are pre-harvest agreements that connect the firm and the farmer to a particular set of conditions governing the sale of the crop. These conditions often specify about price, quality and timing of the delivery of produce. The farmers have right on most of the decisions related to farming activities and farm assets.
ii. **Resource providing contract**: In this type, some of the inputs are provided by the firm with certain conditions along with managerial help and supervision. Price of farm produce is generally based on spot markets.
iii. **Production management contracts**: A firm holds a complete control over the production as the farmer are bond to follow particular production method or input regime usually in exchange for a marketing agreement or resource provision.

Singh (2007) has classified contracts into three types on the basis of firm's objectives:

i. **Procurement contracts**: In this type of contract, only sale and purchase conditions are specified.
ii. **Partial contracts**: Some of the inputs are provided by contracting firm and produce is procured at pre-agreed price.
iii. **Total contracts**: This type of contract exist when a contracting firm supplies and manages all the inputs on the farm and the farmer becomes just a supplier of land and labour.

Contract farming usually follows one of the five broad models; depending on product, resources of the sponsor and intensity of the relationship between the farmers and the sponsor (Eaton and Shepherd, 2001).

i. **Centralized model:** It is often called outgrower scheme. This is a vertically coordinated model, where the sponsor purchases the crop from large number of small farmers and markets the produce after processing or

packaging. Such models are generally associated with tree crops, annual crops, poultry and dairy.

ii. **Nucleus estate model:** This model is a variant of centralized model where sponsor also manages plantation. A core estate and company is established and the farmers in the surrounding area grow crops on a part of their own land that they sell to the company for processing. Nucleus estate model is often used in Indonesia and Papua New Guinea for oil palm and other crops (Singh, M.P. 2007).

iii. **Multipartite model:** In case of multipartite model, statutory bodies and private companies jointly participates with the farmers. This type of model can have separate organizations for the responsibility of credit provision, production, processing and marketing (Rehber, 2007).

iv. **Informal model:** The model includes simple and informal contracts between individual entrepreneurs or small companies on a seasonal basis particularly for fresh F &Vs.

v. **Intermediary model:** There exist individual collectors or farmer committees between the farmers and the companies. In this type of model, there is not any direct linkage between the sponsor and the farmer. In Indonesia, this model is practiced and is termed as plasma.

Another classification of the contract farming models is based on the number of parties involved. These models are bi-partite, tri-partite, quad-partite and five-partite (Singh, 2005a).

i. **Bi-partite model**: It involves only two parties- the firm and the farmers.

ii. **Tri-partite model**: In this model, besides the firm and the farmers, a third party- bank is involved for credit facility to the farmers. The payment of the produce to the farmers is also facilitated through the bank.

iii. **Quad-partite model**: Under this model, a fourth party viz. agri-input supplier is involved to provide seeds to the farmers, payment of which is facilitated by the banks. These payments are deducted by the banks from the payments of output.

iv. **Five-partite model**: Under this model, along with firm, farmer, bank and agri-input company, local *arthiya*/commission agent/input dealer as a franchisee is also involved as an agri-facilitator.

Another set of contract farming models are distinguished on the basis of the role of the government. Several companies have practiced this model in Punjab.

i. **Direct contract farming**: The companies had a direct contract with the farmers without any involvement of government agencies. The companies are responsible for providing extension services and procuring the farm produce directly.

ii. **Indirect contract farming**: The government plays a significant role in enforcement of contractual arrangement. In Punjab, companies operated through the intervention of Punjab Agro Foodgrains Corporation (PAFC) come under this model. The contract in most of the cases was written but without any legal obligations both on the part of the companies as well as the farmers. Most of the firms provide seeds to the farmers at a market price and in some cases the companies also provide necessary machinery either at nominal charges or free of cost (Kumar, 2006).

1.7 Research Gap

Several studies (Kumar, 2006; Singh, 2007; Singh, 2009; Sharma, 2016) especially in the context of Punjab have analysed the problems and prospects of contract farming. Though the studies have examined the procurement operations of the contract farming companies, but still some of the important aspects of the procurement such as quality and quantity norms, rejection rate, transportation cost, etc. and how the procurement procedure of the firms differs in case of existence and non-existence of open market for high value crops are not covered at large. There exist much diversity among contracting firms about the procurement operations and linkage building with the farmers as the contracting practice differs from crop to crop. Recently, some of the domestic firms in Punjab have introduced new crops through the contract farming. No specific attempt has been made in the earlier studies in the context of new crops. Most of the earlier studies largely focused on single potato crop. Thus, an attempt has been made to explore the contract farming potential of the new crops introduced by some of the new contract farming companies besides exploring the efficiency of production, diversification potential of the crops and factors influencing farmer's participation which is not covered in the earlier studies at all. Further, no attempt has been made to study the impact of contract farming in vegetable production on the farm

income using econometric techniques in Punjab and furthermore, its effect on employment in rural economy. No study has tried to find the role of contract farming in diversification in the context of Punjab, which is facing severe agrarian crisis. Besides, the study will also examine the technical efficiency in the production of vegetables under contract farming, which will help to further maximize output with a given set of inputs. Finally, if contract farming has a pro-poor impact in the state, the study will attempt to justify such programmes on equity grounds as there have been no studies relating to this aspect in Punjab's agrarian economy.

1.8 Research Questions

1) What are the procurement strategies adopted by the contracting firms?
2) Do the procurement operations differ across companies for the newly contracted crops?
3) Are the companies covering production and marketing risks of the produce contracted by the company?
4) What are the criteria adopted for selecting the area and the farmers by the contracting firms?
5) What are the socio-economic characteristics of farmers who participate in the contract farming?
6) How does the production costs and returns differ among contracting and non-contracting farmers for same/alternative crops?
7) Does contract farming raise the income of participating farmers?
8) What is the degree of small farmers' participation in contract farming schemes?
9) What compels the exclusion and inclusion of the farmers in contract?
10) What are the major constraints faced by the farmers in linking with the contracting firms?
11) Is there any difference in the cropping pattern among contract and non-contract farmers?
12) What is the labour absorption capacity of contract crops?
13) Is there any role of contract farming in farm diversification?

1.9 Objectives of the Study

1) To examine nature of contracts and procurement operations of the contract farming firms.
2) To compare socio-economic characteristics of the contract and non-contract farmers.
3) To analyse costs and returns among contract and non-contract farmers for the same/alternative crops.
4) To examine factors determining the farmer's participation in contract farming.
5) To analyse role of contract farming in farm diversification and employment.
6) To examine technical efficiency in crop production across contractand non-contract farmers.
7) To study the perceptions of the farmers and the firms regarding the practice of contract farming system; and
8) To suggest suitable policy measures to revive the state's agrarian economy in the presence of contract farming.

1.10 Hypotheses

Based on the issues identified, the study makes the following presumptions:

1) Contract farming firms exclude small and marginal farmers and work with the large farmers due to the diseconomies of scale associated with the small and marginal farmers.
2) Contract farming creates socio-economic differentiation among farmers due to selectivity biasedness.
3) Firms avoid making formal contracts with farmers to avoid production risk.
4) The contract farmers are more efficient in the production of crops than the non-contract farmers as they grow contracted crops under the supervision of the company.
5) Farmers are not willing to shift towards contract crops since traditional crops are more remunerative and have assured government supported price mechanism in comparison to the contracted crops.
6) Labour absorption capacity in farm operations of vegetables under contract is more as compared to traditional crops.

1.11 Scope of the Study

Since the agrarian economy of Punjab is facing crises in the form of declining income, declining water table in central region, water logging in south western region and indebtedness due to monoculture of cropping pattern, thus the policy makers are looking at some of the alternatives to revive the economy. Horticultural crops are usually considered as substitute for the traditional crops grown in the state. But, lack of assured price and market act as a major deterrent for the farmers to shift towards the perishable crops. In this regard, the practice of contract farming is looked as an alternative to enhance the income of the farmers, shift away from traditional crops and creating new markets for the producers, as various provisions under contract aim at reducing production and market risks for both the farmers and the companies. Therefore, the study in this context will explore emerging models of linking with the farmers adopted by the domestic and international firms. The study has implications for both small and marginal farmers and agricultural labourers, who are the worst sufferers due to the ongoing agrarian crisis. Thus, the study will not only expand the extant literature, but it will also help the policy makers to design model for the diversification mechanism in the presence of contract farming.

1.12 Organisation of the Thesis

Chapter 1 introduces the theme of the study. It brings out the relevance and objectives of the study to be examined. Chapter 2 discusses about the theoretical and empirical perspectives of contract farming existing in literature. The chapter is divided into key themes to explain the analytical studies relevant to each theme. Chapter 3 enumerates the data sources and methodology used in the study. It also elaborates various techniques used to analyse the data. Chapter 4 examines the nature of contract between the firms and the farmers and analyses procurement operations of the firms and strategies of the firms for choosing the area and the farmers. Chapter 5 discusses the socio-economic characteristics of contract and non-contract farmers. Various characteristics such as operational holding, leased-in and leased out practices, allied farm and non-farm income, farm implements, education, age, household size pattern are compared across both the categories. Chapter 6 compares the cropping pattern and diversification across contract and non-contract farmers. The chapter also discusses about the

production and marketing costs across both the categories. Chapter 7 focuses on various factors affecting the contract participation and also compares the technical efficiency in crop production across contract and non-contract farmers. It also addresses the labour absorption capacity of contract and non-contract crops. Chapter 8 brings out various benefits and problems in production and marketing process of the contract farmers based on their perceptions. Chapter 9 summarizes the major findings and conclusions of the study. It accentuates the policy measures for the revival of Punjab's agrarian economy in the presence of contract farming.

CHAPTER 2
REVIEW OF LITERATURE

Contract farming is viewed as an institutional solution to the various agricultural market failures in both developed and developing countries. The literature on contractual practice in farming has been reviewed case by case to understand appropriately it's potential for the rural development in general and for farmers' welfare in particular.

2.1 Contract Farming Scenario at International Level

2.1.1 History of contract farming

The emergence of contract farming in the developed countries was continued from time immemorial in the literature. Eaton and Shepherd (2001) claimed that the contracts began to emerge in the ancient Greece, where a specified percentage of particular cropswere offered as rents and debts and China also witnessed various forms of sharecropping during first century. However, the history of contracts between the firm and the farmers with tenure dates back around 100 years ago (Prowse, 2012). The involvement of agribusiness in vertical coordination for processing of F&Vs started in earlier 20^{th} century in North America and Western Europe followed by poultry and hogs (Catelo and Costales, 2008). The contract for seed production was found since 1940s in Europe and North America in the study of Watts, 1994.The study also highlighted the use of contracts by the Japanese in Taiwan for sugar production in the last decades of nineteenth century and by the US firms in Central America in the early parts of the twentieth century. In advanced capitalist states, contract farming was generally led by the vegetable canning industry in North America and by the seed industry in the Western Europe in the 1930s and 1940s (Rehber, 2007). The expansion of contract farming has taken place in all regions of the world. Latin America has seen rapid growth in contract farming since the 1950s. In developing countries, private sector was playing a dominant role in contract farming: e.g., in 2008 Nestle (Switzerland) had contracts with more than half a million farmers in over 80 developing and transitional economies; Olam from Singapore contracted around 2,00,000 farmers in over 60 countries to supply 17 agricultural commodities; Unilever (United Kingdom/Netherlands) sourced two-thirds of its raw materials from approximately

1,00,000 small and large farms in developing countries and Carrefour (France) contracted with farmers in 18 developing countries (UNCTAD, 2009). The World Bank has also promoted contract farming in order to encourage the technology and market for the small farmers with the dynamic participation of private players (Little and Watts, 1994).

2.1.2 Farmers profile

Companies' decision about signing contract with farmers varies across crops and regions revealing their heterogeneous pattern. In Africa, contract farming is considered as most successful project to generate income among small farmers (Grosh, 1994). In some crops such as tomato and vegetables in Mexico (Runsten and Key, 1996; Key and Runsten, 1999) and French beans in Madagascar (Minten *et al.*, 2009), firms found profitable to work with small farmers as they were able to produce at low costs due to family labour, lower land rents, lower cost of pest control and higher yields. But in contrast, in China, small farmers were less likely to participate in contract scheme as compared to the large farmers (Guo *et al.*, 2005). Rosset *et al.* (1999) in their study of hybrid tomato seed production in Thailand observed that around 45 per cent of the farmers included in contract scheme were cultivating less than 3.9 acres and also observed that 23.6 per cent of those involved in contract scheme were landless households. In South Africa's Limpopo province, contract farming increased agricultural income of the contract farmers by providing better access to resources and extension services, but its scope remained limited in reducing poverty as it involved already better-off farmers (Freguin Gresh *et al*., 2012). In general, contracting companies seems to prefer large farmers but in actual included whosoever was available. In 1980, ALCOSA purchased cold weather crops like cauliflower, broccoli and Brussels sprouts from 95 per cent small farmers in Gautemala (Glover and Kusterer, 1990). The selection of farmers for contract farming by companies was not a random distribution. The income between contract and non-contract farmer may differ due to some unobservable characteristics like management skills. The selectivity correction approach was used by Warning and Key (2002) among peanut growers in Senegal; by Miyata *et al.* (2009) for apple and green onion growers in China; by Simmons *et al*. (2005) for seed corn in East Java, seed rice in Bali and broilers in

Lombok, Indonesia and by Winters *et al.* (2005) for hybrid seed corn growers in East Java, Indonesia.

2.1.3 Procurement system

In Gautemala, ALCOSA operated 17 buying stations to procure the produce. At buying stations, farmer themselves classify and pack their produce in baskets provided by the factory. After weighing the product, farmers get the delivery receipt (Glover and Kusterer, 1990). In Tropical Africa, Kawacom procured on an average 198 kg organic coffee from farmers' at collection centre and pressing and grading is done in Kampala factory. Under contract scheme only dry parchment coffee is procured i.e. *beans whose pulp has been removed through wet-processing (hand pulping) and subsequent fermentation and sun drying* (Bolwig *et al.*, 2009). Vermeulen *et al.*, 2008 found that in South Africa, agri-business companies procured 78.5 per cent of the F&Vs for processing through contractual arrangement.

2.1.4 Factors affecting the participation of farmers in contract farming

There were three main motives of the farmers to indulge in contract farming i.e. transaction cost, risk management, positive impact on production efficiencies and technological improvement (Smale *et al.*, 1994; Poole *et al.*, 1998; Abebe *et al.*, 2013; Hu, 2013). Abebe *et al.* (2013) offered a sanguine approach towards small farmers' participation in contract farming to improve their livelihood. The author found that farmers' willingness to participate increases if a contract design has the following attributes: a written form, inputs, technical support and seed supply and variable output quality and variable price options. Barrett *et al.* (2012) highlighted the factors such as physical constraints (lack of assets) and institutional constraints (lack of credit and insurance, insecure land rights) restraining the participation of small farmers in contract farming from five countries- Ghana, India, Maadagascar, Mozambique and Nicaragua. Among Tanzania farmers, experience, farm group and age had significant influence on farmers' decision to participate in contract farming in tobacco (Sambuo, 2014). Miyata *et al.* (2009) examined the impact of contract participation on household income of apple and green onion farmers in China. Contract farmers were selected on the basis of location and labour availability rather than by the farm size or education level.

Thus, firms did not seem bias for large farmers. In case of small farmers, the transaction cost for assessing and supervising family labour was low due to which they may had comparative advantage in the production of labour-intensive crops (Poulton *et al.*, 2010; Saenger *et al.*, 2013). The imposition of contracts in Ethiopia's traditional vegetable marketing was primarily because of mutual trust and brokers' mediation (Haji, 2010). In East Asia and Latin America, contract participation by individuals' capital/labour ratio and access to infrastructure instead of land (World Bank, 2008).

2.1.5 Costs and returns

Contract farming had a positive effect on producers average return of corn and soybean in US (Hu, 2013), an organic coffee in Tropical Africa (Bolwig *et al*., 2009), pollinated tomato seed in Rangpur (Sarkar *et al.*, 2011), sunflower in Tanzania (Henningsen *et al*., 2015) and for seed corn and broiler in Indonesia (Simmons *et al.*, 2005), while it had insignificant effect on wheat producers in US and seed rice contract in Indonesia. Warning and Key (2002) determined how participation in the NOVASEN program affected the agricultural income of 32,000 peanut growers in Senegal without favouring the wealthier growers. It not only raised the standard of living of growers, but also had positive effect on employment, infrastructure and economic growth. Contract farming of tea production in Moc Chau district of Vietnam also provided higher technical efficiency and slightly higher income to households (Saigenji and Zeller, 2009). In few studies, comparison has also been made between high value crops and traditional crops. For example, watermelon cultivation was found to be hugely more profitable than local traditional competing rice crop as it provides 13 times more gross margin per hectare than rice (Shanker *et al.*, 2011). Similarly, Braun *et al*. (1989) also found that contract farmers in Gautemala growing non-traditional export crop, snow peas made 15 times more net return as compared to the farmers growing traditional maize crop. In Thailand, organic rice farming had been found to be more profitable for the contract farmer which was largely due to higher prices received in international markets (Setboonsarng *et al.*, 2006). Contract farming had been failed for oil palm, pineapple and asparagus in Thailand as the farmers had lower shifting cost. The farmers had greater production and marketing options in the open market (Glover and Lim, 1992). Malaysian Federal Land

Development Authority (FELDA) had not only increased the income of the settlers but the sources of income had also diversified. The FELDA scheme had also developed infrastructural facilities in the area along with economic development (Lim and Dorall, 1994).

Contract farming had not only increased the income of participating families, but also had increased the families' welfare. Bellemare and Novak (2016) found that the participation in contract farming in Madagascar has also reduced the hungry season in families by about eight days. In Ethiopia,high level of economic inefficiency was found for vegetable farms as compared to the whole farm (Haji and Andersson, 2006).

2.1.6 Role of the firms in contract farming

Firms would choose contractual practice only if the expected benefits were more than other alternative situations such as buying on spot market or producing on proprietary farms (Bellemare, 2012; Abebe *et al.*, 2013). Sugar Corporation provided seeds and fertilizers to the sugarbeet contract growers in AK village of Turkey (Morvaridi, n.d.). In Madagascar, Lecofruit used to provide cent per cent of the seeds, 37 per cent of pesticides and 57 per cent of the fertilizers used in the production of contracted crops e.g. green beans, cucumber, leeks, etc. (Bellemare, 2010). Further, the study also found that the number of visits by the extension staff had a statistically significant effect on the productivity and it was also more effective for the farmers who have completed fewer years of education.Both farmers and extension agents used to give more importance to the market-driven vegetable crops in Ethiopia. The farmers devoted high share of funds towards market-driven farm production. Even the extension agents provided less attention to the whole-farm production (Haji and Andersson, 2006).The private firm in Lam Nam Oon also gave some US $40 payment to some farmers in case of natural disasters as support for the coming season (Benziger, 1996). To make contract farming program successful, there is need to strike balance between the farmers and the companies' interest as the farmers would like the increment in procurement prices every year due to rising input costs but on the other hand, companies' would like to pay lower prices (Sahota, 2013).

2.1.7 Role of the government in contract farming

Singh (2005b) recognized the role of the state in encouraging or discouraging the agribusiness firms in Thailand and found that contracts were biased against the farmers and the companies relied on the brokers to work with the farmers. In Ethiopia, among potato farmers, input market uncertainty was found to be more important than output market uncertainty in smallholders' decision to participate in contract farming. Farmers tend to minimize their risk by opting for the buyer firm above the state and NGOs as providers of seed, inputs and technical assistance (Abebe *et al.*, 2013). In 1953, the joint Sino-American Commission on Rural Reconstruction in collaboration with Taiwan Agricultural Research Institute initiated research for mushroom cultivation. Within a few years mushroom exports had reached 2 million cases, however this can't be possible if research had been left to the private sector. Further, the government contributed in this success through the provision of public roads and irrigation facilities (Benziger, 1996). Thailand government has promoted contract farming through four-sector cooperation plan to develop agriculture and agro-industry in 1987 (Manarungsan and Suwanjinder, 1992). The success of FELDA scheme in Malaysia for oil palm and rubber became possible only because of strong and continuous support by the government (Lim and Dorall, 1994). However, reason behind the failure in contract farming of Thailand was less interventionist approach of the government.

2.1.8 Pricing and quality parameters

Pricing policy adopted by the contracting firms played an important role in raising quality and productivity. Flexible pricing can make contracts self-enforcing because it makes farmers' confidence in firms that they would not be cheated in case of higher price in open market (Miglani and Kalamkar, 2012). Kenyan Tea Development Authority (KTDA) even remained restricted to the small growers to ensure plucking standards and also gave bonus for quality to growers for encouragement. Further, to maintain quality standards, KTDA tried to effectively control tea operation like- the quality of planting material through control of nurseries, the quality of production through selective registration, the effectiveness of extension, the supervision of leaf quality and critically, through the exercise of a buying monopoly (Baumann, 2000).

2.1.9 Major problems in contract farming

Contract farming had some shortcoming such as over-exploitation of resources caused soil erosion, fertility loss, ravine and gully formation (Siddiqui, 1998), and companies used to move to new lands to exploit productive resources at the least cost (Torres, 1994). Nanda (1995) considered the contract farming as an exploitative extension as the control of production shifted away from farm towards agro-industrial enterprises. Watts (1992) also criticized it by considering contract farming as a system for self-exploitation of family labour. Morvaridi (1995) and Siddiqui (1998) in particular criticized on the ground that thecontract farming schemes as they found out that most of the contracts were short term and the firms tended to move on to the new farmers and lands after exhausting the natural potential of natural resources. In North Cyprus, polly peck international's involvement in citrus production showed that the contract terms differ on the basis of farmers' access to resources and production increased only in the short term at the expense of long term productivity. In the Central American countries, development policies had encouraged agricultural production for export with intensive exploitation of natural resources. While producing a new crop/variety, farmers faced production and marketing risks (Umamageswari *et al.*, 2013). Morvaridi (n.d.) also found that sugarbeet farmers in AK village were applying more water and fertilizer to make bigger size of the root to earn more money. Due to which, the problem of waterlogging and salinity had started emerging in the region. Delay in payment was reported by the farmers in Ethiopia, thus farmers lost their interest to make investment in the production of vegetables (Haji, 2010). Mwambi *et al.* (2016) found through case study of avocado in Kenya that participation in contract practice was not enough to increase farmers' income until the contract conditions were not attractive. Like in situation of glut production, contractor used to purchase only small quantity of produce at premium price. Even due to poor coordination, farmers had to often wait for long time for company-owned machinery during harvesting time and for wait for longer hours at the factory gate for delivery. The best example of poor coordination in case of tomato in Panama *"where it was unclear whether long waits at the factory gate for tomato deliveries were the result of poor coordination, or a deliberate effort to increase evaporation and reduce the effective product price*" (Glover and Kusterer, 1990).

2.1.10 Gender issues in contract farming

Though, women workers working in cotton plant processing of Japan gained better working condition (Ramamurthy, 2000). Contract farming in case of tomato processing industry in Dominican Republic increased the demand for women's farm labour; along with self esteem and strengthens their domestic standings (Raynolds, 2002). In Peru, the cultivation of asparagus had doubled the burden of house and farm work on women. However, it had positive impact on women's net income (Glover and Kusterer, 1990). Von Bulow and Sorensen (1993) found that KTDA faced difficulties in tea production due to conflicts between spouses and even sometimes women came to headquarter to claim their income share from their husband's tea license holder field, because they considered themselves to be the real managers of the tea field, while their husbands neglected them and their children.

2.2 Contract Farming Scenario at India Level

2.2.1 History of contract farming

Contract farming in India dates back to colonial period, when British government introduced cash crops such as tea, coffee, rubber, poppy and indigo through a central, expatriate-owned estate surrounded by small out grower's models (Singh, R., 2009; Sharma, 2014). ITC introduced cultivation of Virginia tobacco in coastal Andhra Pradesh in the 1920s incorporating most elements of fair contract farming system. Organised public and private seed companies emerged in the 1960s, depend on individual farms for multiplication of seeds under contract farming as they did not own lands. So, contract farming in India is not a new phenomenon as informal contract farming had been practiced by cooperatives for quite some time. However, corporate-led contract farming system in India is a recent phenomenon. Faced with an acute shortage of soft wood, Wimco, the country's sole mechanized match manufacturer instituted an innovative farm-forestry scheme for the cultivation of poplars in Punjab, Haryana and Uttar Pradesh (Deshpande, 2005).

Realizing the problems in farming economy of Punjab, the government started emphasizing the diversification of agriculture by promoting alternatives to the existing cropping pattern through contract farming, encouraging agro-industries and developing infrastructure for easy marketing access for other commodities

(Dhillon and Singh, 2006). Singh (2004) believed that involvement of Punjab in contractual arrangements began in 1980s with seed and timber production and in perishables like mustard leaves, procured by Markfed from the farmers to process it for export market. However, this practice went unnoticed from the attention of the policies and research. But, most widely accepted belief about origin of contract farming in Punjab is associated with Pepsi Foods Ltd. (Singh, 2002). The Johl committee report on diversification in 1986 recommended that at least 20 per cent of the area under wheat and paddy should be brought under new crops specially F&Vs. In order to achieve the said objective, contract farming was adopted by the government of Punjab as a tool to promote diversification in the state. In 1988, with the support of Bhartiya Kisan Union and Shiromani Akali Dal, Pepsi introduced tomato cultivation in Punjab under contract farming to obtain inputs for its paste-manufacturing facility established as a pre-condition to its entry into India. The entry of Pepsi was followed by another local entrepreneur (Nijjer) who also set up tomato-processing plant with half the capacity of Pepsi's plant. Pepsi sold its Zahura processing plant to Brook Bond India Ltd. and that was purchased by Hindustan Lever Limited (HLL, a Unilever subsidiary) in 1995 (Roul, 2001). Most of the other state governments had also amended their own Agricultural Produce Market Committee (APMC) Acts to allow contract farming. In 2000, Madhya Pradesh government formed a joint venture with HLL to grow wheat. With the gap of five years, the area has been increased to 15000 acres. Under this scheme, HLL, Rallis and ICICI formed an alliance with farmers, in which Rallis supplied agri-inputs and know-how and ICICI financed the contract farmers (Viswanadham, 2006; Spice, 2003). BHC Agro India private limited initiated Kuppam project with support of Andhra Pradesh government in 1997. The company leased-in land from small and marginal farmers who worked as labourers to grow potatoes, gherkins and chillies by using expensive Israeli technology (Pionetti, 2005). In 2002, Appachi Cotton Company (ACC) integrated with 600 farmers of Tamil Nadu on a holistic plank to encourage them to grow cotton seeds in their fields. Another company named Ugar Sugar Works established a malt unit and started contract farming in the Belgaum with 470 small and marginal farmers for providing barley in 1997 (Spice, 2003).

In 2002, when the impacts of agrarian and ecological crisis became clearly visible in Punjab, another committee headed by Dr. S.S. Johl was constituted after a gap of 16 years. The committee recommended that an area of 10 lakh hectares under paddy and wheat should be shifted to other crops those have a lower water requirement and are ecological and soil friendly. Given the above recommendations, the Punjab government introduced the contract farming programme as a solution for the prolonged malaise in agriculture sector. Punjab started the process of enacting a model APMC Act on the lines of the Model Act of 2003 initiated by the Union government to introduce private markets, abolish market tax, boost contract farming and facilitate spot trading in food grains. Punjab became the first state to launch contract farming officially. The Punjab Agro Foodgrains Corporation (PAFC) was designated as a nodal agency for promoting diversification under contract farming (Kumar, 2006). PAFC adopted multipartite model by involving farmer, government agency and private firm. Its role ranged from the provision of quality seeds, modern machinery, supervision and procurement of entire produce at comparable or with better returns to farmers as compared to wheat-paddy. The crops indentified for cultivation under contract in first phase were maize, sunflower, hyola, basmati, durum wheat, barley, moong and guar (Singh, M.P 2007). However, most of the initial attempts by the government to bring diversification in the state through contract farming have largely been failed. In 2013, the state government has launched new diversification plans by formulating a separate Punjab Contract Farming Act, but the APMC act in state is still remained unamended (Singh, 2016).

2.2.2 Farmers profile

Contract farming is more successful in high value crops. The share of high value crops increased from 37.3 per cent in Triennium Ending (TE) 1983-84 to 47.8 per cent in TE 2007-08 (Sharma and Jain, 2011). The small and marginal holdings account for 85 per cent of the total operational holdings. So the sustainability of agriculture depends upon the performance of small and marginal farmers (Dev, 2012). Therefore, the existing literature has been reviewed to understand the contract farmers' landholding status. Various studies showed the exclusion of small farmers from the contractual arrangements because of higher transaction costs (Kumar, 2006; Glover and Kusterer, 1990; Singh, 2012; Singh, N.

2016).Sharma (2013) found that only 15 per cent of the contract farmers belonged to small and marginal farm category. The public agency in Haryana contracted for cottonseed only with medium and large farmers, while private agency contracted with all categories of farmers (Kumar *et al*., 2007). In case of Pepsi, HLL, Chambal Agritech and AM Todd in Punjab, the average size of operational holding was higher in case of contract farmers than that in case of non-contract farmers (Kumar, 2006; Singh, 2009). Wimco instituted an innovative farm forestry scheme for the cultivation of poplars in Punjab, Haryana and Uttar Pradesh; ITC BPL in Andhra Pradesh; JK corp and BILT sewa unit in Odisha. The marginal farmers could not participate as the minimum number of trees to be planted under the scheme was 400-500 (Singh, 2004a). Kumar (2006) also observed that direct contract farming was operated effectively for all the farm size categories, but indirect contracts seemed to favour only large farmers. Another study noted that the large contract farmers accrued greater benefits from participation in contract farming. Mainly progressive farmers of Punjab used to enter in contract farming, who tend to cultivate more than 50 acres, were educated and eager to increase their incomes through diversification and new technologies (Witsoe, 2006). Similarly, Sharma and Singh (2013) with an instance from Punjab in contract farming under Technico Agri Science Ltd., Mahindra Shubh Labh Services and Kartikey Indo Agritech Pvt. Ltd. in case of potato corroborate the dominance of medium to large farmers, however Pepsico Foods Pvt. Ltd. preferred to work with all kind of farmers for potato and basmati. However, optimists presented the cases of the inclusion of small farmers in contractual practice.In Haryana, for the cultivation of wheat seed, private agencies indiscriminately selected the farmers of all categories as compared to it government agencies excluded small and marginal farmers from production programme. The average operational landholding was found around 6.5 hectare, 1.65 hectare and 1.23 hectare among public, private seed agency and independent wheat seed growers, respectively (Kumar *et al.*, 2010).

Food Chain Partnership (FCP) program implemented by the transnational company, Bayer in India was highly selective in terms of the farmers and the crops to be covered. This limited the prospective of FCP to replace the traditional trade system as they concentrated only on those regions and products that were

promising most profit to the company (Trebbin and Franz, 2010). Further, most of the contract farming projects was found to be located in the developed states and areas with the highest concentration of small and marginal farmers were seemed to be evaded (Gill, 2004). This essentially meant that contracting companies did not encouraged the participation of those who need to be helped to participate, as risk preference and innovativeness require not only attitude, but also resources and a risk-taking capability to deal with risky crops and ventures (Singh, 2012a).

Some studies also took into account the non-random sample of contract population in India viz. Ramaswami *et al.* (2009) for poultry in Andhra Pradesh; Sharma (2016) for potato and basmati in Punjab; Birthal *et al.* (2008) for milk contract farming in Rajasthan and Sharma (2008) for different crops in Punjab.

2.2.3 Procurement system

PepsiCo even accepted the lower quality potato from contract farmers however the company was stricter with non-contract farmers. The company procured from non-contract farmers as the contracted produce was less than the companies' processing requirements. Even the Nijjer farmers in Sirsa used to sell their contracted tomatoes in open market through *borias* and traders when the prices were higher in open market (Singh, 2005). Unicorn Agro-tech Ltd. procured the harvested gherkins from the farmers' field and payment was done through cheque within 14 days (Erappa, 2006). Nijjer procured the tomato and chilli produce that should not be rotten, worm-affected and yellow in colour, AM Todd accepted the maximum oil extraction quality produce and PepsiCo paid lesser price for under and over size potatoes and rotten/mechanically damaged/ green potatoes were returned to the farmer. In case of PepsiCo and Nijjer, farmers themselves used to deliver their produce at processing plant and in case of AM Todd, farmers delivered their produce at extraction plant (Singh, N. 2016).

2.2.4 Factors affecting the participation of farmers in contract farming

Kumar *et al.* (2010) concluded that the adoption of contract farming among wheat seed farmers under public sector among contract farmers was influenced by prices, repayment of transfer cost and off-farm. In Punjab, socio-economic factors that influenced the farmers' participation in contract farming were education, age,

farm size, access to institutional credit, source of off-farm income, membership to an organization, proportion of adults and loan limit per acreage (Sharma, 2008; Sharma, 2015).

2.2.5 Costs and returns

At the India level, success stories of income improvement had been narrated in various studies. In Haryana, DCM Shriram Consolidated Limited's potato contract farmers had 8.84 per cent higher yield and 140 per cent higher gross income as compared to the non-contract farmers along with about 17-24 per cent higher costs. Farmers preferred the contract scheme due to guaranteed priceprovided by the contract firm (Tripathi *et al.*, 2005). In case study of Punjab, returns was higher among contract farmers for potato and basmati rice due to better prices (Sharma, 2016). The study also found that the contract for basmati rice was not so encouraging due to low yields and low prices. Kumar *et al.* (2013) also found that organic basmati paddy growers were able to receive the margin of 20 to 25 per cent as compared to conventional basmati paddy in Haryana.The returns per acre of cropped area for all direct contracting firms (Pepsi, HLL, Chambal Agritech and AM Todd) were higher in case of direct contracted crops as compared to indirect contract crops of PAFC and non-contracted crops (Kumar, 2006), higher returns from gherkin production in Andhra Pradesh as compared to other crops (Dev and Rao, 2005) and tomato in Punjab (Rangi and Sidhu, 2007). The mint contract growers of AM Todd & Co. in Punjab had lower cost of production; almost negligible transaction cost as the company did not charge for extraction of oil and higher net income than that of the non-contract growers. It was mainly due to better quality of produce and better prices of the new varieties besides good extension services provided by the company (Singh, 2009). In Karnataka, net returns for baby corn and chilli crop were found to be higher under domestic contracts firms than foreign contract firms (Nagaraj *et al*., 2008). For growing contract crops (rice seed) in Andhra Pradesh, cost was 31 per cent higher than non-contract crop (rice), but the net return was eleven times higher than the non-contract crops (Swain, 2010). In Rajasthan, contract farming in milk was found to be more profitable due to reduction in marketing and transaction cost and among milk suppliers, small farmers were selected in satisfactory numbers (Birthal *et al.*,

2005; Birthal *et al.*, 2008). The major benefits received by contract farmers were higher yield and higher prices. Though, not all experiences of contract farming in India had been positive. There are also numerous examples when contractual schemes proved to be failed. Narayanan (2013) found that contractual arrangement had increased the returns of contract farmer in Tamil Nadu in case of broilers, gherkins and papayas. However, marigold cultivation under contract left participating farmers in worse condition. The study concluded that farmers' participation in modern supply chain will not improve their income at the same extent. So, this heterogeneous nature of contract farming required considerable attention of policy makers. Ultimately, the farmers doing or can do better in contract arrangement were excluded by the firms are cause of policy concern.

2.2.6 Role of the firms in contract farming

In India, Chambal Agritech and AM Todd lifted the produce from the farm-gate at the company's cost, while Pepsi/Fritolay and HLL asked the farmers to deliver their produce at the pre agreed procurement point. The farmers who signed a contract with PAFC specified companies were not provided with desirable extension services and their product was also not fully procured by the contracting companies (Kumar, 2006). FLI (Pepsi) in Maharashtra worked through an intermediary called 'Hundekari' who manages the relation with small growers on behalf of the company right from registering farmers to buy back arrangements. In Karnataka, the company had organised informal associations of growers, who manage the operations like seed distribution and supply schedules for delivery of the produce among themselves. Further, PepsiCo in Jharkhand used to select farmers on the basis of farmers' willingness to work under contract, ability to adopt new variety of seeds, assured irrigation facility, financial position and suitability of land for potato cultivation (Mishra, 2009). In Kaithal, in case of organic basmati paddy, Agrocel supplied organic inputs certified by SKAL and seed supplied by PICRIC and procured the entire potatoes except damaged potatoes from the farmers at the factory (Singh, 2007). Further, violation of contractual terms and conditions by the farmers and price fluctuations in the international markets were the major constraints faced by the contracting firms in Karnataka (Kumar and Kumar, 2008).

2.2.7 Role of the government in contract farming

The critics considered the contract practice a tool through which MNCs can exploit the poor farmers due to their monopoly position (Dhillon and Singh, 2006). Therefore, the government can play an important role in protecting the weaker entity from powerful agri-firms. Andhra Pradesh government encouraged oil palm contract farming through private and corporate entrepreneurs by allotting zones to the firms. Firms had to follow the prices fixed by the government for fresh fruits and to provide seeds along with extension services to the farmers. Although majority of the farmers wanted the government intervention and demanded power for 15 hours a day instead of the present seven hours (Dev and Rao, 2005). To promote contract farming of basmati, Uttaranchal government provided ₹ 200/ farmer to a service provider and established centre for providing technical and marketing support (Singh, 2009a). PAFC was promoting contract farming for diversification in state on behalf of Punjab government (Sharma, 2013). Though being a written contract, there was lack of commitment on extension services made by the companies (Kumar, 2006). In 2013, Punjab government passed Punjab Contract Farming Act "*to provide for improved marketing of agricultural produce through Contract farming and to regulate the development of efficient Contract farming system by putting in place effective infrastructure for Contract farming and lay down procedures and systems and the matters connected therewith and incidental thereto*" for 108 crops (GoP, 2013).

2.2.8 Pricing and quality parameters

Under direct contract farming in Punjab, companies purchased the produce only if it passed the quality norms set in contract agreement. Like, Fritolay purchased only those lots of potato that fulfilled the sugar norms and HLL bought basmati paddy from farmers only if the pre-determined norms related to moisture and colour of the produce was satisfied (Kumar, 2007). Fritolay did not return undersized potatoes to the farmers and used to offer one price for all rejected chip-grade potato produce. On the other side, in case of McCain there was possibility to reduce the price by an undetermined amount if the quality parameters like size, machine damage, presence of solid matter and mixing up of other varieties was more than 2 per cent in the produce (Singh, 2012b).

2.2.9 Major problems in contract farming

Contract farming was a agricultural industrialization that took place through contemporaneous processes of *appropriationism* that operates as a process of exploitation of land by the application of advanced technology to get more and cheaper raw materials and *substitutionism* that tried to move agribusiness away from direct dependence on land by a way of application of technology to create new products (Singh, 2002). Another study that raised long term environmental sustainability issues through repeated cultivation of potato crop was by Mishra (2009).

On the other hand, the farmers of Pepsi, HLL and Nijjer reported problems like poor coordination of activities, interior technical assistance, low prices, preferences for large farmers, delayed payments, outright cheating in dealings, manipulation of norms by the firms (Singh, 2004; Singh, 2012). Nagaraj *et al.* (2008) observed that the farmers faced constraints in contract farming were delay in payment and delivery of inputs, delay in lifting up of produce, manipulation of quality standards and higher cost of inputs. Contract farming was also promoting reverse tenancy as firms prefer to deal with relatively large farmers (Singh, 2000; Singh, 2002; Singh, 2009). The monopsony of contracting firms was found to be one of the major reasons for producers' exploitation because buyer was in a position to settle unfair contract terms that had to be accepted by the producers (Sivramkrishna and Jyotishi, 2008). Further, Swain (2016) found that the contract farmers used more chemicals to attain higher productivity that raises the question about contract farming's sustainable use of resources such as groundwater and about the sustainability of soil quality.

2.2.10 Gender issues in contract farming

In contract farming, women had been mainly employed because of their feminine skills and nimble fingers to accomplish delicate work. However, these were based on social skills entrenched during the upbringing of girls instead of natural skills (Singh, 2003). Female young workers employed in cotton seed farms of Andhra Pradesh were unfree labour and such changes in gender relations put more of the family maintenance onus on the women and daughters (Venkateshwarlu and Corta, 2001). For cotton-seed production, 10 to 15 children were hired for 100 to

150 days. In case of scarce labour, children were being ``tied'' to contract farmers with advances of cash and grain to parents. Many girls also came with their mothers to fields for casual work (Ramamurthy, 2000).

2.3 Summary

The extant review of literature on contract farming at international and national level reveals about the diversity among contracting firms about the procurement operations and linkage building with the farmers as the contracting practice differs from crop to crop. The expansion of agribusiness companies in India has enhanced vertical coordination in agricultural sector by ensuring market and price for the farm produce. By opening new markets for high value farm produce, contract farming has built up the scope for the resource poor farmers to cultivate risky crops earlier that they might avoid to produce. Several studies showed that returns to contract farmers were higher than non-contract farmers due to provision of technical guidance and quality inputs by the contracting companies. Although, the contract farming companies were not free from some marketing constraints, but these were found less as compared to open markets. Further, the state governments are also taking the initiatives for the promotion of contract farming such as Punjab government introduced contract farming in 2003 through the involvement of PAFC as well as by enacting Punjab Contract Farming Act, 2013. Although several studies exist in the context of contract farming at Punjab level, but none of the study has been conducted on contracting of new commercial crops in the state.

Table 2.1

Review of Studies on the Contracted Crops across Various Regions

Author	Region	Company	Contracted crop
Punjab Studies			
Singh (2002)	Punjab	HLL, Pepsi, Nijjer	Tomato, Potato, Chilli
Dhillon and Singh (2006)	Amritsar	Nijjer Agro	Tomato
Kumar (2006)	Punjab	Pepsi/Fritolay, HLL, Chambal Agritech, A M Todd, companies operating through PAFC	Potato, Basmati, Potato seed, Mint, Maize, Sunflower, Durum wheat, Hyola, Groundnut
Singh, M.P. (2007)	Jalandhar	PAFC	Basmati, Sunflower, Maize, Hyola
Sharma (2008)	Amritsar, Jalandhar, Ludhiana	PepsiCo	Basmati
Singh (2009)	Jalandhar	AM Todd & Co.	Mint
Singh *et al.* (2015)	Bathinda, Mansa	United Breweries Ltd.	Barley
Sharma (2016)	Ludhiana, Jalandhar, Fatehgarh Sahib	TechnicoAgri Science Ltd., Mahindra Shubhlabh Services, Kartikey Indo Agritech Pvt. Ltd., PepsiCo	Potato, Basmati paddy
Singh N. (2016)	Punjab	Nijjer, PepsiCo, AM Todd	Mint, Tomato, Chilli, Potato, Basmati rice
National Studies			
Venkateshwarlu & Corta (2001)	Andhra Pradesh	Multinational and National companies via seed organisers	Cotton seed
Singh (2003)	Andhra Pradesh, Punjab	MNCs, national and local companies	Cotton seed, Tomato, Potato
Birthal*et al.* (2005)	Punjab, Andhra Pradesh, Delhi	Nestle India Limited,	Milk, Broiler, Vegetable

		Venkateshwara Hatcheries Limited, Mother Dairy Fruits and Vegetables Limited	
Dev & Rao (2005)	Andhra Pradesh	Govt. allotted zones to processing factories	Oil palm, Gherkin
Tripathi *et al.* (2005)	Haryana	DCM Shriram Consolidated Limited	Potato
Nagaraj *et al.* (2008)	Karnataka	Foreign and domestic firm	Baby corn, Chilli
Singh (2009a)	Haryana	Agrocel	Organic Basmati
Bhanumathy & Ravichandran (2011)	Tamil Nadu	-	Gloriosa Superba
Sarkar *et al.* (2011)	Bangladesh	BADC	Tomato seed
Narayanan (2013)	Tamil Nadu	-	Gherkins, Marigold, Papaya, Broiler chicken
Swain (2016)	Andhra Pradesh	Pioneer, Pro-Agro	Hybrid paddy seed

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Data Base

The study is mainly based on primary data collected through field survey. Some parts of the study are also assisted by secondary data pertaining to area, production and yield of the crops.

3.1.1 Primary Data

For the data collection, field survey was conducted during December, 2015 to June, 2016. The primary survey has been undertaken with the help of pre-tested schedule from the selected contract and non-contract farmers. Besides, a separate schedule was also constructed for the company officials to study procurement operations of the companies and discussions with the key persons of the agri-business companies involved in the contractual practice was also covered.

3.1.2 Secondary Data

Besides primary data collection, the study also uses secondary data from the various issues of Statistical Abstract of Punjab, Handbook on Horticulture Statistics, Indian Horticulture Database, Agricultural Statistics at a Glance, etc.

3.2 Sampling Design

The Punjab Agro Foodgrain Corporation was contacted for attaining a list of companies involved in contract farming of Punjab, but information provided by them was not updated. Thus the companies selected for the study were on the basis of personal contacts. The following companies were considered for the study (Table 3.1). Three companies, one MNC- PepsiCo and two local companies- Paras Spices Pvt. Ltd. and Rana Sugars Limited involved in processing of value added food products was selected for the study. The discussion with company officials included information about total number of farmers, selection criteria for area and farmer, market destination, type of contract, etc. (Appendix A).

Table 3.1
List of the Companies Studied

Companies	Crops
PepsiCo	Potato
Paras Spices Pvt. Ltd.	Chicory
Rana Sugars Limited	Sugarbeet

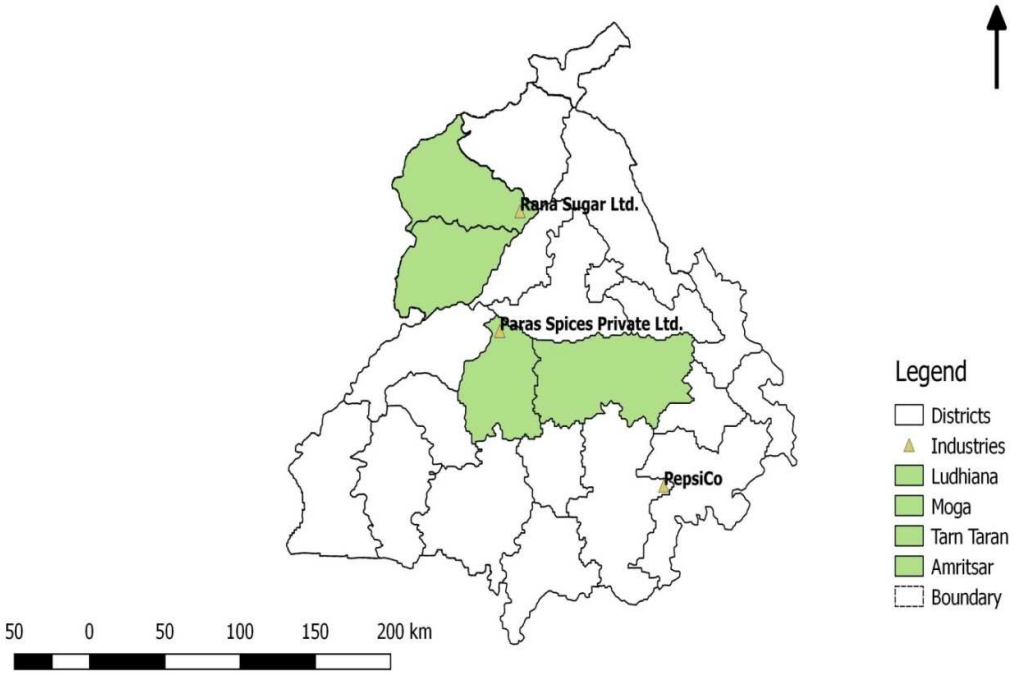
The selection of districts was determined on the basis of maximum area under contracted crops for all the three selected companies. Thus, in case of PepsiCo Ludhiana and Moga district, in case of Paras Spices Pvt. Ltd., Moga and in case of Rana Sugars Limited, Tarn Taran and Amritsar districts were selected. In case of Paras Spices Pvt. Ltd. only one district was selected as about more than 90 per cent of chicory farmers were located in the concerned district only.

Table 3.2
Distribution of Operational Landholdings in Selected Districts of Punjab during 2010-11

Categories	Ludhiana	Moga	Amritsar	Tarn Taran	Punjab
Marginal	8981 (12.70)	8946 (17.30)	8675 (12.41)	7682 (13.03)	164431 (15.62)
Small	11320 (16.01)	10486 (20.28)	16905 (24.18)	12869 (21.82)	195439 (18.57)
Semi-medium	20530 (29.04)	16238 (31.40)	26037 (37.24)	21142 (35.85)	324515 (30.83)
Medium	23093 (32.67)	13674 (26.44)	15924 (22.77)	15256 (25.87)	298451 (28.35)
Large	6770 (9.58)	2368 (4.58)	2383 (3.41)	2018 (3.42)	69718 (6.62)
All	70694 (100)	51712 (100)	69924 (100)	58967 (100)	1052554 (100)

Source: GoP, 2015

Map 3.1:
Location of the Companies along with their Farmers in Punjab



3.2.1 Data Collection

The schedule was prepared for the farmers (Appendix B). A complete list of the farmers was obtained from the company officials. A sample of 50 farmers in each company was taken through the stratified random sampling. The company-wisepopulation of contract farmers was divided into farmer category strata. From each stratum, sample was taken in such a way that proportion of farmers in each farmer category in the sample was similar to that in the contract farmer population. Therefore, a sample of 50 potato growing contract farmers in case of PepsiCo, 50 sugarbeet growing contract farmers in case of Rana Sugars Limited and 50 chicory growing contract farmers in case of Paras Spices Pvt. Ltd. was taken for the survey. Another set of the farmers in the vicinity of the contract farmers was also taken to make the comparison of both categories of farmers with respect to their socio-economic characteristics, factors determining their participation in contract farming, type of cropping pattern followed, etc. In case of PepsiCo, alternative non-contract farmers were potato growers. Since, domestic firms

introduced new crops, sugarbeet and chicory by replacing wheat, the alternative non-contract farmers chosen were traditional wheat growing farmers. Thus, a sample of 50 potato non-contract farmers in the vicinity of the PepsiCo and 50 wheat farmers each in the vicinity of Rana Sugars Limited and Paras Spices Pvt. Ltd. were taken based on the proportion of the farmers in each category in each location through the stratified random sampling technique. Thus, in nutshell, the study was carried out with 150 contracted and 150 non-contracted farmers constituting a sample of 300 farmers.

3.3 Description of the Selected Districts

3.3.1 Ludhiana: The total geographical area of the district is 3767 sq km, which is divided into the flood plains of the Sutlej and upland plain area. Out of total operational holdings, 16 per cent and 12 per cent belongs to small and marginal holdings, respectively. The Ludhiana district consists of seven sub-divisions i.e. Ludhiana (East), Ludhiana (West), Samrala, Khanna, Payal, Raikot and Jagraon. The district is divided into 12 development bocks i.e. Ludhiana (East), Ludhiana (West), Machhiwara, Samrala, Khanna, Doraha, Dehlon, Pakhowal, Raikot, Sudhar, Jagraon and Sidhwan Bet. The net sown area is 2.99 lakh hectares and total cropped area is 5.92 lakh hectares in 2013-14. The literacy level (82.20 per cent) is higher than the state's literacy rate (76.70 per cent).

3.3.2 Amritsar: It is bounded by river Beas in the south-eastern side and river Ravi on the north-west side. It comprises 9 development blocks viz. Ajnala, Chogawan, Harsha Chhina, Jandiala Guru, Majitha, Rayya, Tarsikka, Verka and Attari with geographical area of 2.64 lakh hectares, out of which 2.22 lakh hectares are cultivable.The net sown area is 2.20 lakh hectares and total cropped area is 4.18 lakh hectares in 2013-14. The literacy rate in the district is 70.68 per cent less than the state's literacy level (Table 3.3).

3.3.3 Moga: Administratively, the district has been divided into three sub divisions (Moga, Baghapuran and Nihal Singh Wala) and five development blocks i.e. Moga-I, Moga-II, Kot-Ise-Khan, Baghapuran and Nihal Singh Wala. The net sown area is 1.94 lakh hectares and total cropped area is 3.82 lakh hectares in 2013-14. The literacy rate in the district is 76.27 per cent.

3.3.4 Tarn Taran: The district is divided into 8 development blocks, viz., Bhikhiwind, Chohla Sahib, Gandiwind, Khadur Sahib, Naushehra Pannuan, Patti, Tarn Taran, Valtoha. The net sown area is 2.17 lakh hectares that is almost double cropped and some area is even put to 3 crops a year. 40 per cent area is under tubewell irrigation and 60 per cent under canal irrigation. Out of total 58967 operational holdings, about 34 per cent is under small and marginal holdings. The total geographical area of the district is 241449 hectare. About 4192 hectare area of the district is beyond the border wiring; out of which 3597 hectare area is cultivable.

Table 3.3
Profile of Selected Districts

Characteristics	Ludhiana	Moga	Amritsar	Tarn Taran	Punjab
Geographical area (sq. km)	3767	2242	2683	2414	50362
Total Population (in lakhs)	34.98	9.95	24.90	11.19	277.43
Literacy rate (%)	82.20	76.27	70.68	67.81	76.70
Gross cropped area (000 hectares)	592	382	418	401	7848
%age of gross irrigated area to gross cropped area	100	100	100	100	98.5
Net sown area (000 hectares)	299	194	220	218	4145
Cropping intensity	191	198	196	196	191

Source: GoP, 2015

3.4 Analytical Tools

The data collected through schedule was tabulated and analysed. The farmer category-wise analysis was done across contract and non-contract farmers. The data pertaining to socio-economic characteristics, perceptions of farmers was analysed using simple descriptive statistical tools and techniques like mean, percentage, etc. supplemented by qualitative observations. The various other analytical techniques used are outlined as under:

The cost concept ‘A1’, ‘A2’, ‘B’ and ‘C’ was adapted to enlighten the economics of crop cultivation. Cost ‘A1’ included all the direct expenses incurred on crop production in cash and interest on working capital, whereas cost ‘A2’ included cost ‘A1’ plus rent paid for the leased-in land. Cost ‘B’ included cost ‘A2’ plus interest on the value of fixed assets. Cost ‘C’ included cost ‘B’ plus imputed value of family labour. The costs of hired and family labour were estimated on the basis of average market rates prevalent for hiring labour in the locality. Interest on the working capital was charged @ 12 per cent per annum whereas cost of fixed capital was considered @ 10 per cent of the total fixed assets (Johl and Kapur, 2001).

3.4.1 Simpson Index of Diversification

Horizontal diversification is the increase in number of crops grown in order to either increase or stabilize their income. To assess the impact of cropping pattern Simpson index is used to measure the extent of diversification.

$$Simpson\ index\ (SI) = 1 - \sum_{i=1}^{n} p_i$$

Where, i= 1, 2,…..n

P_i = proportionate area of traditional (wheat-paddy) crop in the gross cropped area

SI is bound by 0 and 1 with 0 implying complete specialization and 1 implying complete diversification.

3.4.2 Treatment Effect Model

Treatment effect model is used to explain determinants of participation in contract farming and whether participation in contract farming scheme affects farm income. To explain these relationships, unobserved factors that may affect both likelihood of participation and farm income was also taken into account. The study employed treatment effects model. As OLS model does not take into consideration possible selection bias in contract participation. If contract farmers tend to be more skilled than non-contract farmers, then they would have higher income regardless of whether they participated in the contract farming scheme. In this case, the coefficient on the participation dummy variable will include the effect of these unobservable characteristics in addition to the effect of contracting, thus over-

estimating the effect of contracting. This indicates that there is a correlation between independent and dependent variables. The correlation leads to results having inconsistent and biased estimates of the coefficient of variables between participants and non-participants of contract farming in the income model. By using participating probit model, an inverse mills ratio was computed for each observation and included this as an independent variable in the income model. Inverse mills ratio is the ratio of the probability density function over the cumulative distribution function. This term corrects for possible selection bias and yield unbiased and consistent estimates in the income model. This analysis is implemented as maximum likelihood estimation as all the parameters in both models are estimated simultaneously, rather than as a two- step procedure (Puhani, 2000; Warning and Key, 2002; Sharma, 2008; Miyata *et al.*, 2009; Sambuo, 2014).

The equation for the study is:

$$Y_i = \alpha + \beta X_i + \mu C_i + \mu_i \qquad (1)$$

$$C_i^* = \gamma_1 + \gamma_2 Z_i + e_i \qquad (2)$$

$$C_i = 1 \; if \; C_i^* > 0, otherwise \; C_i = 0$$

Where Y_i is the gross revenue of the *i*th farmer, C_i is a dummy variable taking the value 1 if one participates in a contract with a contracting firm, and 0 if one does not participate in any contractual arrangement. *Xi* is a vector of the variables believed to affect the gross revenue and μ_i is a zero mean random variable; while *β*measures the impact of contracting on gross income. An OLS estimate of equation (1), is likely to be biased, because of the effects of unobservable factors. Thus, e_i (which contains within it the random unobservable factors) will be correlated with C_i. To correct for selectivity bias, equation (2) (probit) is estimated with a contract/independent producer as a binary dependent variable (C_i) and a set of explanatory variables *Zi*. Variables in *Zi* will overlap with variables in *Xi*. Identification requires that there should be at least one variable in *Zi* that is not in *Xi*. Then, predicted values (also known as the inverse Mills ratio) from equation (2) can be used as an instrument (of C_i) in equation (1) (Greene, 2003).

3.4.3 Data Envelopment Analysis

Technical Efficiency (TE) means that the transferring of physical inputs into outputs at the best level of performance i.e. without any wastage of resources to produce specific quantity of output (Charnes *et al.*, 1978). Coelli's (1996) 'A Data Envelopment Analysis (Computer) Program version 2.1' was used for the analysis of technical efficiency of farm. Data envelopment analysis (DEA) is a linear programming problem that provides a means of calculating apparent efficiency levels within a group of organizations. The efficiency of an organization is calculated relative to the group's observed best practice (Bhagavath, 1998). The purpose of DEA is to construct a non-parametric envelopment frontier over the data points such that all observed points lie on or below the production frontier.

Farmer is said to be technically efficient if he produces maximum feasible output from a given set of inputs or uses minimum amount of inputs to obtain a given level of output. So there are two measures of TE i.e input-oriented and output-oriented efficiency measure. The present study used input-oriented measure of efficiency.

Consider data are available on K inputs and M outputs for each of N farms. For the i^{th} farm in t^{th} time period, input and output data are represented by the column vectors x_i and y_i, respectively. The data for all N farms may be denoted by K×NT input matrix, X and M×NT output matrix, Y. The DEA model for TE under the assumption of constant returns to scale (CRS) is:

$$min_{\theta,\lambda}\ \theta$$

Subject to $$-y_i + Y\lambda \geq 0,$$

$$\theta x_i - X\lambda \geq 0,$$

$$\lambda \geq 0$$

Where ɵ is a scalar and λ is an N×1 vector of constants. This envelopment form involves fewer constraints than the multiplier form (K+ M < N+1), and hence is generally preferred. A measure of $ɵ_i$=1 indicates that the farm is completely technically efficient. However, the assumption of CRS is correct only as long as farms are operating at an optimal scale. In the case of agriculture, increased

amounts of inputs do not proportionally increase the amounts of output may cause the farm to operate at a non-optimal scale (Ahuja, 2007; Manjunatha *et al*., 2009). Using CRS DEA model will cause TE measures to be influenced by scale efficiencies. By adding convexity constraint, variable returns to scale (VRS) is instead assumed:

$$min_{\theta,\lambda}\, \theta,$$

Subject to $$-y_i + Y\lambda \geq 0,$$

$$\theta x_i - X\lambda \geq 0,$$

$$N1'\lambda = 1$$

$$\lambda \geq 0,$$

Where N1 is a N×1 vector of ones. This constraint makes the comparison of farms of similar size possible.

3.4.5 Garrett's Ranking Technique

The problems and benefits of involvement in contract scheme were prioritised using Henry Garrett Ranking Technique. As per this method, farmers have to assign the rank to major issues of dissatisfaction and benefits and the outcome of such ranking has been converted into score value with the help of the following formula:

$$Percent\ position = \frac{100\ (R_{ij} - 0.5)}{N_j}$$

Where

R_{ij}= Rank given for the i^{th} variable by j^{th} farmers

N_j= Number of variable ranked by j^{th} farmers

With the help of Garrett's Table, the percent position estimated was converted into scores (Appendix C). Then for each factor, the scores of each individual are added and then total value of scores and mean values of score was calculated. The factors having highest mean value was considered to be the most important issue among the farmers.

CHAPTER 4
CONTRACT FARMING OPERATIONS IN PUNJAB

This chapter examines the operations of contract farming for three companies, one MNC and other two being domestic firms. The chapter has thoroughly examined the interface between the companies and the farmers in terms of procurement operations, mode of payments, selection of farmers and different grades, technical guidance provided by the companies, etc.

4.1 PepsiCo: A Profile

4.1.1 Brief history of PepsiCo and its operations in India

PepsiCo, Inc. was established in 1965 with the merger of Pepsi-Cola and Frito-Lay. Pepsi-Cola was created in late 1890s by Caleb Bradham, while Frito-Lay came into existence in 1961 with the merger of the Frito Company (founded by Elmer Doolin in 1932) and the H.W. Lay Company (founded by Herman W. Lay in 1932). The company operates through six segments: Frito-Lay North America (FLNA), Quaker Foods North America (QFNA), Latin America Foods (LAF), which includes its food and snack businesses in Latin America; PepsiCo America's Beverages (PAB), including its North American and Latin American beverage businesses; PepsiCo Europe (Europe), which includes beverage, food and snack businesses in Europe and South Africa; while PepsiCo Asia, Middle East and Africa (AMEA) includes beverage, food and snack businesses in AMEA, excluding South Africa. The company manufactures, markets, distributes and sells a variety of beverages, foods and snacks through its contract manufacturers and other third parties. The company serves customers and consumers in more than 200 countries and territories.

PepsiCo entered India in 1989 as a joint venture of Punjab Agro-Industries Corporation and Voltas, an Indian corporate. For processing of F&Vs, it started first plant at Zahura village in Hoshiarpur district of Punjab where it procured and processed tomatoes. In 2000, the company introduced chilli cultivation in state as chilli sauce is considered as complimentary to ketchup and within a short period of two decades, it has grown into one of the largest MNCs of food and beverage in the country. Its growth in India has been guided by "Performance with Purpose", to

provide optimum financial performance, while creating sustainable growth. After achieving the success in contract farming of tomato, it has successfully followed the model in other crops like food-grains (Basmati rice), spices (chilies), oil seeds (groundnut) and vegetables (potato). PepsiCo had 4 unit plants in India, one each in Punjab (Sangrur), Maharashtra (Pune), Haryana (Gurgaon) and Gujarat (Bharuch), with each having about 400 tonnes processing capacity of potato per day. PepsiCo had 33 acre land in Jalandhar district, where multiplication of seed was done through tissue culture. PepsiCo had built an expansive beverage and snack food business supported by 37 beverage bottling plants and 3 food plants. The extensive portfolio of the company included iconic brands such as Pepsi, Lay's, Kurkure, Tropicana 100 per cent, Gatorade, Quaker and fast growing brands like Nimbooz and Aliva.

4.1.2 Contract farming operations

In 1989, PepsiCo started to procure the produce from any farmer growing tomatoes in the state on the basis of quality. In 1995-96, it procured tomatoes through forward contract. It started practicing actual contract farming in Punjab in 2001-02. The company started expanding its contract farming business to other states of India since 2005-06. PepsiCo was the first corporate to introduce collaborative farming of process-grade potatoes in India in 2004-05. It also started contract farming for basmati rice through DSR (Direct Seeding of Rice) in 2006 which continued till 2013. At present, the company is doing contract farming in potato for chips and seeds. The seed varieties included Atlantic, Chipsona-3, FL-1533, FC-3 and FC-5. FC-3 and FC-5 are the patent varieties of the PepsiCo.

PepsiCo had also initiated the contract farming in Quaker oats on trail basis at 500 acres land of Madhya Pradesh and Rajasthan in India. The company had established a model of partnership with the farmers and practices the contract farming with 24,000 farmers across nine states in Punjab, Haryana, Uttar Pradesh, West Bengal, Madhya Pradesh, Maharashtra, Gujarat, Chhattisgarh and Odisha. In Andhra Pradesh and Tamil Nadu, the company trained the farmers in rainwater harvesting for irrigation and provided value added support for efficient water usage and income generation, but it had not started the contract farming yet. In Punjab, PepsiCo had practiced contract farming with 400 farmers at Ludhiana, Moga,

Jalandhar, Fatehgarh Sahib, Patiala, Sangrur, Barnala, Kapurthala, Amritsar, S.B.S Nagar and Hoshiarpur districts. In India, the company had about 20,000 acres of land under contract farming, out of which about 2500 acres were only in Punjab. Approximately, 45 official employees worked in the company in various managerial positions to regulate the operations of the contract farming in India. The company also had about 250 field agronomists in India including 40 in Punjab, who provided the various extension related guidance and training to the contract farmers.

There was a legal contract between the firm and the farmers (Appendix D). The agreement was in English, which had the information pertaining to acres, price, delivery of produce, incentives to be paid by the company, supply of planting material, etc. for the contracted crop duly signed by both the parties. The company issued an ID number to each contract farmer, through which the transaction of inputs and produce took place between the farmers and the company. The company selected the farmers on the basis of their willingness to work under contract, availability of at least 10 acres land for contract, suitability of land, availability of assured irrigation facilities, financial position of the farmers; and commitment and trustworthiness.

4.1.3 Agronomical guidance

The company appointed a field agronomist with a minimum qualification of senior secondary education by giving proper training. The appointed field agronomist visited the farm with the gap of 2 days and guided the farmers about agricultural practices in terms of techniques to be used for seed treatment (Photo 4.1), sowing and harvesting, type and brand of fertilizers and pesticides to be used, when and in what proportion to be used (Appendix E). He also discusses about various farm level problems and gives remedial solutions. The field agronomist maintained a register in which all details regarding acreage, sowing date, quantity of fertilizer, pesticide and fungicide applied and number of irrigations along with time of application of various inputs on contract crop for each and every farmer were recorded. Besides, the company published and distributed literature in Punjabi language about the incidence of the diseases and spray schedule for potato cultivation to be followed. The company also recommended a schedule of

pesticide sprays for each area; and the type and brand of pesticide to be used each time was also disseminated through agronomist and pamphlets.

4.1.4 Inputs and incentives

The company supplied the quality potato seeds to the farmers. The company delivered the seeds at farmers' farm at 60 per cent of the payment in cash, while another 40 per cent was deducted from the produce. For sowing seed potato on 5 acres land, 150 bags (50 kg each) of seed were required. PepsiCo provided seed of different grades to each farmer. Approximately, 1-2 bags of Z grade; 5-10 bags of D grade; 30-40 bags of A grade; 80-90 bags of B grade and 10-15 bags of C grade were provided for 5 acres of land. The company also provided the chemical kit at ₹ 3220 at distributor price through Bayer (Figure 4.1). The company claimed that chemical kit costs about ₹ 4,000 to farmer if purchased from the market. There was no compulsion to buy chemical kit through Bayer. The farmer could also purchase the same from the market. The payment to Bayer had to be done through demand draft by the farmers directly. The company gave a bonus of ₹ 30/quintal to each farmer if kit was purchased from Bayer. The company had given bonus to the farmers so that there was no delay in spray schedule in order to avoid disease attack and enhance the yield level. The company had also given yield based incentive on the basis of A and B grade production. If a farmer produced 70 per cent A and B grade produce, he was given an incentive of ₹ 35/quintal. Similarly, on 75 per cent A and B grade produce, an incentive of ₹ 40/quintal was given, while on producing 80 per cent A and B grade produce, ₹ 50/quintal was given as incentive. The incentive was given to encourage farmers to increase yield level of the potato. The company was also used to give a chairperson award as an incentive for involvement of the farmers in contract for longer period. The contract farmers with permanent shed facility were given a bonus of ₹ 50/quintal Thus, in total along with fixed price for seed potato, it provided a bonus of ₹ 1.1/ kg which included bonus ₹ 0.30 for chemical kit, ₹ 0.20 for grading, ₹ 0.10 for insurance and ₹ 0.50 for permanent shed facility.

4.1.5 Procurement

At the time of harvesting, the company procured directly from the farmers at the farm gate itself at the pre-agreed price. The transportation facility for the produce was also arranged by the company of its own. The company also provided gunny bags free of cost to pack the potatoes. It procured from the farmers through individual, written and registered contract. On the basis of quantity for storage, PepsiCo hired the cold stores every year. In 2015-16, it hired three cold stores- Amar ICE and Cold Store in Nabha, D.K. Cold Store in Jagraon and Satgur Cold Store in Nakodar. The company was also involved in the contract farming of the chip grade potato in other states such as Madhya Pradesh, Gujarat, Uttar Pradesh and West Bengal.

4.1.6 Quality specifications and rejections

The grading was done by the company workers with the grader at the farm only (Photo 4.2). The grading with grader was done on the basis of size. Z grade seed potato had a size between 10 mm to less than 28 mm, A grade lied between 28 mm to 35 mm, B grade between 36 mm to 45 mm, C grade between 46 mm to 55 mm, while D grade had size 56 mm and above. The rotten and cross-cut potatoes were removed from the produce manually. The company procured all grades of seed potato produce on the basis of different grade price. In 2015-16, A and B grade produce was procured at ₹ 10/ kg; C grade at ₹ 8/Kg and D and Z grade was procured at ₹ 4.50/kg (Table 4.1). After dehaulming of potato plants, the company conducts 3 strip tests from an area of 5 acres regarding the yield level. Another test to check any virus attack on crop was also done by taking sample from the field; the company grows it again on its own land. After growing for 40-50 days, the company reveals the results about the productivity of the crop. The company claims that about 99 per cent of the farmers comply this test. On passing the test, the each farmer gets a bonus of ₹ 50/quintal. Further, PepsiCo did not allow farmers to sell the produce in open market.

Photo 4.1
Seed Treatment of Potato at Farmers' Field

Photo 4.2
Grading of Potato by PepsiCo Worker at the Farmers' Field

The company also procured the chip grade potato from the non-contract farmers in Punjab, after testing the sample regarding quality of the produce. The company selected the produce on the basis of size of the potato. Besides, it should not be rotten and should be without any cross cuts. Test for sugar content was undertaken by frying a small sample from a lot. Potatoes with high starch content will turn red on frying. Sample tests were also undertaken for solid content. The lots were rejected or accepted depending on these sample results. From non-contract farmers, potatoes were procured on the basis of Delhi vegetable market prices.

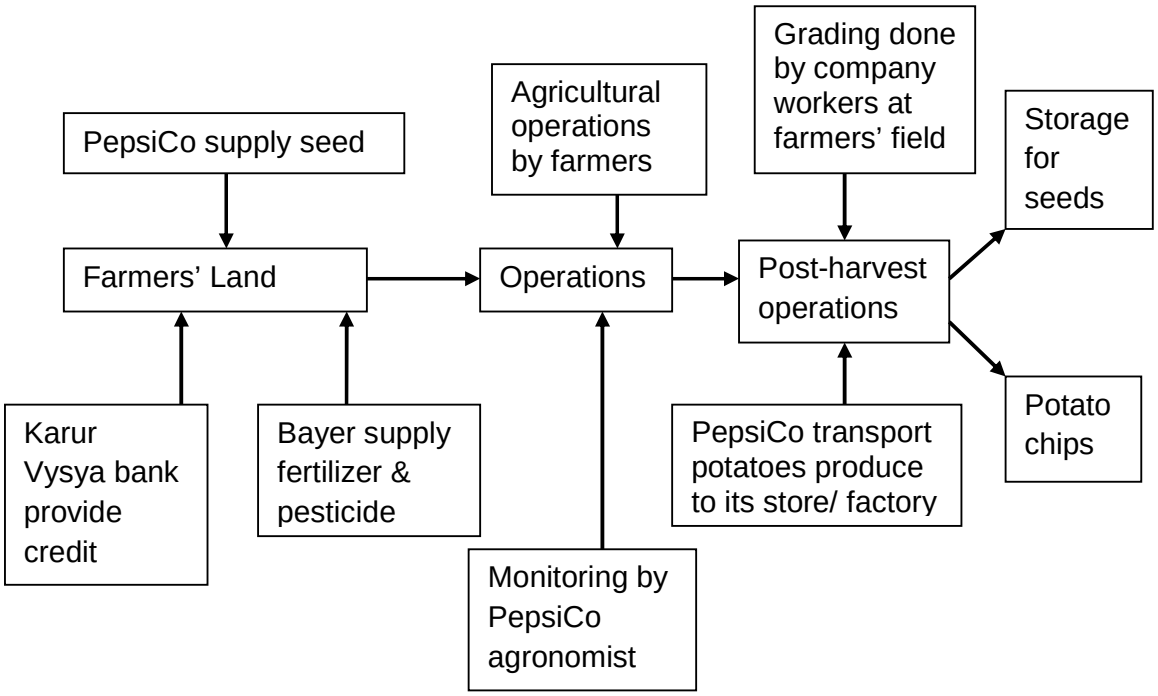
4.1.7 Mode of payment

The payment of produce was made through bank within 10 days after the delivery of last produce by deducting 40 per cent seed price from the produce. The firm had a tie up with Karur Vysya Bank, which had its branches in Patiala, Mandi Gobindgarh and Fatehgarh Sahib. The contract farmers had accounts in these branches. Karur Vysya Bank also provided a loan facility of ₹ 25,000 per acre subjected to a maximum amount of ₹ 2,50,000 without any interest (Figure 4.1). The bank recovered its loan through produce of the crop.

4.1.8 Environmental sustainability

PepsiCo India claims that it is leading a pioneering initiative to replace transplanting of paddy with direct seeding technology, which helps to reduce water consumption in paddy cultivation by 30 per cent and also cut down greenhouse gas emissions by 75 per cent. Besides, the technique helps to reduce labour costs thereby significantly reducing cost of cultivation. PepsiCo also helps farmers in water-scarce areas in Maharashtra, Gujarat, Karnataka and Haryana by promoting drip irrigation in over 3000 acres. PepsiCo initiates in helping the farmers in terms of raising money for the assets through banks, encouraging farmers for the adoption of drip irrigation through a buy-back mechanism and providing help to design agricultural equipment to make drip irrigation commercially viable for farmers. PepsiCo India has also launched a Waste to Wealth program with an NGO, Exnora Green Pammal to demonstrate an economically viable, environmentally feasible and socially acceptable model for urban solid waste management.

Figure 4.1
Value Chain of Potato



4.2 Rana Sugars Limited: A Profile

4.2.1 History of Rana Sugars Limited

Rana group of companies made its beginning with a Kraft paper unit in Punjab in mid 80's. Rana Sugars Limited (RSL), based in Chandigarh is a public limited company listed on the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). It has been promoted by Rana Gurjeet Singh and Rana Ranjit Singh. It was founded in 1992 as joint venture with Punjab Agro Corporation Ltd. Rana Group diversified into sugar manufacturing by setting up its first unit at Buttar Sevian in Amritsar district of Punjab in 1993. It is an integrated sugar manufacturing company with interest in sugar, power and alcohol. It is one of the largest producers of sugar in northern India with manufacturing facilities in the states of Punjab and Uttar Pradesh. In 2002, the company has setup a Demonstration Co-generation Project to produce extra power from the Bagasse (by-product of sugar) and supplied it to Punjab State Electricity Board. RSL established a distillery unit in 2006 with a production capacity of 60 KLPD. The unit manufactures various grades of alcohol such as Rectified Spirit (RS) and potable grade Extra Neutral Alcohol (ENA). The alcohol is produced from both molasses and grain. Molasses is a by-product of sugarcane that has a certain amount of sugar content, which is extracted through a technological process. RSL also has a pilot scale sugarbeet processing plant, where about 10 per cent of sugarbeet juice is mixed with sugarcane juice without any modification in the sugarcane based plant. The company has a processing capacity of about 5000 tonnes/day for sugarbeet, which is considered equivalent to 6500 tonnes/day for sugarcane. Approximately, 350 persons are employed as regular staff and 350 are casual workers in the company.

4.2.2 Contract farming

RSL started crushing of sugarcane in 1993. As being the joint venture with Punjab Agro Corporation, the area reserved for the firm for sugarcane crop was 5 districts of Punjab i.e. Amritsar, Jalandhar, Kapurthala, Gurdaspur and Tarn Taran. In 2015-16, the area under sugarcane crop was 30,000 acres and 6000 farmers were indulged with the firm for the crop. RSL procured different varieties of sugarcane like- COJ85, CO238, CO118 and COJ88. In 2012, the company started the contract farming for sugarbeet with approximately 1500 farmers. The area under

the crop was about 3000 acres. The company promoted the crop by distributing the pamphlets and through the newspapers. In 2015-16, the area under sugarbeet increased to 9000 acres and the number of farmers involved in sugarbeet contract increased to 3000. The company practiced sugarbeet contract farming with the farmers of Amritsar, Jalandhar, Kapurthala, Gurdaspur, Faridkot and Tarn Taran districts. RSL promoted different varieties such as Californ, SZ-35, PAC 60008, SERENAD and Ernestin based on their suitability to the land. RSL also had a command area of about 200-250 acres in Amritsar district, where the sugarbeet and sugarcane crops were grown. The company also initiated trails in sweet sorghum crop, recently.

4.2.3 Contract agreement

The farmers were contacted well before the transplanting season of the crop and the area to be cultivated by each farmer is agreed upon. The contract agreement was on procurement and input contract basis under which the firm not only agreed to procure the contracted acreages at the fixed time and price, but also provided inputs like seeds on credit, technical advice and sugarbeet harvester at free of cost on returnable basis. The contract was written in Punjabi language. The copy of the contract was given to farmer on request. The contract agreement contained signatures of both the parties involved in the contract along with two eye witnesses.

The contract agreement had various conditions that both parties had to follow. The firm provided seeds on credit. About 75 per cent cost of the pesticides had to be borne by the farmer and remaining 25 per cent by the firm. Moreover, it was also specified that the firm will do the harvesting with its own machine. The farmer was not allowed to irrigate land one week before crop harvesting. If any of the party violated the contract then there was penalty on both the parties. In case, firm failed to procure crop of the farmers, the firm had to pay the amount equal to the prevailing MSP of wheat for a yield of 20 quintal/acre (Appendix F). On the other hand, if farmer did not sell 85 per cent of its produce to the firm, then he had to pay penalty equivalent to 10 per cent of the value of the crop. The company preferred that the farmer would sow sugarbeet on atleast 3 acres of land, but in

practice, they had large number of contract farmers growing crop only on one acre.

4.2.4 Agronomical guidance

The company had appointed about 100 graduates as surveyors in selected villages. While appointing surveyors, the graduate with B.Sc. (Agriculture) was given preference. The company also provided fuel and mobile facility along with salary to the surveyors for easy communication with the farmers and higher authorities for timely assistance and feedback. The surveyors visited the farm once in a week and guided each farmer about agricultural practices in terms of techniques to be used for sowing and harvesting, kind of fertilizers and pesticides to be used, when and in what proportion to be used besides discussing various farm level problems and giving remedial solutions. The surveyor maintained a register in which all details regarding acreage, variety, sowing date, quantity of fertilizer, pesticide applied and number of irrigation along with time of application on contract crop for each and every farm was noted. The company also provided one information note along with one official page to the farmer, in which every detail of the sugarbeet crop like sowing date, application of pesticide and insecticide, irrigation, etc. was written by the surveyor and that note remained with the farmer (Appendix G). The company also arranged camps for the farmers, where they were provided information regarding the quantity and schedule of pesticide and insecticide to be used on the crop. The first hand information was also given related to diseases on sugarbeet.

4.2.5 Seeds and other inputs

RSL supplied quality sugarbeet seeds to the contract farmers because these seeds were not available in the open market. Therefore, the company imported the seeds from SES Vanderhave- a Belgium based company and supplied to the farmers at 75 per cent subsidized rate. The payment for the seed was deducted by the company while making payments to the farmers for the final produce. The company also provided the insecticide and pesticide at 25 per cent subsidized rate to the contract farmers. Further, the company also provided the facility of sugarbeet harvester.

4.2.6 Opening bank account

The farmers had to open saving accounts in either State Bank of Patiala, State Bank of India, IDBI Bank or UCO bank (Table 4.1). The company did all the necessary work to open the farmers' bank account. The company also provided loan facility of ₹ 20,000/ acre to farmers for sowing sugarbeet with a maximum amount of loan ₹ 1,00,000. The payment of the produce was made either through cash or bank account within one month. In 2014-15 crop season, the payments were delayed for 3 months due to fall in sugar prices.

4.2.7 Procurement and processing

RSL procured the entire produce of sugarbeet from the farmers without any grading as there was no another market for the crop in the state. Also, the varieties of the sugarbeet under contract were only grown by the contract farmers. There was non-availability of seed in the open market. So, there was a bonded form of contract between both the parties, the firm and the farmers as both had to depend upon each other for the sugarbeet crop. The company gave a slip to the farmers for bringing the produce at the company gate on the basis of sowing date and the processing capacity of the company. After harvesting the crop, the farmers had to immediately transport the produce within 24 hours to the company, otherwise its quality deteriorates. The farmers who were supplying over a distance of 20 km, the company provided ₹ 10 more than the fixed price for produce as transport charges, while for those who bring it from more than 100 km, the company arranged truck facility and transport cost was equally borne by both the parties (Photo 4.3). The sugar is extracted by diffusion process from beet. The beet roots are washed and cut into thin slices (Photo 4.4). After that slices are dipped into hot water that infuse the sugar out and forms syrup. The syrup is then filtered and boiled again. Finally, it is dried to sugar (Figure 4.2). The sugar produced in the company was mainly sold in Punjab, Jammu & Kashmir and Rajasthan markets. The company also faced some problems in sugarcane crop as its prices were fixed by the government on quantity rather than on the quality basis. Thus, the farmers with poor quality produce had also to be given the same price. Due to this, the company was not able to make timely payments to sugarbeet growers and many farmers left the contract with the company. Since there did not exist the proper weedicides for the new varieties of the sugarbeet,

there was high incidence of weeding resulting in high manual labour costs on weeding.

Figure 4.2

Flow Chart of Sugarbeet Processing at Rana Sugars Limited

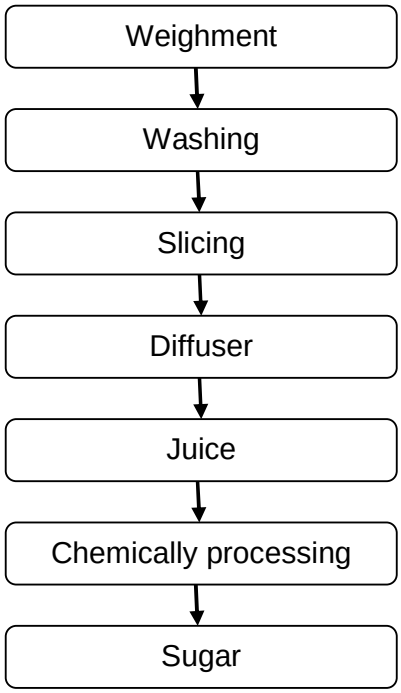


Photo 4.3

Loading of Sugarbeet in Truck by Hired Labour of Farmer at Farm

Photo 4.4

Processing Plant of Sugarbeet at Rana Sugars Limited

4.3 Paras Spices Pvt. Ltd.: A Profile

4.3.1 History of Paras Spices Pvt. Ltd.

The company was initiated as Paras Enterprises in 1982 to cater the need of high quality spices in India. Initially, it supplied to Nestle. Paras Spices began its journey from being a local supplier of spices to a supplier of international quality savory ingredients. Paras Spices started its operations in 1985. It has two production sites, one at village Khosa Pando in Moga district and other at Pantnagar, Uttarakhand. It is globally recognized manufacturer of spices and blending and seasoning of spices and for dehydrated vegetables and herbs like onion, garlic, oregano, parsley, etc. Paras Spices is also involved in the processing and roasting of chicory and its large part is exported mainly to Africa. Over the years, Paras Spices Pvt. Ltd. had also grown from being just a commodity vendor to an associate partner of many major global consumer brands across 15 countries. It is now a bona-fide producer of premium food ingredients. The company has the facility of all the critical quality parameters like estimation of 'RS' (Reducing Sugar) and Total Extractable Matter. In 2011, Paras group opened new unit for cattle feed in Khosa Pando village of Moga, named as Paras Nutritions Private Limited. Paras Spices Pvt. Ltd. had permanent staff strength of 101 and employed about 300 casual workers. It had fully mechanized processing plant with approximately 12,000 tonnes annual capacity and a covered area of 1.30 lakh sq. ft. The company had wide range of retail products under the brand name, 'KLS gold spices' such as *anardana* powder, black pepper powder, *chana masala*, *chat masala*, ginger powder, turmeric powder, *kasoori methi*, butter milk *masala, meat masala,* mint *chutney, raita masala,* red chilli powder, *sambar masala, tea masala*, etc. Paras Spices Pvt. Ltd. has also associations across industries i.e. culinary industry, coffee chains, snacks industry, quick service restaurant, premium hotel groups, restaurant chains, catering service and modern retail chains. Paras Spices Pvt. Ltd. sold its processed chicory to Nestle, besides exporting it to other countries. It also provided spices and ingredients to the food companies such as PepsiCo, Nestle, Britannia, Dunkin Donuts, Coca-cola, Haldiram's, McCain, etc.

4.3.2 Contract farming

Paras Spices Pvt. Ltd. had partnered with farmers to start the plantation of spices. The company worked on 700 acres of area by providing inputs and technical support to the farmers. Paras Spices Pvt. Ltd. is pioneer in introducing chicory cultivation in Punjab. For the objective of sustainable sourcing chicory throughout the year, it was extensively engaged in backward integration of chicory by working in tandem with the vast network of local farmers all over Punjab. The company had contract in ORCHIES variety of chicory in Punjab.

Chicory was processed in the company's state-of-the-art plant in the form of roasted and unroasted cubes and exported to other countries due to its compliance to international quality standards. Paras Spices Pvt. Ltd. initially started the contract farming of chicory with 15-20 farmers in 2006-07. Now, it practices contract farming with 150-200 farmers in Punjab on about 450 acres of land. Paras Spices Pvt. Ltd. mainly preferred the farmers from surrounding area of 40-50 kms of the company. The catchment districts of the company were Moga, Ludhiana, Ferozpur and Faridkot. The company had condition that farmers could not grow the same contract crop with any another company. As in such situation, the chances of contract violation increased because the farmers could sell their produce to the other company. The company chooses the farmers on the basis of soil quality, availability of irrigation and transport (tractor-trolley) facility. However, the company also faced the problem of some procurement issues. Firstly, the contract farmers while harvesting the produce did not make efforts to remove the mud which leads to the problem of contamination and hence, increase the weight of yield. Secondly, sometimes farmers did not bring their produce according to pre-agreed date mentioned on the slip. As a result, quantity of arrived produce increases more than the processing capacity of the firm during peak season. Thus, the farmers had to wait for their turn for longer time and sometimes, the quality of produce also deteriorated. The company had also started trails in cumin and chilli crop.

4.3.3 Agronomical guidance

The company had appointed an 'Area Manager', who visited the farm once in two weeks and guided the farmers regarding irrigation and varieties, timings and

quantity of pesticides to be applied. The Area Manager maintained a register in which all details with respect to sowing dates, acreage and quantity of various inputs applied on chicory crop for each and every farmer was noted along with farmers' signature. One Area Manager guided approximately 30 farmers.

4.3.4 Inputs and incentives

The company sourced chicory seeds from Europe and after acclimatizing them in-house, these were provided to the farmers along with technical aid backed by inputs gathered from PAU, Ludhiana. The company also assisted farmers in getting easier financial help. The company sows the seeds at the farmers' field with its own sowing machine. Even at the harvesting time, the company dug the crop with digger. The company charged ₹ 1700/acre from the farmer for provision of seeds, sowing and digging machine on returnable basis. The company deducted this input cost from the final produce.

4.3.5 Payment

The company announced the price in writing at the start of the season. The price of the chicory crop was fixed on the basis of prices in the international market. The company pays within one week after procuring the produce through cheque after deducting the input costs. The payment was generally done on Wednesday. During 2015-16, the price announced for chicory was ₹ 340/quintal (Table 4.1).

4.3.6 Procurement and processing

Paras Spices Pvt. Ltd. procured the whole produce from the farmers as there was no other market of the crop in the state. Firstly, the company machine dug the crop and then labour of the farmer collected the chicory roots from the field. After cutting the leaves from the chicory root, it was loaded into the trolley. Farmers themselves had to bring the produce to the firm in trolleys. All the produce was procured, nothing was rejected. But, there was a condition that farmer had to bring the produce within 24 hours of harvesting and without mud along with produce. Because after 24 hours, the chicory starts shrinking and its quality level degrades. Thereafter, it becomes difficult to cut it into cubes (Figure 4.3). The company had a processing capacity of 50-60 trolleys/day with each trolley weighing around 50

quintals. The slips were given to the farmers for bringing their produce at the firm on the basis of sowing date to avoid the oversupply on a given day.

Figure 4.3

Flow Chart of Chicory Processing at Paras Spices Pvt. Ltd.

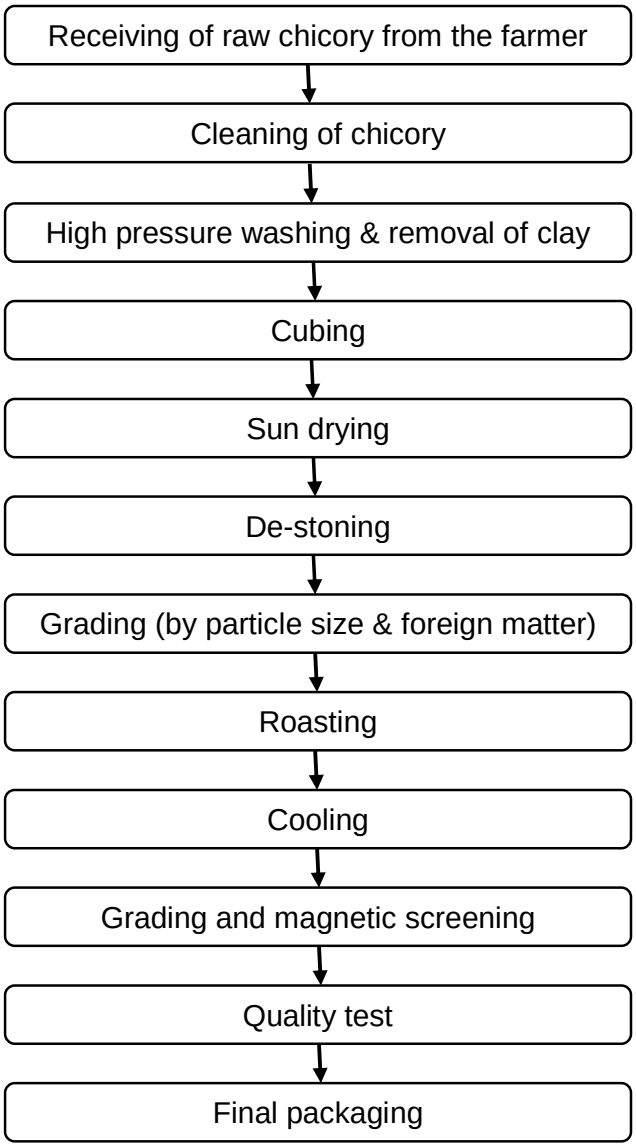


Table 4.1
Key Features of Contract Farming Companies Studied

Particulars	PepsiCo	Rana Sugars Limited	Paras Spices Pvt. Ltd.
Year of Establishment in state	1989	1993	1985
Type of contract	Written	Written	Written
Language of contract	English	Punjabi	English
Criteria for choosing area	Sandy loam soil with pH value 7.5	All over Punjab, but more preference to nearby areas	40-50 km surrounding area of the firm & sandy loam soil
Criteria for choosing farmer	At least 5 acre land for potato crop; resource endowment (farm machinery, assured irrigation facility)	Assured irrigation facility	Assured irrigation facility
Preference for farmer	5 to 10 acres	All	All
Input supply	Seeds and Chemical kit from Bayer	Seeds	Seeds
Price	A & B- ₹ 10/ kg C- ₹ 8/ kg D & Z- ₹ 4.50/ kg	₹ 170/ quintal	₹ 340/quintal
Mode of payment	Account payment	Cash and account payment	From 2013 onwards cheque, earlier cash payment
Time of payment	Within 10 days after the day of last delivery of produce	Within a month	Within a week
Price fixation	Pre-determined	Pre-determined	Pre-determined
Technical guidance	Free of cost	Free of cost	Free of cost
Compensation in the event of crop failure	Crop insurance from Skymet for natural calamity	Till now, no crop failure took place	In 2012, due to heavy rain all crop destroyed but company paid to the farmers
Advanced payment	₹ 25000/ acre loan from Karur Vysya bank	₹ 20000/acre loan from IDBI bank	Only to known farmers, company provide credit for inputs

Source: Field Survey

CHAPTER 5
A COMPARATIVE ANALYSIS OF SOCIO-ECONOMIC CHARACTERISTICS AMONG CONTRACT AND NON-CONTRACT FARMERS

Since the contract farming firms selects the farmers with certain pre-conditions, which distinguish the farmers into two categories, one who participate in contract farming and other, who does not participate in contract farming and may or may not grow the same contracted crop. The chapter aims at finding whether contract farming firms distinguish between the farmers while selecting them based on various socio-economic characteristics such as land, level of education, ownership of farm machinery, etc.

5.1 PepsiCo

5.1.1 Land size

The contract farmers had an average land ownership of 13.8 acres as compared to 11.9 acres among non-contract farmers. Land ownership among medium and large non-contract farmers was found to be higher than that among contract farmers. The reason is that the company preferred to assign a contract for potato crop to the farmer with 10 acres under the crop as it helps the company to build long-term relation with large number of farmers. Secondly, the chances are more that the farmers growing potato on large number of acres mix production or seed with the open market varieties to earn more profit. In order to avoid such situation, company mainly preferred the medium category farmers for contract instead of large farmers. The average size of operational land holdings among contract farmers was 38.44 acres as compared to 22.2 acres among non-contract farmers. The average size of operational land holding in each farmer category in case of contract farmers was 10 acres among semi-medium, 18.5 acres among medium and 49.48 acres among large farmers; while it was 4.6 acres among small, 9.1 acres among semi-medium, 19.1 acres among medium and 46.8 acres among large farmers in case of non-contract farmers. Even the average size of operational holding in each farmer category was turned out to be higher among contract farmers as compared to non-contract farmers except in the case of medium non-contract farmers, where average size of operational holding was slightly higher than that among the contract farmers.

Farmers in both contract and non-contract categories resorted to the practice of leasing-in the land for cultivation. The proportion of leased-in land in operated area was around 64 per cent among contract farmers as compared to 46 per cent among non-contract farmers. The proportion of leased-in land in operational holding was 18.3 per cent among semi-medium contract farmers as compared to 30.4 per cent and 26.4 per cent in case of small and semi-medium non-contract farmers respectively, about 48 per cent in medium contract farmers compared to 40 per cent in non-contract farmers and about 67 per cent in large contract farmers as against 53 per cent in case of large non-contract farmers (Table 5.1). It is evident from the above analysis that leased-in area has increased with the increase in operational land holding.

Apparently, the large contract farmers tried to lease-in more land to increase their operational land holding for gaining the economies of scale. Another study has also revealed that the percentage of leased-in land in operational holding was higher among contract farmers (43 per cent) than that among non-contract farmers (29 per cent) (Kumar, 2006). However, leasing-out practice was found to be negligible among both contract and non-contract farmers. Only 0.22 per cent of land was leased-out by the large contract farmers. Under contract farming, only 6 per cent farmers belonged to semi-medium category as compared to 40 per cent in small and semi-medium categories among non-contract farmers. About 66 per cent of the farmers under contract were large, while the proportion of large farmers was only 28 per cent among non-contract farmers (Table 5.2). Thus, there was not even a single small or marginal farmer under contract with the company. Even the semi-medium farmers under the contract had about 10 acres of operational holding. Most of the farmers in the study area leased-in land as around 82 per cent contract and 80 per cent non-contract farmers had taken land on lease. There was almost negligible trend among farmers to lease-out their land. The study area had large number of NRI families. They lease-out their entire land for cultivation to other farmers. These results were also corroborated by Witsoe (2006) which showed that most of the leased-in land in Jalandhar district was from NRIs.

Table 5.1

Category-wise Land Holding Details of Contract and Non-contract Farmers (in acres)

Category	Land owned	Leased-in land	Leased-out land	Operated land	Leased-in land as %age of operated area	Leased-out land as %age of operated area
Contract farmers						
Semi-medium	8.17	1.83	-	10	18.3	-
Medium	9.5	9	-	18.5	48.6	-
Large	16.14	33.45	0.11	49.48	67.6	0.22
All	13.8	24.71	0.07	38.44	64.3	0.2
Non-contract farmers						
Small	3.2	1.4	-	4.6	30.4	-
Semi-medium	6.7	2.4	-	9.1	26.4	-
Medium	11.4	7.7	-	19.1	40.3	-
Large	21.7	25.1	-	46.8	53.6	-
All	11.9	10.3	-	22.2	46.4	-

Table 5.2

Category-wise Distribution of Contract and Non-contract Farmers by Leasing-in and Leasing-out Activities

Category	No. of farmers	No. of farmers leasing-in land	No. of farmers leasing-out land
Contract farmers			
Semi-medium	3 [6]	1 (33.3)	-
Medium	14 [28]	12 (85.7)	-
Large	33 [66]	28 (84.8)	1 (3.03)
All	50 [100]	41 (82)	1 (2)
Non-contract farmers			
Small	7 [14]	4 (57.1)	-
Semi-medium	13 [26]	8 (61.5)	-
Medium	16 [32]	15 (93.7)	-
Large	14 [28]	13 (92.8)	-
All	50 [100]	40 (80)	-

Note: Figures in ( ) indicate percentage to total in each farmer category; [ ] indicate percentage to total contract and non-contract farmers' category.

Further, area under contract production was more than 9 acres in each farmer category. As the company generally preferred to work with farmers who could put about 9-10 acres of the land under contract production, the semi-medium farmers were growing the contract crop on all their operational land holding during the '*zaid*' season, whereas 50 per cent of operated land was under contract crop in case of medium farmers and only 27 per cent in case of large farmers (Table 5.3).

All the operated area under different farmer categories was irrigated. Among contract farmers, about 83 per cent area under cultivation was tubewell irrigated while 17 per cent area was under canal irrigation. Further, on about 2 per cent area, farmers also installed drip irrigation system. However, about 73 per cent area under cultivation was tubewell irrigated in case of non-contract farmers, while 27 per cent area was under canal irrigation. The irrigation pattern among non-contract farmers was almost similar to the irrigation pattern at Punjab level. In Punjab, about 72 per cent of the net irrigated area was under tubewell irrigation and remaining 28 per cent was under canal irrigation during 2013-14 (GoP, 2015). The reason for comparatively lesser area under canal irrigation among contract farmers was that the company preferred to work with the farmers having assured irrigation facility, which was also mentioned in their contractual agreement.

Table 5.3
Category-wise Area under Contract Crop (acres)

Category	Area under contract	Contract land as %age of operated area
Semi-medium	10	100
Medium	9.29	50.2
Large	13.82	27.9
All	12.32	32

Under contractual arrangement, firms sign their contract for production on owned land or controlled by the farmers as the firms want that farmers should follow their cultivation roles in return for credit, inputs and marketing (Baumann, 2000; Prowse, 2012). Among large farmers, about 36 per cent used owned land, while 33 per cent used only leased-in land and about 30 per cent were found to use both

leased-in and owned land for the contract crop cultivation. Among medium farmers, about 42 per cent used owned land, 35 per cent used only leased-in land, while 21 per cent grew contract crop on both owned and leased-in land. For two-third of the semi-medium farmers, the land under contract was owned, while remaining used both leased-in and owned land for contract crop. Thus, 40 per cent of the contract farmers cultivated contract crop on owned land, 32 per cent on leased-in land and remaining 28 per cent did so on both leased-in and owned land. The average owned land under contract crop cultivation was 81 per cent among semi-medium, 56 per cent among medium and 43 per cent among large farmers, while remaining 18 per cent land under contract in case of semi-medium; about 43 per cent in case of medium and 56 per cent in case of large farmers was leased-in land (Table 5.4). Thus, with increase in land size, proportionate share of owned area under contract crop declined while leased-in area increased. The large farmers comparatively put more leased-in land under contract crop cultivation. It is also evident from the proportionate share of leased-in land in cultivated area which was also higher among large farmers than other farmer categories.

Table 5.4
Category-wise Distribution of Contract Farmers by the Type of Land under Contract

Farmer category	No. of farmer			Average area (in acre)		
	Owned	Leased	Both	Owned	Leased	Total
Semi-medium	2 [66.67]	-	1 [33.33]	8.17 (81.7)	1.83 (18.3)	10 (100)
Medium	6 [42.86]	5 [35.71]	3 [21.43]	5.21 (56.1)	4.07 (43.8)	9.29 (100)
Large	12 [36.36]	11 [33.33]	10 [30.30]	6 (43.4)	7.81 (56.5)	13.82 (100)
All	20 [40]	16 [32]	14 [28]	5.91 (47.9)	6.41 (52.1)	12.32 (100)

Note: Figures in [ ] indicate percentage to total farmer in each category; ( ) indicate percentage to total area in each category.

5.1.2 Education

The proportion of illiterates was 12 per cent in case of non-contract farmers, while no one was illiterate in the case of contract farmers. Even the primary and middle level literate farmers were slightly higher among non-contract farmers (16 per cent) than that among contract farmers (12 per cent). The proportion of graduates was same among both contract and non-contract farmers. But, no one was post-graduate in case of contract farmers as compared to 4 per cent post-graduates among non-contract farmers. Further, the proportion of higher secondary farmers was higher among contract farmers (34 per cent) than that among non-contract farmers (28 per cent). The matric holders were also turned out to be higher in case of contract farmers (42 per cent) as compared to non-contract farmers (28 per cent). Apparently, the contract farmers were better in terms of literacy level than the non-contract farmers (Table 5.5). Another study by Dhillon and Singh (2006) also revealed that education level and the adoption of contract farming in Punjab were highly and positively related to each other. Further, as revealed in Table 5.6, contract farmers on an average attended the school for 10-11 years, while non-contract farmers were found to attend the school for relatively less number of years than the contract farmers. On an average, non-contract farmers attended the school for about nine years.

Table 5.5

Category-wise Distribution of Contract and Non-contract Farmers by Literacy level

Literacy level/ Category	Illiterate	Primary (up to 5th standard)	Middle (6th - 8th)	Matric	Higher secondary	Graduate	Post-graduate
Contract farmers							
Semi-medium	-	-	-	2 (66.67)	1 (33.33)	-	-
Medium	-	-	1 (7.14)	7 (50)	4 (28.57)	2 (14.28)	-
Large	-	1 (3.03)	4 (12.12)	12 (36.36)	12 (36.36)	4 (12.12)	-
All	-	1 (2)	5 (10)	21 (42)	17 (34)	6 (12)	-
Non-contract farmers							
Small	1 (14.3)	-	-	3 (42.8)	2 (28.6)	1 (14.3)	-
Semi-medium	1 (7.7)	2 (15.4)	2 (15.4)	2 (15.4)	4 (30.8)	1 (7.7)	1 (7.7)
Medium	1 (6.3)	3 (18.7)	-	7 (43.7)	4 (25)	1 (6.3)	-
Large	3 (21.4)	1 (7.1)	-	2 (14.3)	4 (28.6)	3 (21.4)	1 (7.1)
All	6 (12)	6 (12)	2 (4)	14 (28)	14 (28)	6 (12)	2 (4)

Note: Figures in parentheses indicate percentage to total in each category.

Table 5.6
Category-wise Average Number of Education Years among Contract and Non-contract Farmers

Category	Contract farmers	Non-contract farmers
Small	-	9.6
Semi-medium	10.33	9.3
Medium	10.93	9.0
Large	10.76	9.4

5.1.3 Age, household size and farm family workers

Age of the farmer can be associated with the accretion of skills in one activity that leads to specialization in fewer crops (Minot *et al.*, 2006). The medium and large contract farmers were relatively younger as compared to the non-contract farmers. However, semi-medium non-contract farmers were much younger than the semi-medium contract farmers. Thus, on an average, age of contract farmers was about 41 years as against 43.6 years among non-contract farmers. Family size also plays an important role in farming particularly in labour intensive vegetable crops. Generally, larger family size implies more farm family workers resulting in positive land allocation to vegetables (Birthal *et al.*, 2007). The family size among both contract and non-contract farmers was turned out to be 5.8 and 6.1, respectively. The average family size of contract farmers was 2.6 in case of semi-medium farmers, 4.5 in case of medium farmers and 6.7 in case of large farmers as compared to 4.7, 5.3, 6.1 and 7.6 in case of small, semi-medium, medium and large farmers, respectively among non-contract farmers. Thus, family size of non-contract farmers was found to be higher as compared to the contract farmers. The proportion of farm family worker was highest among medium contract farmers (51.9) as compared to all other categories of both contract and non-contract farmers. Overall, the proportion of farm family worker was similar among both contract and non-contract farmers (Table 5.7).

Table 5.7

Category-wise Average Family Structure of Contract and Non-contract Farmers

Family details/ Category	Average age of farmer (years)	Adult		Children	Average family size	Farm workers	%age of farm workers in family
		Male	Female				
Contract farmers							
Semi-medium	57	1.33	1.33	-	2.67	1.33	51.9
Medium	38.30	2.14	1.64	0.71	4.5	1.21	26.8
Large	40.82	2.9	2.75	1	6.69	1.70	25.4
All	41.08	2.62	2.36	0.86	5.84	1.54	26.4
Non-contract farmers							
Small	43.8	2.1	2	0.6	4.7	1.3	27.6
Semi-medium	37.3	2.5	2.1	0.8	5.3	1.7	32.1
Medium	45	3	2.6	0.5	6.1	1.6	26.2
Large	47.8	3.4	3	1.1	7.6	2.2	28.9
All	43.6	2.9	2.5	0.8	6.1	1.7	27.9

5.1.4 Allied farm and non-farm income

The income from allied farm and non-farm sources helps the farmers to bear the risk from the cultivation of the crops as such. The average income from allied farm and non-farm activities was turned out to be higher among non-contract farmers (₹ 11,163/month) as compared to contract farmers (₹ 9,052/month). However, income from non-farm sector was higher in case of contract farmers (₹ 6660/month) as compared to non-contract farmers (₹ 4500/month), while income from allied farm activities was higher among non-contract farmers (₹ 6663/month) as compared to the contract farmers (₹ 2391/month). The non-contract small farmers earned ₹ 14571.4 per month from dairying alone (Table 5.8). Among all categories of contract and non-contract farmers, the proportionate share of income from dairying was much higher than other farm allied activities. Furthermore, income from dairying was also higher among non-contract farmers (₹ 5380/month)

as compared to only ₹ 1850/month among contract farmers. Hence, it can be concluded that contract farmers not only had higher income from non-farm activities as compared to their counterparts, but the proportion in earning such income was also higher among contract farmers (26 per cent) than the non-contract farmers (18 per cent).

5.1.5 Farmer's association with contract firm

The long association between the farmers and the firms indicates the mutual trust that they are able to build with each other. The semi-medium farmers were found to supply potato to PepsiCo for the past six years (Table 5.9). As earlier the company's contract acreage condition was of at-least 5 acres under the potato crop. The medium and large farmers were involved in contract farming for about five years. The proportion of farmers supplied to contract firm between two to less than five years were highest among semi-medium farmers (66.7 per cent) followed by medium (42.8 per cent) and large farmers (36.3 per cent). About 21 per cent of medium and 30 per cent of large farmers were linked to the contracting firm for last two years. Overall 26 per cent were involved in contract for last two years, 40 per cent farmers from two to five years, 18 per cent for more than five to eight years, while 16 per cent farmers supplied for more than eight years to the same firm. However, among those who supplied for more than eight years, 75 per cent were large farmers.

Table 5.8

Category-wise Income of Contract and Non-contract Farmers from Allied Farm and Non-farm Activities (₹/month)

Farmer category	Allied farm income					Non-farm income	Total
	Dairying	Hiring-out farm machinery	Renting out cold store	Rent from leased out land	Total		
Contract farmers							
Semi-medium	-	-	-	-	-	20000 [100]	20000
Medium	1035.7 (68.5)	476.2 (31.5)	-	-	1511.9 [32.9]	3071.4 [67.1]	4583.3
Large	2363.6 (79.2)	265.2 (8.9)	-	353.5 (11.9)	2982.3 [30.0]	6969.7 [70.0]	9952
All	1850 (77.3)	308.3 (12.9)	-	233.33 (9.8)	2391.6 [26.4]	6660 [73.6]	9051.6
Non-contract farmers							
Small	14571.4 (100)	-	-	-	14571.4 [69.4]	6428.6 [30.6]	21000
Semi-medium	3000 (88.6)	384.6 (11.4)	-	-	3384.6 [63.8]	1923.1 [36.2]	5307.7
Medium	1250 (63.2)	729.2 (36.8)	-	-	1979.2 [26.1]	5625 [73.9]	7604.2
Large	7714.3 (62.7)	1369.0 (11.1)	1785.6 (14.5)	1428.6 (11.6)	12297.5 [72.6]	4642.8 [27.4]	16940.3
All	5380 (80.7)	716.7 (10.8)	66.67 (1.0)	500 (7.5)	6663.4 [59.7]	4500 [40.3]	11163.4

Note: Figures in [ ] are percentages to total allied farm and non-farm income in each category; ( ) are percentages to total allied farm income in each category.

Table 5.9

Category-wise Distribution of Contract Farmers by the Number of Years under Contract

Years of linkage/ Farmer category	Upto two year	>2 - ≤5 year	>5 - ≤8 year	> 8 year	Average number of years of association with the company
Semi-medium	-	2 (66.67)	-	1 (33.33)	6
Medium	3 (21.43)	6 (42.86)	4 (28.57)	1 (7.14)	4.64
Large	10 (30.30)	12 (36.36)	5 (15.15)	6 (18.18)	4.85
All	13 (26)	20 (40)	9 (18)	8 (16)	4.86

Note: Figures in parentheses indicate per cent to total in each category.

5.1.6 Farm machinery

The possession of farm machinery was considered as one of the vital selection criteria for the farmers as explained by the company officials during discussion. Information was collected from the sampled farmers for the possession of agricultural implements. Table 5.10 shows that the possession of farm machinery was in general, higher among the contract farmers than that among non-contract farmers. Tractor was owned by all the contract and non-contract farmers. Since, the farmers had contracted the potato crop with the firm, the possession of potato planter and digger was essential. 98 per cent of contract farmers owned potato planter as compared to 90 per cent among non-contract farmers. Potato digger was possessed by 96 per cent among contract farmers as compared to 88 per cent in case of non-contract farmers. No one among non-contract farmers possessed the irrigation generator, but in case of contract farmers, 66 per cent owned generator.

Table 5.10

Category-wise Distribution of Contract and Non-contract Farmers by Ownership of Farm Machinery

Farm Machinery/ Farmer category	Tractor	Trolley	Rotavator	Potato planter	Potato digger	Harrow	Cultivator	Irrigation generator
Contract farmers								
Semi-medium	3 (100)	2 (66.6)	1 (33.33)	2 (66.6)	3 (100)	1 (33.3)	2 (66.6)	-
Medium	14 (100)	13 (92.8)	6 (42.8)	14 (100)	13 (92.8)	10 (71.4)	11 (78.6)	10 (71.4)
Large	33 (100)	32 (97)	21 (63.6)	33 (100)	32 (97)	28 (84.8)	25 (75.7)	23 (70)
All	50 (100)	47 (94)	28 (56)	49 (98)	48 (96)	39 (78)	38 (76)	33 (66)
Non-contract farmers								
Small	7 (100)	7 (100)	-	7 (100)	6 (85.7)	3 (42.8)	1 (14.3)	-
Semi-medium	13 (100)	12 (92.3)	1 (16.6)	9 (50)	10 (83.3)	1 (33.3)	-	-
Medium	16 (100)	16 (100)	2 (7.7)	15 (93.7)	15 (93.7)	2 (12.5)	4 (25)	-
Large	14 (100)	14 (100)	10 (71.4)	14 (100)	13 (92.8)	3 (21.4)	5 (35.7)	-
All	50 (100)	49 (98)	13 (26)	45 (90)	44 (88)	9 (18)	10 (20)	-

Note: Figures in parentheses indicate the percentage to the total in each category.

Further, it can also be inferred that semi-medium contract farmers possessed more farm machinery with an average number of 7.33 than non-contract farmers, who on an average possessed 3.9 farm implements. Similarly, medium contract farmers possessed on an average 9.80 farm implements, while medium non-contract farmers possessed 4.6 farm implements. Furthermore, large contract farmers possessed on an average 12.70 farm implements as against 5.8 farm implements possessed by large non-contract farmers (Table 5.11). Thus, it can be concluded that contract farmers were richer in the ownership of farm machinery as compared to non-contract farmers. Ownership of farm machinery increased with increase in average size of operational holding among both contract and non-contract farmers.

Table 5.11
Category-wise Average Number of Farm Implements possessed by Contract and Non-contract Farmers

Category of farmer	Contract farmers	Non-contract farmers
Small	-	4.4
Semi-medium	7.33	3.9
Medium	9.80	4.6
Large	12.70	5.8
All	11.56	4.7

5.2 Rana Sugars Limited

5.2.1 Land size

The average operational land holding size was much higher in case of contract farmers (24.36 acres) as compared to 11.9 acres in case of non-contract farmers. Although both contract and non-contract farmers used to take land on lease, but leasing-in practice was much higher among contract farmers than that among non-contract farmers. The share of leased-in land in operational holding was about 54 per cent among contract farmers as against only about 29 per cent among non-contract farmers. Furthermore, share of leased-in land in operational holding in each farmer category was also found to be higher among contract farmers as compared to non-contract farmers. In case of contract farmers, share of leased-in land in operational land holding was highest among large farmers (65.6 per cent)

followed by 43.7 per cent among medium, 41.7 per cent among small and 26.1 per cent among semi-medium farmers. However, in case of non-contract farmers, proportion of leased-in land within operational holding was highest in case of large farmers (36.6 per cent) followed by medium farmers (31.9 per cent), semi-medium (22.7 per cent), marginal (13 per cent) and small farmers (9.3 per cent). However, the proportion of leased-out land was just 1.9 per cent among contract farmers (Table 5.12).

The average size of land holding was higher among contract farmers (11.61 acres) than that among non-contract farmers (8.5 acres). Average area owned by small contract farmers was smaller than that owned by small non-contract farmers. Furthermore, for large farmers, average area owned was also smaller among contract farmers (21.68 acres) than that among non-contract farmers (24 acres). Contrary to this, average size of operated land was much higher among large contract farmers (59.3 acres) than that among non-contract farmers (37.7 acres). Similar were the results for the medium farmers. Thus, the analysis reveals that on an average, the contract farmers leased-in more land than their counterparts. Therefore, the contract farmers were able to increase their farm size by leasing-in land.

The farmer category-wise analysis shows that 54 per cent of the medium farmers worked with contract firm followed by 22 per cent large farmers and 18 per cent semi-medium farmers. However, only 6 per cent small farmers were involved in sugarbeet contract crop. Furthermore, not even a single farmer from marginal land holding size category was involved in contract farming. However, 36 per cent of the non-contract farmers in the vicinity of contract farmers belonged to semi-medium category followed by 28 per cent in medium, 20 per cent in small and 8 per cent each to small and large farmer categories. The practice of leased-in land existed among both contract and non-contract farmers. But, 78 per cent of the contract farmers had leased-in land as against 54 per cent non-contract farmers. Around 91 per cent of the large contract farmers were practitioners of leased-in activity, while it was also done by 81.5 per cent medium, 66.7 per cent small and 55.5 per cent semi-medium farmers. Only 4 per cent of the contract farmers

leased-out their land. Surprisingly, among non-contract farmers not even a single farmer leased-out their land.

On the other side, among non-contract farmers, all large farmers had leased-in land as compared to that among medium (78.6 per cent), semi-medium (50 per cent), small (20 per cent) and marginal farmers (12.5 per cent) (Table 5.13). The proportion of small and marginal farmers was only 6 per cent among contract farmers compared to 28 per cent among non-contract farmers (8 per cent marginal and 20 per cent small farmers) and 35 per cent in Amritsar and Tarn Taran district during 2010-11. The large farmers among contract farmers were 22 per cent as compared to 8 per cent among non-contract farmers and around 4 per cent in Amritsar and Tarn Taran districts (Table 3.2). Thus, the above analysis clearly indicates that a contract firm mainly preferred to work with medium and large farmers. All the operated area among contract and non-contract farmers was irrigated. Further, about 89 per cent of the irrigated area was under groundwater irrigation among contract farmers and about 11 per cent was under canal irrigation. However, in case of non-contract farmers, 65.84 per cent of the cultivated area was under groundwater irrigation and around 34 per cent was under canal irrigation.

Table 5.12

Category-wise Land Holding Details of Contract and Non-contract Farmers (in acres)

Category	Land owned	Leased-in land	Leased-out	Operated land	Leased-in land as %age of operated area	Leased-out land as %age of operated area
Contract farmers						
Small	2.33	1.67	-	4	41.7	-
Semi-medium	5.9	2.1	-	8.05	26.1	-
Medium	10.4	7.78	0.37	17.8	43.7	2.1
Large	21.68	38.9	1.27	59.3	65.6	2.1
All	11.61	13.24	0.48	24.36	54.4	1.9
Non-contract farmers						
Marginal	2	0.3	-	2.3	13.0	-
Small	3.8	0.4	-	4.3	9.3	-
Semi-medium	6.8	2	-	8.8	22.7	-
Medium	11.5	5.4	-	16.9	31.9	-
Large	24	13.8	-	37.7	36.6	-
All	8.5	3.4	-	11.9	28.6	-

Table 5.13

Category-wise Distribution of Contract and Non-contract Farmers by Leasing-in and Leasing-out Activities

Category	No. of farmers	Farmers leasing-in land	Farmers leasing-out land
Contract farmers			
Small	3 [6]	2 (66.7)	-
Semi-medium	9 [18]	5 (55.5)	-
Medium	27 [54]	22 (81.5)	1 (2)
Large	11 [22]	10 (90.9)	1 (2)
All	50 [100]	39 (78)	2 (4)
Non-contract farmers			
Marginal	4 [8]	1 (12.5)	-
Small	10 [20]	2 (20)	-
Semi-medium	18 [36]	9 (50)	-
Medium	14 [28]	11 (78.6)	-
Large	4 [8]	4 (100)	-
All	50 [100]	27 (54)	-

Note: Figures in ( ) indicate percentage to total in each farmer category; [ ] indicate percentage to total contract and non-contract farmers' category.

As per Table 5.14, the proportion of contracted land in operated area was highest among small farmer category (50 per cent) followed by semi-medium farmers (37.3 per cent), medium (30.9 per cent) and large farmers (12.8 per cent). On an average, small farmers put 2 acres of land under contract, while 3 acres by semi-medium farmers, 5.5 acres by medium and 7.6 acres by large farmers.

Table 5.14
Category-wise Area under Contract Crop (acres)

Category	Area under contract	Contract land as %age of operated area
Small	2	50
Semi-medium	3	37.3
Medium	5.5	30.9
Large	7.6	12.8
All	5.3	21.8

Further, the small farmers had grown the contract crop on owned land only. While 77 per cent semi-medium farmers used owned land and 22 per cent used leased-in land for the cultivation of contract crop. About 66.67 per cent medium farmers used owned land, 22.22 per cent used leased-in and 11.11 per cent grew it on both owned and leased-in land. In case of large farmers, 54.54 per cent grew contract crop on owned land, 36.36 per cent on leased-in land and 9.1 per cent on both owned and leased-in land. The proportion of owned land under contract crop cultivation was highest among small farmers (100 per cent) followed by semi-medium (76.67 per cent), medium (63.27 per cent) and large farmers (46.64 per cent) (Table 5.15). On the whole, the farmers used about 60 per cent owned land for the cultivation of sugarbeet and remaining crop was grown on leased-in land. The reason to grow the crop on owned land was that during harvesting of crop the leaves of sugarbeet were usually left in the field which acts as green manure for next crop.

Table 5.15

Category-wise Distribution of Contract Farmers by the Type of Land under Contract

Type of land	No. of farmer			Average area (Acre)		
	Owned	Leased	Both	Owned	Leased	Total
Small	3 [100]	-	-	2 (100)	-	2 (100)
Semi-medium	7 [77.78]	2 [22.22]	-	2.3 (76.67)	0.7 (23.33)	3 (100)
Medium	18 [66.67]	6 [22.22]	3 [11.11]	3.48 (63.27)	2.02 (36.73)	5.5 (100)
Large	6 [54.54]	4 [36.36]	1 [9.1]	3.54 (46.64)	4.04 (53.23)	7.59 (100)
All	34 [68]	12 [24]	4 [8]	3.2 (60.38)	2.1 (39.62)	5.3 (100)

Note: Figures in [ ] indicate percentage to total farmer in each category; ( ) indicate percentage to total area in each category.

5.2.2 Education

Education contributes to agricultural production by improving the decision making ability of a farmer (Pudasaini, 1983). Table 5.16 shows that only 2 per cent of the contract farmers were illiterate as against 10 per cent among non-contract farmers. Thus, the illiteracy level was more among non-contract farmers as compared to contract farmers. The proportion of contract farmers with education up to 5^{th} standard was just 2 per cent, while it was 10 per cent among non-contract farmers. Further, contract farmers with middle and secondary level of education were 10 per cent and 32 per cent respectively against 12 per cent and 42 per cent respectively in case of non-contract farmers. On the other hand, higher secondary education was more prevalent among contract farmers (32 per cent) than their counterparts (20 per cent). The proportion of graduates and post-graduates was also higher in case of contract farmers (22 per cent) than that in case of non-contract farmers was just 6 per cent.

Table 5.16

Category-wise Distribution of Contract and Non-contract Farmers by the Literacy level

Literacy level/ Category	Illiterate	Primary (upto 5th standard)	Middle (6th - 8th)	Matric (9th- 10th)	Higher secondary	Graduate	Post-graduate
Contract farmers							
Small	-	-	-	3 (100)	-	-	-
Semi-medium	1 (11.11)	-	-	4 (44.44)	3 (33.33)	-	1 (11.11)
Medium	-	1 (3.7)	2 (7.41)	8 (29.63)	8 (29.63)	6 (22.22)	2 (7.41)
Large	-	-	3 (27.27)	1 (9.09)	5 (45.45)	2 (18.18)	-
All	1 (2)	1 (2)	5 (10)	16 (32)	16 (32)	8 (16)	3 (6)
Non-contract farmers							
Marginal	2 (50)	-	-	1 (25)	1 (25)	-	-
Small	1 (10)	3 (30)	-	6 (60)	-	-	-
Semi-medium	-	1 (5.6)	3 (16.7)	7 (38.9)	6 (33.3)	1 (5.5)	-
Medium	1 (7.1)	1 (7.1)	3 (21.4)	5 (35.7)	3 (21.4)	1 (7.1)	-
Large	1 (25)	-	-	2 (50)	-	1 (25)	-
All	5 (10)	5 (10)	6 (12)	21 (42)	10 (20)	3 (6)	-

Note: Figures in parentheses are percentages to total in each category.

The average number of years on schooling also points out that contract farmers were better in education in comparison with non-contract farmers. Further, average number of education years for the contract farmers increased with increase in farm size. Thus, large contract farmers placed larger emphasis on education than the other farmer categories. The numbers of education years were higher for small contract farmers (10) than the small non-contract farmers (7.4). Furthermore, among all the categories of contract farmers, the number of education years was higher than the non-contract farmers (Table 5.17). Evidently, the above analysis shows that the contract farmers were better in terms of education level than their counterparts.

Table 5.17
Category-wise Average Number of Education Years among Contract and Non-contract Farmers

Category	Contract farmers	Non-contract farmers
Marginal	-	5.5
Small	10	7.4
Semi-medium	10.22	10.12
Medium	11.78	9.14
Large	11.88	8.75

5.2.3 Age, household size and farm family workers

The contract farmers were slightly younger in age in comparison with the non-contract farmers. The average age of contract farmers was about 43 years, while it was 45 years for non-contract farmers. The marginal and small non-contract farmers were elder in comparison with small contract farmers. Therefore, the contract farmers were mainly in young and middle age group showing the least participation from the old age farmers. Even the contract firms have one of the aims to promote it to attract young people in the farming sector. Another study corroborates the finding that contract farming in Punjab is mainly opted by young and middle age farmers (Dhillon and Singh, 2006).

The average household size among contract farmers was largest in case of large farmers (5.9) followed by medium (5.6), semi-medium and small farmers (4.6

each). Therefore, in case of contract farmers, family size increased with increase in land size. However, in case of non-contract farmers, marginal and small farmers had to support more number of members in their households (7.5 and 7.8 respectively). Among non-contract farmers, the average household size was 6 in large, 5.2 in medium and 4.9 in semi-medium farmers. Overall, there was not much difference among all contract and non-contract farmers with respect to their household size.

Among contract farmers, average number of family members working on the farm was highest in case of large and medium farmers (1.4 each) followed by small (1.3) and semi-medium farmers (1.2). Accordingly, the proportion of farm workers among the contract farmer families was highest among small farmers (28.3 per cent) followed by semi-medium (26.1 per cent), medium (25 per cent) and large farmers (23.7 per cent). Among non-contract farmers, on the other hand, the proportion of farm workers from the family was highest in case of marginal farmers (33.3 per cent) followed by semi-medium (30.2 per cent), small and medium (around 28 per cent each) and large farmers (20 per cent). Thus, the general inference drawn from the analysis is that small and marginal farmers relatively depend more upon family labour as compared to large farmers, who hire more workers for the field work (Table 5.18).

Table 5.18

Category-wise Average Family Size of Contract and Non-contract Farmers

Family details/ Category	Average age of farmer (yrs.)	Adult		Children	Average family size	Farm workers	%age of farm workers in family
		Male	Female				
Contract farmers							
Small	34.3	2.3	1.3	1	4.6	1.3	28.3
Semi-medium	44.2	1.7	2	0.9	4.6	1.2	26.1
Medium	43.5	2.4	2.2	1.0	5.6	1.4	25.0
Large	42.5	2.6	2.5	0.8	5.9	1.4	23.7
All	42.9	2.3	2.2	0.9	5.4	1.4	25.9
Non-contract farmers							
Marginal	55.7	3.7	3	0.7	7.5	2	33.3
Small	52.9	3.7	2.3	1.8	7.8	1.9	28.4
Semi-medium	40.6	2.2	2	0.7	4.9	1.4	30.2
Medium	40.9	2.3	2.1	0.8	5.2	1.4	28.3
Large	48.5	2.5	2.5	1	6	1.3	20
All	45	2.7	2.2	1	5.9	1.6	27.1

5.2.4 Allied farm and non-farm income

The average income from allied farm activities was higher among contract farmers (₹ 6,157/month) than non-contract farmers (₹ 5,480/month). Furthermore, non-farm income was also substantially higher among contract farmers (₹ 10,080/month) than non-contract farmers (₹ 5,240/month). The small, marginal and large farmers among both contract and non-contract farmers earned relatively more income from non-farm activities as compared to farm allied activities. The dairying had highest proportion in the income from allied farm activities among all contract farmers followed by rent from leased-out land and custom hiring of farm machinery. On the other hand, income from custom hiring of farm machinery was the largest contributor in income from allied farm activities followed by income from dairying (₹ 2720/month) among non-contract farmers (Table 5.19).

5.2.5 Farmer's association with contract firm

The average number of years under contract with the firm were turned out to be highest among large contract farmers (3.4 years) followed by medium (2.8 years), semi-medium and small farmers (2.7 years each). Thus, the proportion of farmers who supplied sugarbeet to contract firm for more than three years were highest among large farmers (54.5 per cent) followed by medium (14.8 per cent) and semi-medium farmers (11.1 per cent). Surprisingly, not even a single small farmer supplied to firm for more than 3 years. 66.7 per cent of small, 55.6 per cent each of semi-medium and medium farmers and 27.3 per cent of large farmers supplied to firm for more than two years to up to three years. Only 11.1 per cent of semi-medium and 7.4 per cent of medium farmers started supplying during last one year only. The majority of the contract farmers were associated for more than two to three years. Therefore, it is evident from the analysis that association of the large farmers was relatively older with the contract firm as compared to all other categories of the contract farmers (Table 5.20).

Table 5.19

Category-wise Income of Contract and Non-contract Farmers from Allied Farm and Non-farm Activities (₹/month)

Farmer category	Allied Farm income				Non-farm income	Total
	Dairying	Hiring-out farm machinery	Rent from leased out land	Total		
Contract farmers						
Small	-	-	-	-	11666.7 [100]	11666.7
Semi-medium	3333.3 (78.9)	888.9 (21.1)	-	4222.2 [32.48]	8777.8 [67.52]	13000
Medium	4814.8 (78.2)	259.3 (4.2)	1080.2 (17.6)	6154.3 [40.12]	9185.2 [59.88]	15339.5
Large	5636.4 (59.8)	-	3787.9 (40.2)	9424.3 [42.80]	12909.1 [57.80]	22333.4
All	4440 (72.1)	300 (4.9)	1416.7 (23.0)	6156.7 [37.92]	10080 [62.08]	16236.7
Non-contract farmers						
Marginal	4250 (100)	-	-	4250 [13.18]	28000 [86.82]	32250
Small	1000 (100)	-	-	1000 [12.5]	7000 [87.5]	8000
Semi-medium	1555.6 (20.3)	6111.1 (79.7)	-	7666.7 [84.66]	1388.9 [15.34]	9055.5
Medium	4071.4 (67.1)	2000 (32.9)	-	6071.4 [89.47]	714.3 [10.53]	6785.7
Large	6000 (100)	-	-	6000 [34.78]	11250 [65.22]	17250
All	2720 (49.6)	2760 (50.4)	-	5480 [51.12]	5240 [48.88]	10720

Note: Figures in [ ] are percentages to total allied farm and non-farm income in each category; ( ) are percentages to total allied farm income in each category.

Table 5.20

Category-wise Distribution of Contract farmers by the Number of Years under Contract

Years of linkage/ Farmer category	Upto one year	>1 - ≤ 2 year	>2 - ≤ 3 year	>3 - ≤ 4 year	Average year under contract
Small	-	1 (33.3)	2 (66.7)	-	2.7
Semi-medium	1 (11.1)	2 (22.2)	5 (55.6)	1 (11.1)	2.7
Medium	2 (7.4)	6 (22.2)	15 (55.6)	4 (14.8)	2.8
Large	-	2 (18.2)	3 (27.3)	6 (54.5)	3.4
All	3 (6)	11 (22)	25 (50)	11 (22)	2.9

Note: Figures in parentheses indicate per cent to total in each category.

5.2.6 Farm machinery

The ownership of all types of farm machinery was comparatively higher among contract farmers as compared to their counterparts. 98 per cent of the contract farmers possessed tractors as compared to 90 per cent non-contract farmers. Similarly, trolley ownership was also higher among contract farmers (90 per cent) as compared to non-contract farmers (80 per cent). Even among contract farmers, 8 per cent farmers had two tractors, while 6 per cent had double trolleys. Further, ownership of rotavator was found to be higher among large contract farmers (54.5 per cent) as compared to large non-contract farmers (25 per cent). This revealed superiority of the contract farmers in terms of ownership of farm machinery. Furthermore, 66 per cent of the contract farmers also possessed harrow as compared to 34 per cent among non-contract farmers. Similarly, cultivator ownership was also higher among contract farmers (66 per cent) as compared to non-contract farmers (46 per cent) (Table 5.21).

Table 5.21

Category-wise Distribution of Contract and Non-contract Farmers by Ownership of Farm Machinery

Farm Machinery/ Farmer category	Tractor	Trolley	Rotavator	Peas planter	Potato digger	Harrow	Cultivator	Irrigation generator
Contract farmers								
Small	3 (100)	2 (66.7)	-	-	-	-	1 (33.3)	-
Semi-medium	8 (88.9)	7 (77.8)	1 (11.1)	-	-	3 (33.3)	4 (44.4)	-
Medium	27 (100)	25 (95.6)	4 (14.8)	2 (7.4)	1 (3.7)	19 (70.37)	21 (77.8)	2 (7.4)
Large	11 (100)	11 (100)	6 (54.5)	1 (9.1)	2 (18.2)	11 (100)	7 (63.6)	4 (36.4)
All	49 (98)	45 (90)	11 (22)	3 (6)	3 (6)	33 (66)	33 (66)	6 (12)
Non-contract farmers								
Marginal	1 (25)	1 (25)	-	-	-	-	1 (25)	-
Small	8 (80)	5 (50)	-	1 (10)	-	1 (10)	2 (20)	1 (10)
Semi-medium	18 (100)	16 (88.9)	-	1 (5.6)	-	6 (33.3)	8 (44.4)	-
Medium	14 (100)	14 (100)	1 (7.1)	-	-	7 (50)	11 (78.6)	1 (7.1)
Large	4 (100)	4 (100)	1 (25)	1 (25)	-	3 (75)	1 (25)	2 (50)
All	45 (90)	40 (80)	2 (4)	3 (6)	-	17 (34)	23 (46)	4 (4)

Note: Figures in parentheses indicates the percentage to the total in each category.

The same was also evident from the average number of farm implements possessed by the contract and non-contract farmers. The average number of farm implements was 3.7 in contract farmers, while it was only 2.6 in non-contract farmers. Further, all the categories of contract farmers possessed more agricultural machinery as compared to non-contract farmers except the semi-medium farmers, as semi-medium contract and non-contract farmers possessed almost similar number of agricultural implements. The large contract farmers, on an average, possessed higher farm implements (5.1) than their counterparts (4.0). The above discussion clearly reveals that the company preferred to work with farmers who owned better farm machinery (Table 5.22).

Table 5.22
Category-wise Average Number of Farm Implements Possessed by Contract and Non-contract Farmers

Category of farmer	Contract farmers	Non-contract farmers
Marginal	-	0.75
Small	2	1.8
Semi-medium	2.6	2.7
Medium	3.7	3.4
Large	5.1	4
All	3.7	2.6

5.3 Paras Spices Pvt. Ltd.

5.3.1 Land size

The land ownership pattern indicates that contract farmers possessed slightly higher land (8.1 acres) than the land owned by non-contract farmers (7.8 acres). Surprisingly, the company was found to work with only semi-medium, medium and large farmers excluding small and marginal farmers. Further, land owned by these three categories was 4.1 acres, 7.3 acres and 10.1 acres respectively, which was lower than that among non-contract farmers (5.4, 12.6 and 17.8 acres respectively). Furthermore, average operational land holdings among semi-medium and medium contract farmers were lower than that among non-contract farmers. However, average size of operational holdings was higher among large contract farmers (42.8 acres) compared to that among large non-contract farmers

(39 acres). The average size of operational land holdings in case of contract farmers was found to be 25.7 acres compared to smaller land holdings in case of non-contract farmers (12.3 acres). The contract farmers did not have any marginal and small farmers compared to 32 per cent in case of non-contract farmers. Therefore, in terms of operational holdings, on an average contract farmers were large farmers, while non-contract farmers were medium farmers.

The practice of leasing-in land was found to be much higher among contract farmers than the non-contract farmers. The proportion of leased-in land in operational holding among contract farmers was about 41 per cent in case of semi-medium, about 56 per cent in medium, 76 per cent in case of large farmers as compared to 36.9 per cent, 33.7 per cent and 54 per cent respectively in case of non-contract farmers. Overall, the proportion of leased-in land in operational holdings among contract farmers was around 68 per cent, which was higher than non-contract farmers (39 per cent). Thus, the contract farmers leased-in large proportion of land to increase their operational holdings in order to improve their economies of scale (Table 5.23).

The bigger size of the operational holdings among contract farmers can also be found from the fact that the proportion of large farmers was 38 per cent among contract farmers as compared to only 10 per cent among non-contract farmers. Similarly, the proportion of medium farmers was double among contract farmers (52 per cent) in comparison with non-contract farmers (26 per cent). No one from the marginal and small farmers' category was indulged in chicory contract farming (Table 5.24). Therefore, it may be concluded that small and marginal farmers were excluded from contractual arrangement. Further, the proportion of marginal and small operators among non-contract farmers was 14 per cent and 18 per cent respectively as compared with the proportion of marginal holders (17 per cent) and small holders (20 per cent) in Moga district (Table 3.2). About 92 per cent of the cultivated area was irrigated through groundwater and the remaining 8 per cent area was under canal irrigation among contract farmers. On the other hand, in case of non-contract farmers, about 88 per cent of the operated area was under groundwater irrigation, while 12 per cent was under canal irrigation.

Table 5.23

Category-wise Land Holding Details of Contract and Non-contract Farmers (acres)

Category	Land owned	Leased in land	Leased out	Operated land	Leased-in land as %age of operated area	Leased-out land as %age of operated area
Contract farmers						
Semi-medium	4.1	2.9	-	7	41.4	-
Medium	7.3	9.4	-	16.7	56.3	-
Large	10.1	32.7	-	42.8	76.4	-
All	8.1	17.6	-	25.7	68.5	-
Non-contract farmers						
Marginal	1.8	-	-	1.8	-	-
Small	3.8	0.6	-	4.4	13.6	-
Semi-medium	5.4	3.1	0.1	8.4	36.9	1.2
Medium	12.6	6.1	0.6	18.1	33.7	3.3
Large	17.8	21.2	-	39	54.4	-
All	7.8	4.8	0.3	12.3	39.0	2.4

Table 5.24

Category-wise Distribution of Contract and Non-contract Farmers by Leasing-in and Leasing-out Activities

Category	No. of farmers	No. of farmers leasing-in land	No. of farmers leasing-out land
Contract farmers			
Semi-medium	5 [10]	4 (80)	-
Medium	26 [52]	25 (96.2)	-
Large	19 [38]	19 (100)	-
All	50 [100]	48 (96)	-
Non-contract farmers			
Marginal	7 [14]	-	-
Small	9 [18]	2 (22.2)	-
Semi-medium	16 [32]	9 (56.2)	1 (6.25)
Medium	13 [26]	8 (61.5)	1 (7.69)
Large	5 [10]	4 (80)	-
All	50 [100]	23 (46)	2 (4)

Note: Figures in ( ) indicate percentage to total in each farmer category; [ ] indicate percentage to total contract and non-contract farmers' category.

Table 5.25 indicates the proportion of contracted area under chicory in operational holdings. It was turned out to be highest among semi-medium farmers (38.6 per cent) followed by medium (25.1 per cent) and large farmers (11.7 per cent). Thus, with increase in the size of operational land holding, the proportionate share of contract area declines. Overall contract farmers put only 17.1 per cent of their operational land holdings under contract. The development of agribusiness normalization observed in the area does not persuade confidence among farmers. The chances of output rejection by the private firm inhibit the farmers to bring large area under contract farming.

Table 5.25
Category-wise Area under Contract Crop (acres)

Category	Area under contract	Contract land as %age of operated area
Semi-medium	2.7	38.6
Medium	4.2	25.1
Large	5.0	11.7
All	4.4	17.1

Table 5.26 shows type of land used for the cultivation of chicory under contract. Most of the contract farmers used owned land for the cultivation of chicory. The semi-medium farmers used 80 per cent of their owned land, while 20 per cent used both leased-in and owned land for the contract crop. While about 69 per cent of the medium farmers grew contract crop on owned land and 26 per cent used leased-in land and remaining around 4 per cent used both owned and leased-in land. Among large farmers, 58 per cent used owned land and 42 per cent used leased-in land for growing chicory. The average owned land under contract crop cultivation was about 77 per cent each among semi-medium and medium farmers and 54 per cent among large farmers, while 22 per cent area in case of semi-medium, about 23 per cent in case of medium and 46 per cent in case of large farmers was leased-in land. Thus, all the farmers used higher share of owned land as compared to leased-in land in cultivation of contract crop. During field survey, few farmers admitted that chicory leaves were used as green manure in the field

which is beneficial for next crop grown in the plot. Therefore, they preferred to cultivate the crop on the owned land rather than leased-in land.

Table 5.26
Category-wise Distribution of Contract Farmers by Type of Land under Contract

Type of land	No. of farmer			Average area (Acre)		
	Owned	Leased	Both	Owned	Leased	Total
Semi-medium	4 [80]	-	1 [20]	2.1 (77.8)	0.6 (22.2)	2.7 (100)
Medium	18 [69.2]	7 [26.9]	1 [3.8]	3.2 (76.2)	1.0 (23.8)	4.2 (100)
Large	11 [57.9]	8 [42.1]	-	2.7 (54)	2.3 (46)	5.0 (100)
All	33 [66]	15 [30]	2 [4]	2.9 (65.9)	1.5 (34.1)	4.4 (100)

Note: Figures in [ ] indicate percentage to total farmer in each category; ( ) indicate percentage to total area in each category.

5.3.2 Education

Table 5.27 describes education level of both contract and non-contract farmers. 14 per cent of farmers in both the categories were illiterate. The proportion of graduates and post-graduates was also found to be similar among contract and non-contract farmers (6 per cent each). The percentage of secondary and higher secondary certificate holders was also same in both categories of the farmers (28 per cent and 18 per cent each, respectively). Whereas the proportion of middle level of education was found to be higher for non-contract farmers (30 per cent) as compared to the contract farmers (18 per cent). However, average numbers of years in the schooling presents a slightly different picture. The medium and large non-contract farmers were slightly better in terms of average number of years in schooling (Table 5.28).

Table 5.27

Category-wise Distribution of Contract and Non-contract Farmers by Literacy Level

Literacy level/ Category	Illiterate	Primary (upto 5th standard)	Middle (6th - 8th)	Matric (9th- 10th)	Higher secondary	Graduate	Post-graduate
Contract farmers							
Semi-medium	-	-	4 (80)	1 (20)	-	-	-
Medium	5 (19.2)	4 (15.4)	2 (7.7)	8 (30.8)	6 (23.1)	1 (3.8)	-
Large	2 (10.5)	4 (21.1)	3 (15.8)	5 (26.3)	3 (15.8)	2 (10.5)	-
All	7 (14)	8 (16)	9 (18)	14 (28)	9 (18)	3 (6)	-
Non-contract farmers							
Marginal	1 (14.3)	1 (14.3)	2 (28.6)	2 (28.6)	1 (14.3)	-	-
Small	1 (11.1)	-	2 (22.2)	4 (44.4)	2 (22.2)	-	-
Semi-medium	3 (18.7)	1 (6.2)	6 (37.5)	4 (25)	2 (12.5)	-	-
Medium	2 (15.4)	-	3 (23.1)	2 (15.4)	3 (23.1)	1 (7.6)	2 (15.4)
Large	-	-	2 (40)	2 (40)	1 (20)	-	-
All	7 (14)	2 (4)	15 (30)	14 (28)	9 (18)	1 (2)	2 (4)

Note: Figures in parentheses are percentage to total farmer in each category.

Table 5.28
Category-wise Average Number of Education Years among Contract and Non-contract Farmers

Category	Contract farmers	Non-contract farmers
Marginal	-	7.6
Small	-	8.5
Semi-medium	7.6	7.1
Medium	7.4	9.6
Large	8.1	9.4

5.3.3 Age, household size and farm family workers

The average age of grower in each farmer category was turned out to be slightly higher among non-contract farmers than contract farmers. The average age of contract farmers was 49.8 years in case of semi-medium, 47.5 years in case of medium and 45.9 years in case of large farmers as compared to 51.6 years among semi-medium, about 48 years each among medium and large non-contract farmers. The average household size was turned out to be almost similar in case of contract farmers (5.7) and non-contract farmers (5.4). Further, average household size of contract farmers was 4 in case of semi-medium farmers, 5.5 in case of medium and 6.4 in case of large farmers as compared to the respective figures of 4.7, 5.2 and 9.6 among non-contract farmers. Large farmers had more number of members in their family. Thus, household size increased with increase in land size. The proportion of farm workers from family declined with the increase in land size among contract farmers. Further, the proportion of farm family workers was similar among contract and non-contract farmers (28 per cent each). Furthermore, the results also reveal that no significant difference in the family size exists between contract and non-contract farmers except for the large non-contract farmers, who had higher number of household members (9.6) than the large contract farmers (6.4). Therefore, it can be concluded that the family size for the contract farmers as compared to non-contract farmers holds no different pattern.

Table 5.29

Category-wise Average Family Size of Contract and Non-contract Farmers

Family details/ Category	Average age of farmer (yrs.)	Adult		Children	Average family size	Farm workers	%age of farm workers in family
		Male	Female				
Contract farmers							
Semi-medium	49.8	2.2	1.6	0.2	4	1.8	45
Medium	47.5	2.5	2.3	0.7	5.5	1.5	27.3
Large	45.9	2.7	2.4	1.3	6.4	1.5	23.4
All	47.1	2.5	2.3	0.9	5.7	1.6	28.1
Non-contract farmers							
Marginal	49.8	2	2	0.6	4.6	1.3	28.3
Small	42.1	2.1	1.7	1.4	5.2	1.6	30.8
Semi-medium	51.6	2.4	1.9	0.4	4.7	1.3	27.6
Medium	48.4	2.6	2.2	0.4	5.2	1.5	28.8
Large	48.8	3.8	4	1.8	9.6	2.2	22.9
All	48.5	2.5	2.2	0.7	5.4	1.5	27.8

5.3.4 Allied farm and non-farm income

The proportion of income from allied farm activities was higher among contract farmers (₹ 8,140/month) than the non-contract farmers (₹ 3,450/month). The average income from dairy among contract farmers was highest among semi-medium farmers (₹ 5000/month) followed by medium farmers (₹ 4461/month) and large farmers (₹ 789/month). However, average income from dairy among non-contract farmers was ₹ 428/month in case of marginal, ₹ 4166/month in case of small, ₹ 1718/month in case of semi-medium, ₹ 1884/month in case of medium and only ₹ 400/month in case of large farmers. Thus, all other categories of farmers had more income from dairy as compared to large farmers. Overall, average income from allied farm and non-farm activities was also higher among all categories of contract farmers (₹ 5000/month in case of semi-medium, ₹

13,884/month in case of medium and ₹ 13368/month in case of large farmers) than that of non-contract farmers (₹ 2968/month among semi-medium, ₹ 8192/month among medium and ₹ 8800/month among large farmers) (Table 5.30). This points out that the contract farmers were not only involved in contract farming, but also had higher income from the allied farm and non-farm activities.

5.3.5 Farmer's association with contract firms

Table 5.31 shows duration of association of the contract farmers with the company. Most of the farmers under contract were found to be associated for more than four years. There was not much difference among various farmer categories for average years of the association with the contract firm. 40 per cent semi-medium farmers were associated for more than two to five years, while another 40 per cent were found to be associated for more than five to eight years and remaining 20 per cent were associated during the past two years. Only about 10 per cent of the large farmers were involved in contract farming from more than eight years. These were associated with the company since the beginning of the operations for chicory contract farming in the Moga district. Overall, 26 per cent farmers grew chicory for the firm for the last two years, while another 34 per cent did so for more than two to five years and 36 per cent for more than five to up to eight years.

Table 5.30

Category-wise Income of Contract and Non-contract Farmers from Allied Farm and Non-farm Activities (₹/month)

Farmer category	Allied farm income					Non-farm income	Total
	Dairying	Hiring-out farm machinery	Sheller Rent	Seed/ labour	Total		
Contract farmers							
Semi-medium	5000 (100)	-	-	-	5000 [100]	-	5000
Medium	4461.5 (45.3)	5384.6 (54.7)	-	-	9846.1 [70.9]	4038.5 [29.1]	13884.6
Large	789.5 (12.0)	4526.3 (68.2)	-	1315.8 (19.8)	6631.6 [49.6]	6736.8 [50.4]	13368.4
All	3120 (38.3)	4520 (55.5)	-	500 (6.1)	8140 [63.6]	4660 [36.4]	12800
Non-contract farmers							
Marginal	428.6 (15.8)	-	1428.6 (52.6)	857.1 (31.6)	2714.3 [32.5]	5642.8 [67.5]	8357.1
Small	4166.7 (100)	-	-	-	4166.7 [100]	-	4166.7
Semi-medium	1718.7 (100)	-	-	-	1718.7 [57.9]	1250 [42.1]	2968.7
Medium	1884.6 (36.8)	2307.7 (45.1)	923.1 (18.1)	-	5115.4 [62.4]	3076.9 [37.6]	8192.3
Large	400 (9.1)	4000 (90.9)	-	-	4400 [50.0]	4400 [50.0]	8800
All	1890 (54.8)	1000 (29.0)	440 (12.7)	120 (3.5)	3450 [58.7]	2430 [41.3]	5880

Note: Figures in [ ] are percentages to total allied farm and non-farm income in each category; ( ) are percentages to total allied farm income in each category.

Table 5.31

Category-wise Distribution of Contract Farm by the Number of Years under Contract

Years of linkage/ Farmer category	Upto two year	>2 - ≤5 year	>5 - ≤8 year	> 8 year	Average year under contract
Semi-medium	1 (20)	2 (40)	2 (40)	-	4.6
Medium	6 (23.1)	8 (30.8)	12 (46.1)	-	4.9
Large	6 (31.6)	7 (36.8)	4 (21.1)	2 (10.5)	4.5
All	13 (26)	17 (34)	18 (36)	2 (4)	4.7

Note: Figures in parentheses indicate percentage to total farmers in each category.

5.3.6 Farm machinery

All the contract farmers possessed tractor-trolley, while 80 per cent non-contract farmers had tractor and 76 per cent had an ownership of trolley. Further, contract farmers with rotavator were 26 per cent as against only 6 per cent among non-contract farmers. The possession of irrigation generator was also higher among contract farmers (50 per cent) than that among non-contract farmers (12 per cent). The analysis revealed that chicory grown farmers were richer in the ownership of farm implements as compared to the traditional wheat grown farmers. Further, reaper was possessed by 26 per cent of the contract farmers as compared to 6 per cent non-contract farmers. 6 per cent of the contract farmers also had an ownership of combine (Table 5.32). Furthermore, average number of farm implements was also worked out to be higher among contract farmers than non-contract farmers (Table 5.33). Thus, possession of farm implements was higher among contract farmers in all the categories of machinery. It was also reflected in the higher income earned by the contract farmers from custom hiring of the farm machinery.

Table 5.32

Category-wise Distribution of Contract and Non-contract Farmers by Ownership of Farm Machinery

Farm Machinery/ Farmer category	Tractor	Trolley	Rotavator	Reaper	Combine	Harrow	Cultivator	Irrigation generator
Contract farmers								
Semi-medium	5 (100)	5 (100)	-	-	-	2 (40)	3 (60)	2 (40)
Medium	26 (100)	26 (100)	5 (19.2)	6 (23.1)	1 (3.8)	8 (30.8)	25 (96.1)	11 (42.3)
Large	19 (100)	19 (100)	8 (42.1)	7 (36.8)	2 (10.5)	9 (47.4)	12 (63.1)	12 (63.1)
All	50 (100)	50 (100)	13 (26)	13 (26)	3 (6)	19 (38)	40 (80)	25 (50)
Non-contract farmers								
Marginal	1 (14.3)	1 (14.3)	-	-	-	-	1 (14.3)	-
Small	6 (66.7)	6 (66.7)	-	-	-	1 (11.1)	6 (66.7)	-
Semi-medium	15 (93.7)	13 (81.2)	-	-	-	11 (68.7)	12 (75)	-
Medium	13 (100)	13 (100)	2 (15.4)	1 (7.7)	1 (7.7)	7 (53.8)	8 (61.5)	3 (23.1)
Large	5 (100)	5 (100)	1 (20)	2 (40)	-	2 (40)	3 (60)	3 (60)
All	40 (80)	38 (76)	3 (6)	3 (6)	1 (2)	21 (42)	30 (60)	6 (12)

Note: Figures in parentheses indicates percentage to the total farmers in each category

Table 5.33

Category-wise Average Number of Farm Implements Possessed by Contract and Non-contract Farmers

Category of farmer	Contract farmers	Non-contract farmers
Marginal	-	0.6
Small	-	2.1
Semi-medium	3.4	3.2
Medium	4.4	4.1
Large	5.8	5.4
All	4.8	3.1

5.4 Summary

The above analysis of the contract vis-à-vis non-contract farmers in Punjab reveals that there exists heterogeneity among farmers with respect to various socio-economic factors like age, operated land, farm machinery and income from farm and non-farm allied activities. The companies were observed to be biased in the selection of farmers. Small farmers were excluded from the contractual arrangements. Hence, the hypothesis framed that contracting firms exclude small and marginal farmers and work with the large farmers due to the diseconomies of scale associated with the small and marginal farmers was found to be true. Simultaneously, second hypothesis i.e. contract farming creates socio-economic differentiation among farmers as the companies select farmers with certain pre-conditions, was also accepted.

CHAPTER 6
DIVERSIFICATION AND RETURNS AMONG CONTRACT AND NON-CONTRACT FARMERS

Punjab's agrarian economy was acknowledged for its opulence due to its contribution towards the success of green revolution, but since 1980s, agriculture started showing the signs of deceleration and stagnation in yield level of major crops. The policy makers and various studies recommended for the diversification through contract farming (Singh, 2004; Dhillon and Singh, 2006). It is argued that diversified agricultural economy is expected to enhance farm income and reduce the risks of the producer. Linking farmers to contracting firms may also cause a shift in the cropping pattern toward high value crops and consequently, result in diversification away from traditional crops like wheat-paddy. Therefore, an attempt has been made to examine the impact of contract farming on diversification by comparing the cropping pattern and cropping intensity of the contract farmers with the non-contract farmers. This chapter also studies the impact of contract farming on net returns of the farmers by comparing costs and returns from contracted crops with the traditional existing crops on non-contract farms.

6.1 Cropping Pattern

6.1.1 Comparative analysis of potato's contract and non-contract farmers

Cropping pattern for each farm size category among potato contract farmers is presented in Table 6.1. Among contract farmers, the highest proportion of area was devoted to paddy (38.63 per cent) followed by potato (20.62 per cent) and wheat (17.09 per cent). The area under contract crops was only 13 per cent, while 87 per cent of the gross cropped area (GCA) was under non-contract crops. The semi-medium farmers put about 33.33 per cent of GCA under potato contract crop as compared to 19.66 per cent by medium and 11.36 per cent by large farmers. The medium and large farmers along with potato contract crop also grew it for the open market as the company provided seed for the maximum 10 acres, while some farmers grew it for spreading risk as sometimes open market prices rises more than the contract prices. The overall GCA under potato was 33.33 per cent among semi-medium, 22.34 per cent among medium and 20.06 per cent among

large farmers. Among potato contract growers, 6 per cent were also involved in the contract farming of chicory, while another 4 per cent also did the contract farming of sugarbeet. After potato crop, the major proportion of area was under moong (11.4 per cent of GCA), followed by maize (5.81 per cent) and mint (2.73 per cent). Carrot, radish and peas were also grown by the large farmers. Among all farmer categories, large farmers had highest GCA under traditional crops (56.49 per cent) like wheat, paddy followed by medium (54.15 per cent) and semi-medium farmers (33.33 per cent). Surprisingly, semi-medium farmers did not grow wheat even for domestic consumption, which also they purchased from fellow farmers. During field survey, few farmers revealed that cultivation of two crops such as mint, maize, moong (of three month duration each) was more beneficial instead of growing single wheat crop in same time period, which helped them to earn more income. It was further supported by the fact that cropping intensity was turned out to be highest among semi-medium farmers (300) followed by medium (257.3) and large farmers (246.4) (Table 6.1).

On the other hand, among non-contract farmers, small farmers put about 26.4 per cent of GCA under potato followed by 25.9 per cent each by medium and large farmers; and 24.2 per cent by semi-medium farmers. Other vegetables like carrot, radish and peas were also grown by the large farmers. The GCA under traditional paddy crop was 28.8 per cent in case of small farmers, 36.4 per cent each in case of semi-medium and medium farmers and 36.9 per cent in case of large farmers. On the other hand, GCA under wheat was 11.2 per cent in case of small farmers, 13.6 per cent in case of semi-medium, about 11 per cent each in case of medium and large farmers. The cropping intensity was found to be highest among small farmers (271.7) followed by medium (269.1), large (268.8) and semi-medium farmers (259.3). Accordingly, semi-medium farmers surprisingly had lowest cropping intensity as compared to the other farmer categories. However, GCA under traditional paddy-wheat crop was also highest among semi-medium farmers category. Among overall non-contract farmers, paddy occupied the highest proportion of GCA (36.6 per cent), followed by potato (25.7 per cent), moong (16.1 per cent), wheat (11.2), mint (4.7 per cent) and maize (4.0 per cent) (Table 6.2).

Table 6.1

Category-wise Cropping Pattern of Contract Farmers

Category /Cropping pattern	Semi-medium		Medium		Large		All	
	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA
Contract crops								
Potato	10	33.33	9.36	19.66	13.85	11.36	12.36	12.93
Sugarbeet	-	-	-	-	0.12	0.09	0.08	0.8
Chicory	-	-	-	-	0.32	0.26	0.21	0.22
Contract	10	33.33	9.36	19.66	14.29	11.7	12.65	13.23
Non-contract crops								
Mint	-	-	1.82	3.82	3.18	2.61	2.61	2.73
Moong	6.67	22.23	6.5	13.65	13.15	10.79	10.9	11.4
Maize	-	-	2.36	4.95	7.42	6.08	5.56	5.81
Bajra	-	-	-	-	1.51	1.24	1	1.04
Wheat	-	-	7.57	15.9	21.54	17.67	16.34	17.09
Paddy	10	33.33	18.21	38.25	47.32	38.82	36.93	38.63
Fodder	-	-	0.46	0.96	2.4	1.97	1.72	1.8
Tomato	3.33	11.1	-	-	0.03	0.02	0.22	0.23
Potato	-	-	1.28	2.68	10.6	8.7	7.36	7.69
Others*	-	-	-	-	0.45	0.37	0.3	0.31
Non-contract	20	66.67	38.2	80.24	107.6	88.26	82.94	86.75
GCA	30	100	47.6	100	121.9	100	95.6	100
Net area (acre)	10		18.5		49.48		38.44	
CI**	300		257.3		246.4		248.7	

Note: Others* include vegetables- carrot, radish, peas etc

CI** is cropping intensity

Table 6.2

Category-wise Cropping Pattern of Non-contract Farmers

Category /Cropping pattern	Small		Semi-medium		Medium		Large		All	
	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA
Potato	3.3	26.4	5.7	24.2	13.3	25.9	32.6	25.9	15.3	25.7
Mint	0.1	0.8	0.3	1.3	1.4	2.7	8.1	6.4	2.8	4.7
Moong	2.4	19.2	4.8	20.3	10.9	21.2	16.1	12.8	9.6	16.1
Maize	1.1	8.8	0.3	1.3	0.7	1.4	6.9	5.5	2.4	4.0
Mustard	0.1	0.8	0.2	0.8	0.1	0.2	-	-	0.1	0.2
Wheat	1.4	11.2	3.2	13.6	5.8	11.3	13.8	10.9	6.7	11.2
Paddy	3.6	28.8	8.6	36.4	18.7	36.4	46.5	36.9	21.8	36.6
Fodder	0.3	2.4	0.2	0.8	0.2	0.4	0.3	0.2	0.2	0.3
Others*	0.1	0.8	0.3	1.3	0.3	0.6	1.4	1.1	0.6	1.0
GCA	12.5	100	23.6	100	51.4	100	125.8	100	59.6	100
Net area (acre)	4.6		9.1		19.1		46.8		22.2	
CI**	271.7		259.3		269.1		268.8		268.5	

Note: Other* include vegetables- carrot, radish, peas, etc.
CI** is cropping intensity

Surprisingly, the comparison between contract and non-contract farmers revealed that non-contract medium and large farmers had higher GCA under potato crop than that among contract farmers. Only semi-medium contract farmers had higher GCA under potato as compared to non-contract farmers. It is evident from the fact that the company assigned the contract with farmers for 10 acres only. The proportion of area under other than traditional (paddy-wheat) crops was 66.67 per cent in case of semi-medium, 45.85 per cent in case of medium and 43.51 per cent in case of large contract farmers. On the other side, in case of non-contract farmers, it was turned out to be 60 per cent among small, 50 per cent among semi-medium, around 52 per cent each among medium and large farmers. The GCA under other than traditional crops was also highest only among semi-medium contract farmers as compared to the semi-medium non-contract farmers; however

in all other farmer categories, it was higher among non-contract farmers. Furthermore, cropping intensity was also turned out to be higher among semi-medium contract farmers than that among non-contract semi-medium farmers. Hence, it can be concluded that semi-medium contract farmers and small non-contract farmers had shown greater crop diversification away from traditional (wheat-paddy) as compared to other farmer categories and that diversification mainly took place towards potato and moong.

The Simpson's Index of Diversification (SID) (Table 6.3) was highest in semi-medium contract farmers (0.67) followed by medium (0.46) and large farmers (0.44). Furthermore, in case of non-contract farmers, SID was turned out to be highest among small farmers (0.61) followed by 0.50 in case of semi-medium and 0.52 each in case of medium and large farmers. However, overall, SID among contract farmers (0.44) was also lower as compared to that among non-contract farmers (0.52). Across contract farm size categories, the diversification away from traditional crops was least among large farmers as compared to semi-medium and medium farmers. However, across non-contract farm size categories, all semi-medium, medium and large farmer categories had lesser diversification than the small farmers. Thus, diversification mainly towards cultivation of potato and moong was observed in both contract and non-contract farmers. Some diversification also occurred towards maize and mint.

Table 6.3
Simpson's Index of Diversification among Contract and Non-contract Farmers

Farm size categories	Contract farmers	Non-contract farmers
Small	-	0.61
Semi-medium	0.67	0.50
Medium	0.46	0.52
Large	0.44	0.52
All	0.44	0.52

The number of crops grown by contract and non-contract farmers is presented in Table 6.4. The average number of crops grown was higher i.e. 5.3 in case of contract farmers compared with 4.6 crops in case of non-contract farmers. However, crop diversification towards non-traditional crops was higher among non-contract farmers as compared to contract farmers due to company's condition of assigning ten acres of potato seed to one farmer but in terms of number of crops grown by contract farmers was higher than among non-contract farmers.

Table 6.4
Average Number of Crops Grown Among Contract and Non-contract Farmers

Farm size categories	Contract farmers	Non-contract farmers
Small	-	4.5
Semi-medium	3	4.6
Medium	4.9	4.7
Large	5.7	4.7
All	5.3	4.6

6.1.2 Comparative analysis of sugarbeet (contract) and wheat (non-contract) farmers

The contract farmers grew sugarbeet and sugarcane under contract with the company. The proportion of GCA under traditional wheat and paddy crop was 27 per cent and 39.6 per cent, respectively. Further, 11 per cent of GCA was under sugarbeet and another 10 per cent was under sugarcane cultivation. The proportion of GCA under sugarbeet was highest among small contract farmers (25 per cent) as compared to semi-medium (19.3 per cent), medium (15.9 per cent) and large farmers (6.3 per cent). Further, GCA under sugarcane was 9.3 per cent in case of semi-medium farmers, 10.4 per cent in case of medium and 10 per cent in case of large farmers. Further, it was also found that 22 per cent of contract farmers did intercropping. Sugarbeet, wheat and cauliflower were successfully intercropped with sugarcane crop by the contract farmers.

"In intercropping we require three times lesser seed for sugarcane along with better income". Jaspal Singh, Kaler

Tomato, peas, cauliflower, onion and potato were major vegetables grown by the contract farmers. 3.5 per cent of GCA was devoted to peas by the farmers. Further, large farmers had about 12 per cent of GCA under vegetables while it was only 3.8 per cent in medium and 2.4 per cent in semi-medium farmers. Furthermore, overall 1.6 per cent of GCA was under carom, 1.2 per cent under moong and 1 per cent under fodder. The area under paddy was 50 per cent among small farmers as compared to around 41 per cent each in case of semi-medium and medium and 38.4 per cent in case of large farmers. The proportion of area under wheat crop was second highest in all the farmer categories with the largest share among large farmers (28.4 per cent) followed by semi-medium (26.1 per cent), small (25 per cent) and medium farmers (24.8 per cent). Thus, it is evident that with increase in size of operational holding, proportion of GCA under other vegetables had also increased. The resulting cropping intensity was highest in large farmers (203.9) followed by 200 in small, 198.8 in semi-medium and 194.4 in medium farmers (Table 6.5).

In case of non-contract farmers, proportion of GCA under traditional wheat and paddy crop was 42.3 per cent and 46.8 per cent, respectively. The proportion of GCA under paddy was highest in case of semi-medium farmers (49.4 per cent) followed by medium (48 per cent), small (47.7 per cent), marginal (45.2 per cent) and large farmers (43.8 per cent). Similarly, percentage of GCA under wheat was 49.4 per cent in case of semi-medium farmers followed by around 45 per cent each among marginal and medium farmers, 38.6 per cent among small and 32 per cent among large farmers. Surprisingly, large non-contract farmers also had 11.8 per cent GCA under peas, 8.8 per cent under potato and 2.5 per cent under carom crop. The proportion of GCA under sugarcane was just 0.4 per cent. As only semi-medium and medium farmers had small proportion of GCA under annual sugarcane crop (0.6 per cent each). Marginal, small and semi-medium farmers did not grow potato. Marginal and semi-medium farmers grew only traditional crops. The resulting cropping intensity was astonishingly higher among large farmers (225.5) while it was 204.6 among small farmers followed by 200 in case of medium, 197.7 in case of semi-medium and 182.6 in case of marginal farmers (Table 6.6).

Table 6.5

Category-wise Cropping Pattern among Contract Farmers

Category /Cropping pattern	Small		Semi-medium		Medium		Large		All	
	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA
Contract crops										
Sugarbeet	2	25	3.1	19.3	5.5	15.9	7.6	6.3	5.3	11
Sugarcane	-	-	1.5	9.3	3.6	10.4	12	10	4.8	9.8
Contract	2	25	4.6	28.6	9.1	26.3	19.6	16.3	10.1	20.8
Non-contract crops										
Carom	-	-	0.1	0.6	0.4	1.2	2.6	2.1	0.8	1.6
Moong	-	-	0.06	0.4	0.2	0.6	2	1.6	0.6	1.2
Maize	-	-	0.2	1.2	0.07	0.2	1.2	1	0.4	0.8
Wheat	2	25	4.2	26.1	8.6	24.8	34.4	28.4	13.1	27
Paddy	4	50	6.6	41	14.3	41.3	46.4	38.4	19.3	39.6
Fodder	-	-	-	-	0.7	2.0	0.4	0.3	0.5	1.0
Tomato	-	-	0.2	1.2	0.2	0.6	3.1	2.6	0.8	1.6
Peas	-	-	0.1	0.6	0.4	1.2	6.6	5.4	1.7	3.5
Others*	-	-	0.1	0.6	0.7	2.0	4.6	3.8	1.4	2.9
Non-contract	6	75	11.5	71.7	25.5	73.9	101.3	83.6	38.6	79.2
GCA	8	100	16.1	100	34.6	100	120.9	100	48.7	100
Net area (acre)	4		8.1		17.8		59.3		24.4	
CI**	200		198.8		194.4		203.9		199.6	

Note: Others* include cauliflower, onion, potato

CI** is cropping intensity

Table 6.6

Category-wise Cropping Pattern among Non- contract Farmers

Category/ Cropping pattern	Marginal		Small		Semi-medium		Medium		Large		All	
	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA
Wheat	1.9	45.2	3.4	38.6	8.6	49.4	15.5	45.8	27.2	32	10.5	42.3
Paddy	1.9	45.2	4.2	47.7	8.6	49.4	16.2	48	37.2	43.8	11.6	46.8
Fodder	0.4	9.5	0.4	4.5	0.2	1.1	0.6	1.7	0.5	0.6	0.4	1.6
Sugarcane	-	-	-	-	0.1	0.6	0.2	0.6	-	-	0.1	0.4
Potato	-	-	-	-	-	-	0.6	1.8	7.5	8.8	0.8	3.2
Peas	-	-	0.4	4.5	-	-	-	-	10	11.8	0.9	3.6
Maize	-	-	0.1	1.1	-	-	0.6	1.8	-	-	0.2	0.8
Carom	-	-	0.3	3.4	-	-	-	-	2.5	2.9	0.3	1.2
GCA	4.2	100	8.8	100	17.4	100	33.8	100	85	100	24.8	100
Net area (acre)	2.3		4.3		8.8		16.9		37.7		11.9	
CI*	182.6		204.6		197.7		200		225.5		206.7	

Note: CI* is the cropping intensity

Overall, cropping intensity among non-contract farmers was turned out to be higher than contract farmers. The reason behind it was that contract farmers had about 10 per cent of the GCA under sugarcane crop as compared to just 0.4 per cent in case of non-contract farmers. Even with low cropping intensity, the contract farmers had higher diversification towards high value crops. Among contract farmers, around 33 per cent of area was under non-traditional crops as compared to only 9 per cent among non-contract farmers.

The SID has been calculated for both contract and non-contract farmers. The diversification was observed to be relatively more in case of contract farmers than non-contract farmers. The index value was turned out to be 0.33 in case of contract farmers as compared to 0.11 in case of non-contract farmers. The value of SID was highest in medium contract farmers (0.34) followed by large and semi-medium farmers (0.33 each) and small farmers (0.25) (Table 6.7). Among contract farmers, diversification away from traditional wheat-paddy crop was mainly towards cultivation of sugarbeet, sugarcane, carom, moong and vegetables like tomato, peas, cauliflower, etc. In case of non-contract farmers, crop diversification away from traditional crops was lesser than contract farmers across all the farm size categories. Among large non-contract farmers, some diversification towards cultivation of potato and peas was also observed. However, in case of semi-medium non-contract farmers, there was no sign of crop diversification away from traditional crops as about 98.8 per cent of the GCA was found to be under wheat-paddy crop.

Table 6.7
Simpson's Index of Diversification among Contract and Non-contract Farmers

Farm size categories	Contract farmers	Non-contract farmers
Marginal	-	0.10
Small	0.25	0.14
Semi-medium	0.33	0.01
Medium	0.34	0.06
Large	0.33	0.24
All	0.33	0.11

Further, the number of crops grown was also higher in case of contract farmers than in case of non-contract farmers. Thus, contract farmers were not only diversified towards the cultivation of new sugarbeet crop but also in terms of number of crops grown than the non-contract farmers (Table 6.8).

Table 6.8
Average Number of Crops Grown among Contract and Non-contract Farmers

Farm size categories	Contract farmers	Non-contract farmers
Marginal	-	3.2
Small	2.7	2.9
Semi-medium	4.1	2.3
Medium	4.3	3.3
Large	5.2	4.5
All	4.4	2.9

6.1.3 Comparative analysis of chicory (contract) and wheat (non-contract) farmers

The cropping pattern of contract farmers showed that semi-medium farmers had about 19 per cent of GCA under chicory compared to 12 per cent in medium and 5.3 per cent in large farmers; the overall among all contract farmers was 8.2 per cent. Among all the contract farmer categories, medium farmers had highest GCA under traditional crops like wheat, paddy and fodder (79.5 per cent) followed by semi-medium and large farmers (about 72 per cent each). GCA under moong was highest in case of large farmers (5.6 per cent) followed by semi-medium (4.2 per cent) and medium farmers (3.5 per cent). Potato was also grown across all categories of contract farmers. GCA under potato was turned out to be highest among large farmers (10.8 per cent) followed by semi-medium (4.2 per cent) and medium farmers (3.7 per cent). Cauliflower, carrot and peas were also grown by large farmers. Further, cropping intensity was turned out to be highest among large farmers (223) followed by medium (207) and semi-medium farmers (202); the overall for all the farmers being 217 (Table 6.9).

Table 6.9

Category-wise Cropping Pattern of Contract Farmers

Category /Cropping pattern	Semi-medium		Medium		Large		All	
	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA
Chicory	2.7	19.1	4.2	12.1	5.1	5.3	4.6	8.2
Moong	0.6	4.2	1.2	3.5	5.4	5.6	2.7	4.8
Maize	-	-	0.3	0.9	0.4	0.4	0.3	0.5
Wheat	3.3	23.2	10.7	30.8	27.0	28.2	16.2	29.0
Paddy	6.6	46.5	16.6	47.8	42.5	44.4	25.4	45.5
Fodder	0.4	2.8	0.3	0.9	0.3	0.3	0.3	0.5
Potato	0.6	4.2	1.3	3.7	10.3	10.8	4.7	8.4
Others*	-	-	0.1	0.3	4.7	4.9	1.7	3.1
GCA	14.2	100	34.7	100	95.7	100	55.8	100
Net area (acre)	7		16.7		42.8		25.7	
CI**	202.8		207.8		223.6		217.1	

Note: CI** is the cropping intensity

Others* include vegetables- carrot, cauliflower, peas, etc.

In case of non-contract farmers, GCA under traditional crops like wheat, paddy and fodder was turned out to be highest among marginal farmers (100 per cent) followed by semi-medium (98.6 per cent), small (94 per cent), medium (93.3 per cent) and large farmers (91.3) (Table 6.10). Thus, the analysis reveals that among non-contract farmers, all the farmer categories had more than 90 per cent of GCA under traditional crops. All the marginal non-contract farmers grew only traditional crops as cultivation of wheat crop was essential for domestic purposes, while the alternative of paddy crop was not available in the Moga district. Consequently, they grew only traditional crops. All categories of non-contract farmers grew potato except the marginal farmers. GCA under potato was turned out to be highest among large farmers (4.3 per cent) followed by small (3.6 per cent), medium (3.3 per cent) and semi-medium farmers (0.6 per cent). Medium and large farmers' category also had some area under moong and maize crop. In case of non-contract farmers, cropping intensity was highest among large farmers (206)

followed by medium (203), marginal (194), small (190) and semi-medium farmers (183). The semi-medium used relatively more area for fodder cultivation as they grew it for commercial purpose besides growing it for domestic dairy animals.

Further, cropping intensity was higher among contract farmers than that among non-contract farmers as they had more area under three month crops. Table 6.11 shows that SID value was highest in case of semi-medium contract farmers (0.30) followed by large (0.27) and medium farmers (0.21). In case of semi-medium contract farmers, the crop diversification away from traditional wheat-paddy was mainly towards chicory crop. Further, in case of large contract farmers, diversification towards potato, chicory and moong was observed. However, in case of non-contract farmers, there was some diversification towards potato crop. It can also be seen from the table that semi-medium and medium contract farmers had shown greater crop diversification away from traditional food-grains towards mainly chicory crop as compared to large farmers, which showed diversification towards potato, other vegetables and chicory. The SID was turned out to be 0.26 in case of contract farmers as compared to 0.08 in case of non-contract farmers.

The number of crops grown was 4.6 among contract farmers. However, on the other side, this number was 3 among non-contract farmers. Thus, contract farmers were not only involved in the cultivation of new chicory crop in the state but also in terms of number of crops grown by all categories of contract farmers were more than crops grown by non-contract farmers (Table 6.12).

Table 6.10

Category-wise Cropping Pattern among Non- contract Farmers

Category/ Cropping pattern	Marginal		Small		Semi-medium		Medium		Large		All	
	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA	Acres	% of GCA
Wheat	1.7	48.6	3.5	41.7	6.9	44.2	16.3	44.3	34.7	43.0	10.8	43.7
Paddy	1.7	48.6	3.6	42.8	7.9	50.6	17.5	47.5	38.2	47.3	11.8	47.8
Fodder	0.1	2.8	0.8	9.5	0.6	3.8	0.6	1.5	0.8	1.0	0.6	2.4
Moong	-	-	-	-	-	-	0.8	2.2	1.1	1.4	0.3	1.2
Maize	-	-	-	-	-	-	0.5	1.3	1.0	1.2	0.2	0.8
Potato	-	-	0.3	3.6	0.1	0.6	1.2	3.3	3.5	4.3	0.8	3.2
Others*	-	-	0.2	2.4	0.1	0.6	-	-	1.4	1.7	0.2	0.8
GCA	3.5	100	8.4	100	15.6	100	36.8	100	80.7	100	24.7	100
Net area (acre)	1.8		4.4		8.5		18.1		39		12.3	
CI**	194		190.9		183.5		203.3		206.9		200.8	

Note: CI** is the cropping intensity

Others* include vegetables- carrot, cauliflower, peas, radish, etc.

Table 6.11

Simpson's Index of Diversification among Contract and Non-contract Farmers

Farm size categories	Contract farmers	Non-contract farmers
Marginal	-	0.03
Small	-	0.16
Semi-medium	0.30	0.05
Medium	0.21	0.08
Large	0.27	0.10
All	0.26	0.08

Table 6.12

Average Number of Crops Grown among Contract and Non-contract Farmers

Farm size categories	Contract farmers	Non-contract farmers
Marginal	-	2.1
Small	-	3.1
Semi-medium	4.2	2.7
Medium	4.7	3.2
Large	4.6	4.2
All	4.6	3

Contract farmers of RSL and Paras Spices Pvt. Ltd. were more diversified compared to their non-contract farmers. However, potato's contract farmers were less diversified than the non-contract farmers as the company had terms that maximum of ten acres can be assigned to one farmer as the company wanted to proliferate their relation with farmers. The involvement of corporate players in Punjab agriculture has played a significant role to bring about crop diversification in the vicinity of their operations. Thus, along with increase in area under high value crops, private players are expected to help farmers in increasing their farm incomes. Hence, in next section, an attempt has been made to analyze the costs and returns among contract and non-contract farmers.

6.2 Costs and Returns

6.2.1 PepsiCo's potato under contract and non-contract

6.2.1.1 Description of potato

The vegetables in India are grown over an area of 9.54 million hectares with a production of 168.3 million tonnes during 2014-15. Potato has an area of 2.06 million hectares in India during 2014-15 with a production of 44.9 million tonnes. Thus, potato is grown on around 22 per cent of area among vegetables grown in India. On the other hand, area under vegetables and its production in Punjab during 2014-15 is 196.52 thousand hectares and 4054.08 thousand tonnes, respectively. Potato is the leading vegetable of the state with an area of 219.83 thousand acres comprising 45.28 per cent of total area under vegetables in the state (GoI, 2016). Punjab is sixth largest producer of potato in the country and accounts for 5 per cent of the country's production (Table 6.13). Potato crop is grown during September to December in Punjab. According to PepsiCo, 30,000 potato seed are sown in one acre. The tubers are sown on ridges at the gap of 3 inches for Z grade, 4 inches for A and B grade, 5 inches for C grade, while D grade is sown at the gap of 6 to 7 inches. The company strictly recommended cutting of haulms till end December. In case of late sowing of potato, it can be extended till 5th of January. After this, the chances of aphids attack on potato plants increases as aphids start appearing on mustard flowers.

Table 6.13
Top Seven States in the Production of Potatoes in 2014-15

States	Production (thousand tonnes)	Proportionate share in total production
Uttar Pradesh	14315.00	31.89
West Bengal	10200.30	22.72
Bihar	6345.56	14.13
Gujarat	2964.10	6.60
Madhya Pradesh	2425.00	5.40
Punjab	2260.00	5.03
Assam	1706.04	3.80

Source: GoI, 2016

Further, the area and production of potato in various districts of Punjab is presented in Table 6.14. The main potato growing districts are Jalandhar, Hoshiarpur, Ludhiana, Kapurthala, Amritsar, Moga and Bathinda in that order. Jalandhar is the leading district with 22.69 per cent of the state's area under potato.

Table 6.14

District-wise Area and Production of Potato in Punjab in 2014-15

Districts	Area (acres)	%age area under potato	Production (thousand metric tonne)
Jalandhar	50388	22.69	528.0
Hoshiarpur	31122	14.01	310.3
Ludhiana	24700	11.12	256.0
Kapurthala	22230	10.01	235.7
Amritsar	16796	7.56	173.4
Moga	14820	6.67	157
Bathinda	12350	5.56	133.7
Fatehgarh Sahib	10868	4.90	111.6
Patiala	9880	4.45	106.4
S.B.S. Nagar	5928	2.67	40.0
Tarn Taran	4199	1.89	43.1
S.A.S. Nagar	2964	1.33	29.8
Rupnagar	1976	0.89	20.2
Gurdaspur	1729	0.78	16.4
Ferozepur	1235	0.56	12.3
Faridkot	494	0.22	4.6
Shri Muktsar Sahib	247	0.11	4.0
Mansa	247	0.11	3.4
Sangrur	1482	0.67	15.3
Barnala	4199	1.90	28.9

Source: GoP, 2015

6.2.1.2 Economics of potato production

The costs and returns were analyzed for both contract and non-contract farmers to verify the economic viability of contract farming. The cost of production (A1) per acre for potato crop was turned out to be higher for contract farmers (₹ 47,456.5) as compared to that for non-contract farmers (₹ 33,294.1). The major costs incurred for potato cultivation were seed, rent paid for leased-in land, fertilizer and plant protection chemical among contract and non-contract farmers. The seed cost was higher among contract farmers (₹ 23,020.74) as compared to non-contract farmers (₹ 15,100). Seed treatment was done at the cost of ₹ 12/ bag by the workers. The seed cost was higher for contract farmers as they used more quantity of superior quality seed mainly A and B grade, while non-contract farmers used mixed seed of all grades for sowing potato. The total cost of production, cost C for the contract farmers was ₹ 59,757 per acre, whereas for non-contract farmers, it was ₹ 45,872.1 (Table 6.15). Various other studies in Punjab has also confirmed high cost of production in case of contract farmers due to higher input costs (Dhillon and Singh, 2006; Kumar, 2006).

The contract farmers did not incur any marketing costs while selling the produce to the contract firm as the produce was farm-picked by the firm and the gunny bags were also provided by it free of cost to the farmers. On the other side, non-contract farmers had to purchase the gunny bags for packing. The labour charges for grading, packing and sewing of one bag of 50 kg was ₹ 20.17. Each gunny bag costs vary between ₹ 10-18 on the basis of quality requirement for immediate sale or storage. The average cost of gunny bags was turned out to be ₹ 3,249.2 per acre for non-contract farmers. Furthermore, in case of contract farmers, labour for grading along with grader was provided by the company for grading the produce, but in case of non-contract farmers, they themselves had to bear the grading cost, which amounted ₹ 5,349.3 per acre. The contract farmers also did not incur any transportation cost as the contracting firm picked up the produce from the farmers' field (Table 6.16).

Table 6.15

Production Costs among Contract and Non-contract Farmers

Cost component (₹/acre)	Contract farmers	Non-contract farmers
Seed	23020.74 (38.52)	15100 (32.91)
Seed treatment	526.2 (0.88)	543 (1.18)
Machine labour	2474 (4.14)	2576 (5.61)
Dressing up	558 (0.93)	678 (1.48)
Manure	154 (0.26)	120 (0.26)
Fertilizer	7399.6 (12.38)	6588.6 (14.36)
Plant protection	4787.6 (8.01)	3098 (6.75)
Irrigation	632 (1.05)	600 (1.31)
Hired labour	2301 (3.85)	1650 (3.60)
Dehaulming	914 (1.53)	966 (2.11)
Digging-up	3704 (6.20)	494 (1.08)
Depreciation on farm implements	288.3 (0.48)	394.3 (0.86)
Interest on working capital	697.1 (1.17)	486.2 (1.06)
Cost A1	47456.5	33294.1
Cost A2	56969	43094.1
Cost B	58325	44714.1
Cost C	59757	45872.1

Note: Figures in parentheses indicate percentage to total cost C.

Table 6.16

Marketing Costs among Contract and Non-contract Farmers (per acre)

Components	Contract farmers	Non-contract farmers
Cost of gunny bags	-	3249.2 (25.23)
Grading, packing and sewing	-	5349.3 (41.53)
Transportation cost	-	748 (5.81)
Marketing cost	-	9346.5

Note: Figures in parentheses indicate the marketing cost in ₹/quintal.

As the cost of production was higher among contract farmers, farmers would likely to indulge in contract farming only if the returns were high enough to alleviate the higher costs effect. The average yield of potato was higher among non-contract farmers (128.8 quintal/acre) than that among contract farmers (85.58 quintal/acre). The reason for lower yield among contract farmers was that the company strictly recommended cutting of haulms till end December. However, non-contract farmers cut haulms till the end of January. The entire produce of the contract farmers was procured by the company. The farmers were not allowed to sell in open market and storage for seed was also not allowed. However, non-contract farmers stored about 17 per cent produce in cold stores for the next season seed. The non-contract farmers sold their table and seed grade produce to the wholesaler, while *goli* in the local vegetable markets. The company procured A and B grade produce at ₹ 10/kg, C grade at ₹ 8/kg, while D and Z grade were procured at ₹ 4.5/kg each. In case of contract farmers, whole potato produce was procured by the company at the pre-fixed price except cut-cross pieces, while in case of non-contract farmers, the *goli* grade remained unsold. Thus, contracted prices for all grades were higher for the contract farmers than the market price for the non-contract farmers. Therefore, returns were higher among contract farmers due to price differentials (Table 6.17). The returns were turned out to be higher among contract farmers as higher prices for the produce compensated for lower yield and high cost of production. Various other studies have also shown similar results that the returns for the contract farmers are profitable as compared to the non-contract farmers (Kumar, 2006; Nagaraj *et al.*, 2008; Singh, 2009).

Table 6.17

Returns of Contract and Non-contract Farmers

Farmers>	Contract farmers					Non-contract farmers		
Grades>	A	B	C	D	Z	*Goli**	Table*	Seed
Yield (qtl./acre)	85.58					128.8		
Quantity stored for seed (quintal)	-	-	-	-	-	-	-	22.13 (17.2)
Sold (%)	33	35	22	8	2	7	62.9	30.1
Quantity sold (qtl.)	28.2	29.9	18.8	6.8	1.7	7.5	67.1	32.1
Price (₹/kg)	10	10	8	4.5	4.5	1	6.6	8.2
Gross return (₹/acre)	28200	29900	15040	3060	765	750	44286	26332
Overall return	76965					71368		
Production cost (₹/acre)	59757					45872.1		
Marketing cost (₹/acre)	-					9346.5		
Total cost	59757					55218.6		
Net return (₹/acre)	17208					16149.4		

*Note: * Goli* grade means the smallest size of the produce and table grade means the largest size of the produce.

Though the returns were slightly higher among contract farmers than the non-contract farmers and the contract farmers also had lower yield and higher input cost for potato cultivation, then also the farmers preferred to involve in contract farming due to stable prices given by the firm over the years. While, the prices received by the non-contract farmers varied during the season and over the years. The prices fell down in open market sharply whenever there was a glut in the market. The contract farmers received same prices in 2016 as in 2015. The non-contract farmers received on average ₹ 160-250/quintal, while the contract farmers received prices as specified in the contract. Thus, in 2015, potato season, contract farmers earned 7-8 times more income than the non-contract farmers. Further, again in 2017 season, due to glut production prices fell down sharply i.e. to ₹ 200/quintal in the open market while contract farmers got pre-fixed price.

6.2.2 RSL's sugarbeet under contract and wheat under non-contract

6.2.2.1 Description of sugarbeet crop

Sugarbeet (*Beta vulgaris*) is a temperate crop. The tentative trials for root and seed crop were approved in India by Indian Institute of Sugarcane Research in 1950's. Its commercial cultivation started in Sri Ganganagar in 1970 and maximum area was over 1200 hectares in 1975-76 (Singh *et al.*, 1985). In 2004, multinational seed companies led by Sygenta announced development of sugarbeet seed for tropical regions. Thus, in 2005-06, Indian council of agricultural research launched new research project along with the partnership of VSI to evaluate the feasibility of new variety seeds. 22 per cent of the world's total sugar production is produced from sugarbeet (Kumar *et al.*, 2013a; Pathak *et al.*, 2014). Sugarbeet has to be supplied to the sugar mill within 24 hours of harvesting as it deteriorates fast after harvesting. Its beet also acts as a highly nutritious cattle-feed and improves the milk yield of cows.

Sugarbeet is a biennial sugar producing tuber crop. It is sown in October-November and harvested in April-May. It was grown as a garden vegetable and for fodder long before it was valued for its sugar content. It has a conical, white, fleshy root and a flat crown. Sugar is formed through a process of photosynthesis in the sugarbeet's rosette of leaves. Sugarbeet requires good sunshine during its growth period. The crop does not prefer high rainfall as high soil moisture or continuous

heavy rain affect development of tuber and sugar synthesis. The optimum temperature for germination is 20-25℃, for growth and development is 30-35℃ while sugar accumulation requires a temperature of 25-35℃. Well drained sandy loam and clayey loam soils with fairly good organic status are suitable for its cultivation. The root of the beet contains 75 per cent water and 25 per cent dry matter. The dry matter comprises about 5 per cent pulp. The sugar content in sugarbeet can vary from 12 per cent to 20 per cent. The sugar extraction rate depends on sugar content of the sugarbeet at the moment of its arrival in the processing plant. The standard sugarbeet should have a sugar content of 16 per cent, which would yield 130 kg of sugar per tonne of standard sugarbeet processed at a sugar plant. Sugarbeet pulp and molasses are its processed by-products widely used as feed supplements for livestock. Seeds required for one acre is 1400 gram or about 42,000 seeds. The crop is sown in rows 50-56 cm apart at 15 cm plant to plant spacing. The maximum expected yield of sugarbeet from an acre is about 500 quintal.

Both wheat and sugarbeet are *rabi* crops. The sowing and harvesting time for both crops is same i.e. October-November and April-May, respectively. RSL promoted the sugarbeet as best alternative to wheat crop by claiming to have around ₹ 9500 more income through leaflets (Appendix H). Further, there is no open market for the sugarbeet as such and the firm itself is the sole buyer in the Punjab. Thus, economic analysis of the crop viability is possible only with alternative wheat crop in the vicinity of sugarbeet growers.

6.2.2.2 Description of wheat crop

Wheat in India is grown on an area of 30.97 million hectares with a production of 88.94 million tonnes. In Punjab, wheat is grown over an area of 3.51 million hectares with a production of 15.78 million tonnes. In 2015-16, about 45 per cent of the gross cropped area of the state was under wheat cultivation (GoP, 2015-16). As presented in Table 6.18, Punjab is second largest producer of wheat in India and accounts for 17.74 per cent of the nation's production. Punjab also tops among all the states by contributing 41.5 per cent of wheat to the central pool during 2014-15 (GoI, 2015). Further, district-wise area under wheat in Punjab is

presented in Table 6.19. Wheat is the first major crop in all districts of the state except two districts namely Kapurthala and Fatehgarh Sahib (GoP, 2011).

Table 6.18

Top Seven States in the Production of Wheat in 2014-15

States	Production (million tonnes)	Proportionate share in total production
Uttar Pradesh	25.22	28.36
Punjab	15.78	17.74
Madhya Pradesh	14.18	15.94
Haryana	11.86	13.33
Rajasthan	9.87	11.10
Bihar	4.05	4.55
Gujarat	3.22	3.62

Source: GoI, 2015

Table 6.19
District-wise Area under Wheat in Punjab in 2014-15

Districts	Area (acres)	Proportionate share to total wheat area
Sangrur	701480	8.10
Bathinda	627380	7.25
Ludhiana	624910	7.21
Patiala	575510	6.65
Shri Muktsar Sahib	513760	5.93
Faridkot	508820	5.88
Amritsar	464360	5.36
Ferozepur	464360	5.36
Tarn Taran	464360	5.36
Gurdaspur	461890	5.33
Moga	432250	4.99
Jalandhar	412490	4.76
Mansa	410020	4.74
Hoshiarpur	370500	4.28
Barnala	281580	3.25
Kapurthala	271700	3.14
Fatehgarh Sahib	207480	2.40
S.B.S. Nagar	187720	2.16
Pathankot	103740	1.98
Rupnagar	163020	1.88
S.A.S. Nagar	123500	1.43

Source: GoP, 2015

6.2.2.3 Economics of sugarbeet and wheat production

Costs and returns are expected to be diverse across crops and regions. Various studies affirmed high cost of production for the contract crops, so the farmers will likely to indulge in contract farming only if they will get high net returns. The costs and returns for both the crops are examined to check viability of contract crop. Table 6.20 shows different types of costs of production for sugarbeet and wheat crop, which were observed to be higher in case of sugarbeet contract crop than in

case of non-contracted wheat crop. The total cost of production C for sugarbeet crop was ₹ 38,371 per acre and for wheat crop, it was ₹ 20718 per acre. The major cost components among contract and non-contract farmers were machine labour, fertilizer, weeding (only in case of sugarbeet crop) (Photo 6.1) and harvesting (Photo 6.2). The contract farmers spent about 17 per cent of the total cost only on weeding.

Table 6.20
Production Costs among Contract and Non-contract Farmers

Cost component (₹/acre)	Sugarbeet	Wheat
Machine labour	1998 (5.21)	1752 (8.46)
Seed	1000 (2.61)	1237 (5.97)
Rowing	485 (1.26)	-
Manure	278 (0.72)	130 (0.63)
Fertilizer	3263.6 (8.50)	2065.2 (9.97)
Plant protection	1413 (3.68)	958 (4.62)
Weeding	6592 (17.18)	99 (0.48)
Hired labour	904 (2.35)	753 (3.63)
Irrigation	445 (1.16)	22 (0.11)
Digging-up/Harvesting	4580 (11.94)	1156 (5.58)
Depreciation on farm implements	345.2 (0.90)	308.2 (1.49)
Interest on working capital	628.7 (1.64)	245.2
Cost A1	21932.5	8725.6
Cost A2	36132.5	19885.6
Cost B	37593	20124
Cost C	38371	20718

Note: Figures in parentheses are percentages to the total cost C

Photo 6.1
Manual Weeding in the Sugarbeet Crop

Photo 6.2
Harvesting of Sugarbeet with Harvester

Even during field survey, emergence of weed in the sugarbeet was confirmed by the company officials and the farmers. The contract farmers incurred about 12 per cent of the total cost on harvesting and 8.50 per cent on fertilizers for sugarbeet, while non-contract farmers had to incur about 10 per cent of the total costs on fertilizers followed by 8.5 per cent on machine labour, about 6 per cent on seed, and 5.6 per cent on harvesting.

In sugarbeet, transportation cost was ₹ 1866 per acre, while loading/unloading charges accounted for ₹ 530 per acre. The non-contract farmers had to spend ₹ 483 per acre as transportation cost, ₹ 127.64 per acre as cleaning and ₹ 70.26 per acre as loading and unloading charges (Table 6.21). The transportation cost was higher among contract farmers as they had to deliver their produce at the company but on the other hand, non-contract farmers sold their produce in their own village or nearby villages' focal point.

Table 6.21
Marketing Costs among Contract and Non-contract farmers

Components	Sugarbeet	Wheat
Transportation cost	1866 (6.13)	483 (28.11)
Loading and unloading charges	530 (1.74)	70.26 (4.1)
Cleaning	-	127.64 (7.43)
Marketing cost	2396	680.9

Note: Figures in parentheses indicate the marketing cost in ₹/quintal.

The average yield in sugarbeet was 304.2 quintal/acre and in wheat, it was 17.18 quintal/acre. The contract farmers sold their entire produce to the company. However, non-contract farmers sold 86.7 per cent of the wheat produce and the remaining was stored for domestic use and seed. The average price was ₹ 167.6 per quintal and gross return per acre was turned out to be ₹ 50,967.4 among contract farmers. The average price for non-contracted wheat crop was ₹ 1550 per quintal and gross return was worked out to be ₹ 26,629 per acre. The net return in case of contract farmers was ₹ 10,200/acre as compared to ₹ 5,230/acre in case of non-contract farmers. Therefore, sugarbeet was found to be more remunerative *rabi* crop as compared to wheat crop (Table 6.22). The study by Pathak *et al.*

(2014) also concluded that the sugarbeet crop is more profitable than other *rabi* crops such as wheat and mustard.

Table 6.22
Returns of Contract and Non-contract Farmers

Farmers>	Sugarbeet	Wheat
Yield (quintal./acre)	304.2	17.18
Sold (%)	100	86.7
Quantity sold (quintal)	304.2	14.9
Price (₹/quintal)	167.6	1550
Gross return (₹/acre)	50967.4	26629
Production cost (₹/acre)	38371	20718
Marketing cost (₹/acre)	2396	680.9
Total cost (₹/acre)	40767	21398.9
Net returns (₹/acre)	10200.4	5230.1

6.2.3 Paras Spices Pvt. Ltd.'s chicory under contract and wheat under non-contract

6.2.3.1 Description of chicory crop

Chicory is a root crop, dates back 5000 years referred to in the days of Cleopatra and Napolean. It is not only used as beverage, but also as a vegetable. It is also known to have high medicinal value. During 1785, it was a common household product- served as herb beverage and as a hot or cold vegetable at mealtime in American colonies. In India, it is presently used as a coffee additive or as its substitute. It is a caffeine-free herb; therefore it is used as a popular coffee substitute as well as an ingredient of many coffee recipes around the world. The chicory not only increases the bulk and keeping quality of coffee but it also provides special flavour and taste and thus, improves the quality of puree coffee. The current interest in chicory has emerged due to its worldwide use in the manufacturing of coffee and its related products such as coffee like beverages, powdered dried extract or paste. Sometimes, it is also used as a flavouring ingredient for various other food products such as desert mixes, confectionery composition, etc. It is also used by tea making companies in India as being a cheaper source. The maximum expected yield of chicory crop is 250 quintal/ acre.

In India, chicory cultivation is not popular as farmers are not much aware about the marketability of the crop. During 1974, chicory cultivation started in India. It is appraised as both complementary as well as supplement to coffee. During 2014, Gujarat and Uttar Pradesh accounts for the 97 per cent of the total production of crop in India (Haque and Ahmad, 2014). In 2005, Nestle introduced chicory in Punjab. Chicory is a six month crop. It's sowing starts during second week of October and it is harvested in end-March or by the first week of April. A chicory seedling is done at 8-9 inches apart allowing 8 inches between rows (Photo 6.3). Chicory roots are the most common source of inulin as its roots contain 15-16 per cent of sugar content.

6.2.3.2 Economics of chicory and wheat production

The total cost of production/acre, cost C for chicory crop was worked out to be ₹ 45,048. The major costs in chicory cultivation were on labour for harvesting, weeding, fertilizer and machine labour. Further, the farmers had to spent ₹ 1312/ acre on plant adjustment after the sapling of seeds. The total cost of production, cost C in wheat was turned out to be only ₹ 20,856 per acre. The major costs of farmers in wheat were rental value of land, fertilizers, machine labour, pesticides, seed and harvesting cost (Photo 6.4). The rental value of land was higher among chicory farmers (₹ 12630/acre) than that among wheat farmers (₹ 9690/acre) (Table 6.23).

The transportation cost was ₹ 2856/acre among chicory farmers, while wheat farmers incurred only ₹ 242/acre as transportation cost. The transportation cost was higher among contract farmers as they had to deliver their produce at the company and per acre produce quantity was also higher in case of contract crop as compared to non-contract crop that ultimately required more machinery to transport the produce. The loading of chicory was done by hired harvesting labour, while unloading was done with lift-trolley at the company. The loading and cleaning charges accounted for ₹ 66.7/acre and ₹ 118.6/acre respectively among wheat farmers (Table 6.24). The central government extends price support to wheat through FCI and state agencies. The procurement at MSP is open-ended i.e., whatever food-grains are offered by the farmers, are purchased at MSP by the government agencies within the stipulated procurement period, provided that the

food-grains conform to the quality specifications prescribed by the procurement agencies.

Table 6.23

Production Cost among Contract and Non-contract Farmers

Cost component (₹/acre)	Chicory	Wheat
Machine labour	2476 (5.49)	1786 (8.56)
Seed	1700 (3.77)	1160 (5.56)
Plant adjustment	1312 (2.91)	-
Manure	120 (0.27)	70 (0.33)
Fertilizer	4727 (10.49)	2329.3 (11.17)
Plant protection	1998 (4.43)	1193 (5.72)
Weeding	7420 (16.47)	130 (0.62)
Hired labour	630 (1.40)	1054 (5.05)
Irrigation	88 (0.19)	50 (0.24)
Digging-up/Harvesting	7910 (17.56)	1104 (5.29)
Depreciation on farm implements	154.8 (0.34)	176 (0.84)
Interest on working capital	851.4 (1.89)	266.2 (1.28)
Cost A1	29387.2	9318.5
Cost A2	42017.2	19008.5
Cost B	44312	20136
Cost C	45048	20856

Note: Figures in parentheses are percentages to the total Cost C.

Table 6.24

Marketing Costs among Contract and Non-contract Farmers

Components	Chicory	Wheat
Transportation cost	2856 (14.41)	242 (14.49)
Loading and unloading charges	-	66.7 (4.0)
Cleaning	-	118.6 (7.1)
Marketing cost	2856	427.3

Note: Figures in parentheses indicate the marketing cost in ₹/quintal.

The average yield in chicory crop was 198.1 quintal/acre, while in wheat, it was 16.7 quintal/acre in Moga district. The contract farmers sold their entire chicory produce to the company. The non-contract farmers sold 84 per cent of wheat produce as the farmers retained the remaining for domestic use and seeds. The average price received in chicory was ₹ 340 per quintal and gross returns per acre were turned out to be ₹ 67,354 among contract farmers. In wheat, the farmers received average price ₹ 1550 per quintal and gross return was only ₹ 25,885 per acre. The net return in case of contract farmers was ₹ 19,450/acre as compared to only ₹ 4601.7/acre in case of non-contract farmers. Thus, chicory was more remunerative *rabi* crop as compared to wheat crop (Table 6.25). During the field survey, the farmers also argued that three acres of chicory cultivation gives return equal to five acres of wheat cultivation.

Table 6.25
Returns in Chicory among Contract and Wheat among Non-contract Farmers

Farmers>	Chicory	Wheat
Yield (quintal/acre)	198.1	16.7
Sold (%)	100	84
Quantity sold (quintal)	198.1	14.01
Price (₹/quintal)	340	1550
Gross return (₹/acre)	67354	25885
Production cost (₹/acre)	45048	20856
Marketing cost (₹/acre)	2856	427.3
Total cost (₹/acre)	47904	21283.3
Net returns (₹/acre)	19450	4601.7

Photo 6.3
Chicory Crop at Paras Spices Pvt. Ltd.'s Contract Farm

Photo 6.4
Harvesting of Chicory under Contract with Paras Spices Pvt. Ltd.

6.3 Summary

The analysis in this chapter reveals that contract farming in the study areas has largely been able to diversify the cropping pattern in favour of non-traditional vegetable crops except in the case of potato, where the company had an agreement for 10 acres of land and preferred farmers of medium category. The analysis rejects the fifth hypothesis and claims that farmers are accepting new crops even without any government roles for the promotion of new crops. The contract farmers had not only put more area under non-traditional crops, but also produced higher number of crops as compared to non-contract farmers that helped them to manage risk. The potato contract farmers had higher cost of production as compared with non-contract farmers since contract farmers had to sow the seeds provided by the company, which were costlier than the seeds available in local market. Both new sugarbeet and chicory crops had higher cost of production as compared to traditional wheat crop. However, the net income of the contracted crops such as potato, sugarbeet and chicory was turned out to be higher in comparison with the potato and wheat which were either grown as such or as substitute.

CHAPTER 7
PARTICIPATION AND EFFICIENCY IN CONTRACT FARMING

As observed in the previous chapter, contract farming improves the farmers' return from the contract crops. Therefore, it is imperative to study further whether such contracted crops are grown efficiently or not. Further, it is also important to examine different factors determining the participation of farmers in contract farming and its impact on employment generation.

7.1 Determinants of Farmers' Decision to Participate in Contract Farming and Impact on Income

7.1.1 PepsiCo

The treatment effect model used to determine contract farmers' decision to participate in contract farming is presented in Table 7.1. In selection equation, dependent variable was dummy for contract participation. The negative and significant coefficient of age of the farmers indicates that older the farmer, lesser is probability of participation in contract farming. The proportion of area under non-traditional crops was a strong predictor of participation in contract farming scheme i.e. farmers growing other than wheat-paddy crop preferred to participate in contract farming.

At second-stage of econometric analysis, treatment effect model was used instead of OLS for correction bias in sample selection. In outcome equation, gross income of potato was positively affected by farm size, off-farm income, agricultural machinery, proportion of area under non-traditional crops and contract participation. The farmers with higher operational holdings were likely to have more income. The coefficient on the contract variable implies that participation in contract farming raises gross income of potato by ₹ 18,393 per acre. The positive and significant impact of constant on potato income indicates that there were some other factors that increase the gross income. The *ath* parameter shows correlation between error terms of the selection and the outcome equation. This parameter was statistically significant which implies that there was selection bias, so it was essential to estimate gross income using the treatment regression model.

Table 7.1

Treatment Effect Model of Gross Income for Potato Crop

Predictor	Coefficient	SE	P>z
Dependent variable: Binary which assume value 1 for contract participation and zero otherwise			
Household size (persons)	-0.133	0.102	0.192
Age (years)	-0.024*	0.016	0.09
Education (years)	0.090	0.066	0.176
Operated area (acres)	0.004	0.010	0.663
Farm implements (no.)	0.187	0.148	0.207
Off-farm income	0.001	1.250	0.337
Proportion of area under non-traditional crops	0.065***	0.012	0.000
Constant	-1.112	1.232	0.367
Gross income			
Household size (persons)	-231.578	298.283	0.438
Age (years)	-29.620	55.493	0.594
Education (years)	-162.882	213.800	0.446
Operated area (acres)	61.021**	25.324	0.016
Farm implements (no.)	224.420	485.360	0.644
Off-farm income	0.029	0.038	0.446
Proportion of area under non-traditional crops	85.063	60.014	0.156
Contract	18393.47***	3215.728	0.000
Constant	30013.55***	4146.801	0.000
ath (ρ)	0.728*	0.401	0.07
LR test of independent equations			
Chi-squared (1)	0.00		
Probability > chi-square	0.955		

Note: ***, ** and * implies statistical significance level at 1%, 5% and 10% level respectively.

7.1.2 Rana Sugars Limited

Table 7.2 shows the results of treatment effect regression for sugarbeet crop. The coefficient of age was negatively significant that mean the farmers' probability to participate in contract farming was lesser if the farmer was older. The coefficient of farm experience was found to be positively significant, which implies that farmers with more farming experience were likely to participate in new models.

Gross income of sugarbeet farmers was positively affected by the farm size and contract participation. The coefficient on contract variable implies that contracting raises gross income by ₹ 18041. The coefficient of farm size was positively significant, which implies that the farmers with large operational holdings earned more income due to economies of scale. The significant and positive influence of constant on sugarbeet income indicates that there were some other factors that increased the income. The *ath* parameter was not statistically significant implies that there was no selection bias. This indicates that selectivity bias holds no influence on sugarbeet income earned from contract farming. Thus, it was not necessary to estimate gross income of sugarbeet using treatment effect model.

7.1.3 Paras Spices Pvt. Ltd.

Table 7.3 shows the result of treatment effect model for chicory crop. It was evident from the findings that household size had a positive and significant influence on the contract farming participation. Similarly, farm machinery and farm size were also found to have significant impact on the contract farming participation. Other variables like age, education turned out to be insignificant for causing variations in contract farming participation. This indicates that the company mainly considers economic indicators for farmers' selection. Therefore, it can be conjectured that the contract farming participation was a non-random selection. The results also indicate that participation in contract farming leads to the income rise by ₹ 44,768. An increase in operated area increased income by ₹ 69.25 per acre, which was significant at 5 per cent level. The *ath* parameter was statistically significant which implies that there was selection bias, so it was essential to estimate gross income using the treatment regression model.

Table 7.2

Treatment Effect Model of Gross Income for Sugarbeet Crop

Predictor	Coefficient	SE	P>z
Dependent variable: Binary which assume value 1 for contract participation and zero otherwise			
Household size (persons)	-0.177	0.123	0.149
Age (Years)	-0.075**	0.032	0.02
Farming experience (years)	0.055**	0.028	0.053
Education (years)	0.102	0.068	0.134
Operated area (acres)	0.005	0.011	0.609
Off-farm income	1.820	1.790	0.309
Farm implements (no.)	0.193	0.140	0.168
Proportion of area under non-traditional crops	0.068***	0.012	0.000
Constant	-0.149	1.402	0.915
Gross income			
Age (years)	-121.017	126.221	0.338
Farming experience (years)	99.861	125.760	0.427
Education (years)	-107.592	228.745	0.638
Operated area (acres)	66.570***	24.917	0.008
Off-farm income	0.023	0.037	0.526
Proportion of area under non-traditional crops	99.267	75.087	0.186
Contract	18041.13***	3987.603	0.000
Constant	30547.62***	4142.054	0.000
ath (ρ)	0.825	0.565	0.145
LR test of independent equations			
Chi-squared (1)	1.92		
Probability > chi-square	0.165		

Note: ***, ** and * implies statistical significance level at 1%, 5% and 10% level respectively.

Table 7.3

Treatment Effect Model of Gross Income for Chicory Crop

Predictor	Coefficient	SE	P>z
Dependent variable: Binary which assume value 1 for contract participation and zero otherwise			
Household size (persons)	0.101**	0.045	0.026
Age (years)	0.040	0.031	0.194
Experience (years)	-0.052*	0.027	0.058
Education (years)	-0.053	0.046	0.248
Operated area (acres)	0.033***	0.012	0.008
Off-farm income	3.530	0.002	0.208
Farm implements (no.)	0.277**	0.129	0.032
Proportion of area under non-traditional crops	0.068***	0.014	0.000
Constant	-2.334*	1.298	0.072
Gross income			
Age (years)	94.289	76.547	0.218
Experience (years)	-36.493	68.146	0.592
Education (years)	-61.607	131.809	0.64
Operated area (acres)	69.625**	36.071	0.054
Off-farm income	-0.086	0.054	0.115
Proportion of area under non-traditional crops	-92.944*	53.413	0.082
Contract	44768.76***	2384.798	0.000
Constant	21477.87***	3197.382	0.000
Inverse mills ratio	-3168.31	1361.537	
ath (ρ)	-0.835*	0.446	0.061
LR test of independent equations			
Chi-squared (1)	1.30		
Probability > chi-square	0.254		

Note: ***, ** and * implies statistical significance level at 1%, 5% and 10% level respectively.

7.2 Technical Efficiency

The participation in contract farming not only influences income of the farmers but it may also have an impact on technical know-how of the farmers and use of farm resources as the companies in order to get better quality of products, provide the various technical and extension services at the door steps of the farmers. Thus, efficiency to produce crop under contract may differ from crop grown under non-contract. The next section has examined the technical efficiency in production of crops grown under contract and non-contract farming.

7.2.1 PepsiCo

Technical efficiency has been measured under overall technical efficiency (OTE) and pure technical efficiency (PTE) by using non-parametric frontier i.e. data envelopment analysis programme (DEAP). The mean value of gross return and various inputs used in the technical efficiency index for potato's contract and non-contract farmers are presented in Table 7.4. The mean value of gross return from potato per acre was higher in case of contract farmers (₹ 76,965) as compared to non-contract farmers (₹ 71,368). The cost on use of human labour was also higher among contract farmers (₹ 5170) as compared to among non-contract farmers (₹ 1702). The use of both fertilizers and plant protection chemicals measured in value terms were higher for contract farmers than non-contract farmers. Furthermore, the mean value of seed cost was also turned out to be higher in case of contract farmers than that of non-contract farmers. However, mean value of machinery labour and harvesting was higher among non-contract farmers than that of contract farmers.

Table 7.4

Summary Statistics of Variables in DEAP of Potato Farmers

Parti-culars	Gross return (₹/acre)	Labour cost (₹/acre)	Machinery cost (₹/acre)	Seed cost (₹/acre)	Fertilizer cost (₹/acre)	Plant protection costs (₹/acre)	Harvesting cost (₹/acre)	No. of irrigations
Contract farmers								
Mean	76965	5170	2474	23546.9	7399.6	4787.6	3704	4.88
CV (%)	11.68	29.38	45.09	23.16	18.75	27.77	13.54	17.38
Min	47840	2600	1000	5300	4000	3116	3000	3
Max	94000	10000	5000	26000	10310	12000	5500	8
Non-contract farmers								
Mean	71368	1702	2576	15643	6588.6	3098	5843.3	5.14
CV (%)	14.43	24.57	41.79	20.77	16.37	30.12	21.58	8.79
Min	52000	900	1500	7900	2100	1800	2500	4
Max	105500	3000	8500	26000	8600	7000	9850	6

The results for DEAP are presented in Table 7.5. It was observed from the analysis that contract farmers were more efficient than non-contract farmers. The mean technical efficiency score for the contract farmers was 0.92, whereas for the non-contract farmers, it was 0.88. OTE score for 32 per cent contract farmers and 22 per cent non-contract farmers was between 0.81-0.90. Further, 58 per cent contract farmers had OTE score more than 0.91 compared to 50 per cent in case of non-contract farmers. Additionally, 10 per cent contract farmers had OTE scores between 0.71-0.80 compared to 18 per cent in case of non-contract farmers. Approximately, 34 per cent contract farmers were on efficiency frontier, while 32 per cent of non-contract farmers were efficient. Thus, it can be concluded that contract farmers were more overall technical efficient than the non-contract farmers. Further, PTE measure has been used to obtain the managerial performance (Kumar and Gulati, 2008). PTE was also higher in case of contract farmers (0.95) as compared to non-contract farmers (0.92). Furthermore, 54 per cent of the contract farmers were on efficiency scale under VRS as compared to 46 per cent in case of non-contract farmers. Thus, it is revealed that contract farmers' managerial performance in production process was also more efficient as compared to non-contract farmers. The results suggest that contract farmers on an average can reduce their cost on inputs by 5 per cent and non-contract farmers by 8 per cent. Scale efficiency that explains the farmers' ability to select optimum size of resources to attain expected level of production was also measured among the farmers. The scale efficiency score was 0.92 for contract farmers and 0.89 for non-contract farmers. Increasing returns to scale were shown by 62 per cent of the contract farmers and 68 per cent of the non-contract farmers (Figure 7.1). This implies that these farmers were operating at sub-optimum scale size and need to increase their scale of operations. Only 4 per cent contract farmers observed decreasing returns to scale and had supra-optimal scale size. CRS were observed in 34 per cent of the contract farmers and 32 per cent of the non-contract farmers. Furthermore, 34 per cent of the contract farmers were scale efficient compared to 26 per cent in case of non-contract farmers. Thus, the efficiency estimate indicates that the contract method of production was more efficient than the non-contract production. Similar results shown by other studies also revealed that contract farmers are more efficient than the independent farmers (Pandit *et al.*, 2009; Begum *et al*., 2012).

Table 7.5

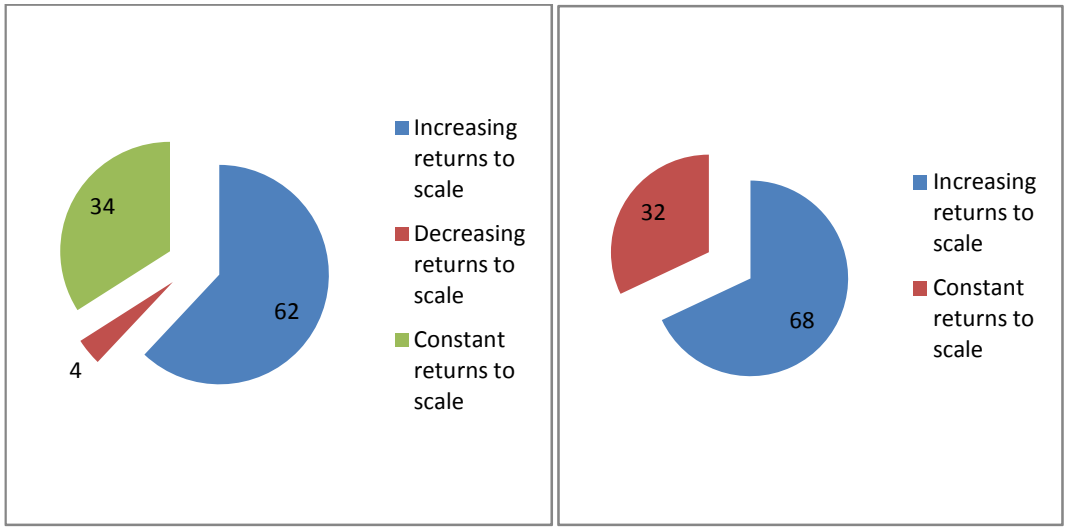
Technical Efficiency Scores among Potato's Contract and Non-contract Farmers

Efficiency scores	Contract farmers			Non-contract farmers		
	OTE	PTE	SE	OTE	PTE	SE
1.00	17 (34)	27 (54)	17 (34)	16 (32)	23 (46)	13 (26)
0.91-0.99	12 (24)	16 (32)	21 (42)	9 (18)	13 (26)	16 (32)
0.81-0.90	16 (32)	7 (14)	11 (22)	11 (22)	11 (22)	17 (34)
0.71-0.80	5 (10)	-	1 (2)	9 (18)	3 (6)	3 (6)
0.61-0.70	-	-	-	4 (8)	-	1 (2)
0.00-0.60	-	-	-	1 (2)	-	-
Mean efficiency	0.92	0.95	0.92	0.88	0.92	0.89
Min. efficiency	0.74	0.83	0.80	0.60	0.79	0.70
Max. efficiency	1.00	1.00	1.00	1.00	1.00	1.00

Note: Figures in parentheses indicate per cent of farmers with T.E. score.

Figure 7.1

Scale Efficiency of Potato among Contract and Non-contract Farmers



(a) Contract farmers (b) Non-contract farmers

7.2.2 Rana Sugars Limited

The pattern of input use and gross returns among sugarbeet and wheat farmers is given in Table 7.6. The mean value for gross return was ₹ 50,967.4 per acre in sugarbeet and ₹ 26,629 per acre in wheat. The expenditure on human labour was maximum ₹ 13,000 among sugarbeet farmers. The labour cost consists of labour

Table 7.6

Summary Statistics of Variables in DEAP of Sugarbeet and Wheat Farmers

Parti-culars	Gross return (₹/acre)	Labour cost (₹/acre)	Machinery cost (₹/acre)	Seed cost (₹/acre)	Fertilizer cost (₹/acre)	Plant protection costs (₹/acre)	Harvesting cost (₹/acre)	No. of irrigations
Sugarbeet farmers								
Mean	50967.4	8274	2483	1000	3263	1413.2	4580	20.28
CV (%)	15.43	23.57	17.20	4.01	28.51	46.32	7.33	20.09
Min	29700	4500	1400	900	1750	800	4000	10
Max	68000	13000	3500	1150	6650	4000	6000	30
Wheat farmers								
Mean	26629	1347	1752	1237	2065.2	1057	1156	4.76
CV (%)	6.99	46.82	22.83	14.02	10.12	38.52	35.78	11.47
Min	22350	600	1200	1000	1750	450	900	4
Max	30500	3000	2900	1600	2700	2200	3000	6

on spraying, irrigation and weeding. The seed cost was less for sugarbeet as the contract firm provided the seed on the subsidized rate. However, in case of wheat crop, the cost was highest on harvesting and human labour (₹ 3000 each) followed by machinery (₹ 2900) and fertilizers (₹ 2700).

Under the assumption of CRS, 18 per cent of the sugarbeet farmers were fully efficient, while 24 per cent of the farmers had score between 0.91-0.99. Further, 30 per cent of the farmers had OTE scores between 0.81-0.90. While 18 per cent had score between 0.71 to 0.80 and remaining 10 per cent between 0.61 to 0.70. Thus, OTE mean score was turned out to be 0.86. When technical efficiency was measured under VRS, the proportion of fully efficient farmers increased to 64 per cent. The mean PTE score was 0.97. The results suggest that sugarbeet farmers can reduce their input usage cost by 3 per cent. The scale efficiency score was worked out to be 0.87. 82 per cent of the farmers operated on sub-optimal returns to scale that meant these farms were too small to its scale of operations. No one operated at supra-optimal scale size. 18 per cent farmers were scale efficient as they had constant returns to scale (Figure 7.2).

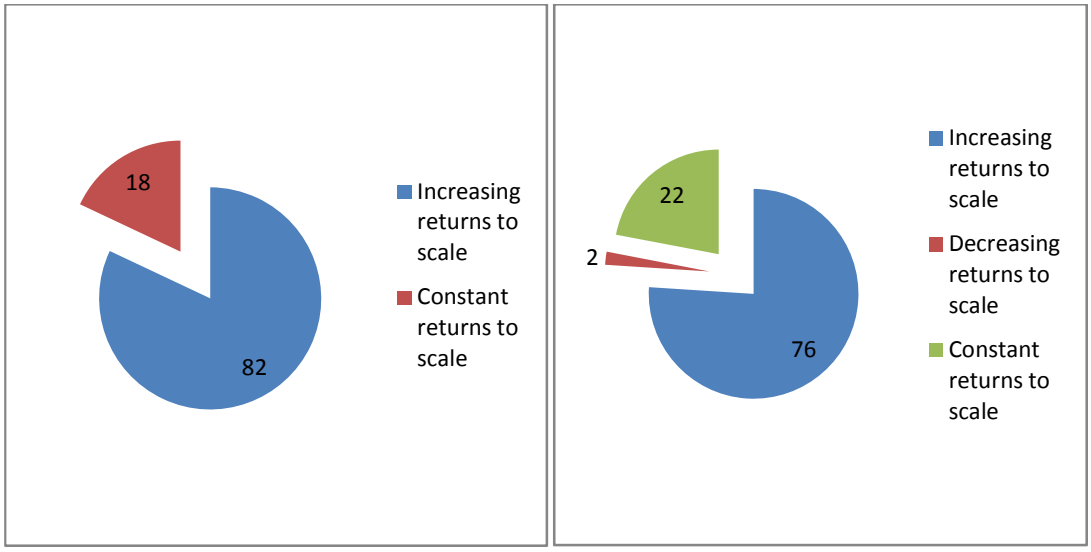
Table 7.7
Technical Efficiency Scores among Sugarbeet and Wheat Farmers

Efficiency scores	Sugarbeet farmers			Wheat farmers		
	OTE	PTE	SE	OTE	PTE	SE
1.00	9 (18)	32 (64)	9 (18)	11 (22)	30 (60)	11 (22)
0.91-0.99	12 (24)	17 (34)	15 (30)	14 (28)	10 (20)	26 (52)
0.81-0.90	15 (30)	1 (2)	16 (32)	21 (42)	9 (18)	13 (26)
0.71-0.80	9 (18)	-	5 (10)	3 (6)	1 (2)	-
0.61-0.70	5 (10)	-	5 (10)	1 (2)	-	-
0.00-0.60	-	-	-	-	-	-
Mean efficiency	0.86	0.97	0.87	0.89	0.95	0.92
Min. efficiency	0.61	0.88	0.61	0.66	0.80	0.81
Max. efficiency	1.00	1.00	1.00	1.00	1.00	1.00

Note: Figures in parentheses are percentage of the farmers with T.E. score.

Figure 7.2

Scale Efficiency of Sugarbeet and Wheat among Contract and Non-contract Farmers



(a) Contract farmers (b) Non-contract farmers

In wheat, technical efficiency calculated under CRS assumption revealed that 22 per cent of the farmers were fully efficient and set the best practice example for inefficient farmers. It means that at these farms, there was no wastage of any inputs. These farmers were most efficient amongst the sample farmers. 28 per cent had score between 0.91-0.99 and were considered to be relatively less efficient. Further, the proportion of the farmers with OTE scores between 0.71-0.80 was 42 per cent. These inefficient farms can improve their efficiency by reducing inputs. The mean OTE score was turned out to be 0.89. The proportion of fully efficient farmers increased to 60 per cent when measured under PTE. The mean PTE score was 0.95. 19 farms which were efficient under VRS, but they were found inefficient under CRS assumption. The inefficiency on these farms was not caused by the usage of poor inputs, but by inappropriate scale size. The scale efficiency was 0.92 (Table 7.7). Increasing returns to scale was shown by 76 per cent farms. These farms need to increase their scale of operations. Just 2 per cent observed supra- optimal scale size. Further, 22 per cent farms were operated at constant returns to scale (Figure 7.2).

7.2.3 Paras Spices Pvt. Ltd.

The mean value of various inputs used in production of chicory and wheat crop involved in the technical efficiency index are presented in Table 7.8. The mean value of gross return for chicory was ₹ 67,354 per acre. Among total cost of cultivation, average labour cost (₹ 10,098) was turned out to be maximum followed by harvesting cost (₹ 7910) and fertilizer cost (₹ 4727). Further, among wheat growing farmers, average gross return was ₹ 25885 per acre. The highest share in total cost was of fertilizers (₹ 2329) followed by machine labour cost (₹ 1786) and labour charges (₹ 1774).

Under the assumption of CRS, 18 per cent chicory growing farmers were fully efficient. OTE score for majority of chicory farmers (36 per cent each) was between 0.91-0.99 and 0.81-0.90. Further, 10 per cent farmers had score between 0.71-0.80. Hence, OTE mean score was turned out to be 0.91. Furthermore, technical efficiency under VRS was also measured to find out the managerial performance for organizing inputs in production process. The mean PTE score was 0.98. Under the assumption of VRS, the proportion of fully efficient farmers also increased to 52 per cent. It has been observed that 26 farmers obtained the status of efficient farmers as they had PTE score equal to one. However, under CRS assumption, 9 farmers were on efficiency frontier. For 17 farmers that became efficient under VRS assumption but they found to be inefficient in case of CRS, it can be concluded that overall technical inefficiency among these farmers was not caused by poor input utilization rather caused by the operations of the farmers with inappropriate scale size (Table 7.9). 82 per cent farmers operated on sub-optimal returns to scale which points out that these farms were too small to its scale of operations. No one operated at decreasing returns to scale (Figure 7.3).

Table 7.8

Summary Statistics of Variables in DEAP of Chicory and Wheat Farmers

Particulars	Gross return (₹/acre)	Labour cost (₹/acre)	Machinery cost (₹/acre)	Seed cost (₹/acre)	Fertilizer cost (₹/acre)	Plant protection costs (₹/acre)	Harvesting cost (₹/acre)	No. of irrigations
Chicory farmers								
Mean	67354	10098	2476	1700	4727	1998	7910	26.48
CV (%)	9.00	18.73	16.98	2.84	13.75	24.46	7.41	16.84
Min	54400	5200	1200	1620	3200	1000	6000	19
Max	88400	18000	3000	1900	5610	3500	9500	40
Wheat farmers								
Mean	25885	1774	1786	1160	2329.3	1323	1104	4.72
CV (%)	10.20	16.90	15.13	20.16	14.30	20.81	6.31	9.36
Min	18600	1150	1000	500	1100	600	1000	4
Max	31775	2600	2300	1600	3000	1800	1220	5

Technical efficiency score under CRS assumption revealed that 20 per cent of wheat farmers were fully efficient and set the best example for inefficient farmers to grow wheat. For 42 per cent of wheat farmers, OTE score was between 0.81-0.90. Further, 20 per cent farmers had OTE scores between 0.91-0.99, 14 per cent between 0.71-0.80 and 4 per cent between 0.61-0.70. The average OTE score was 0.88. Further, the proportion of fully efficient farmers was 54 per cent when measured under PTE. The mean PTE score also increased to 0.96. The scale efficiency was worked out to be 0.91. For 17 farms that became efficient under VRS, but were inefficient under CRS assumption, inefficiency among them was not due to poor usage of inputs, but because of inappropriate scale size. Further, 22 per cent farms were scale efficient as these operated at constant returns to scale. 2 per cent farms operated at the supra-optimum scale size that means farms were too large to take full advantage of scale. 76 per cent farms operated at sub-optimum scale size which meant there was need to increase their scale of operations to operate at scale efficient (Figure 7.3).

Table 7.9

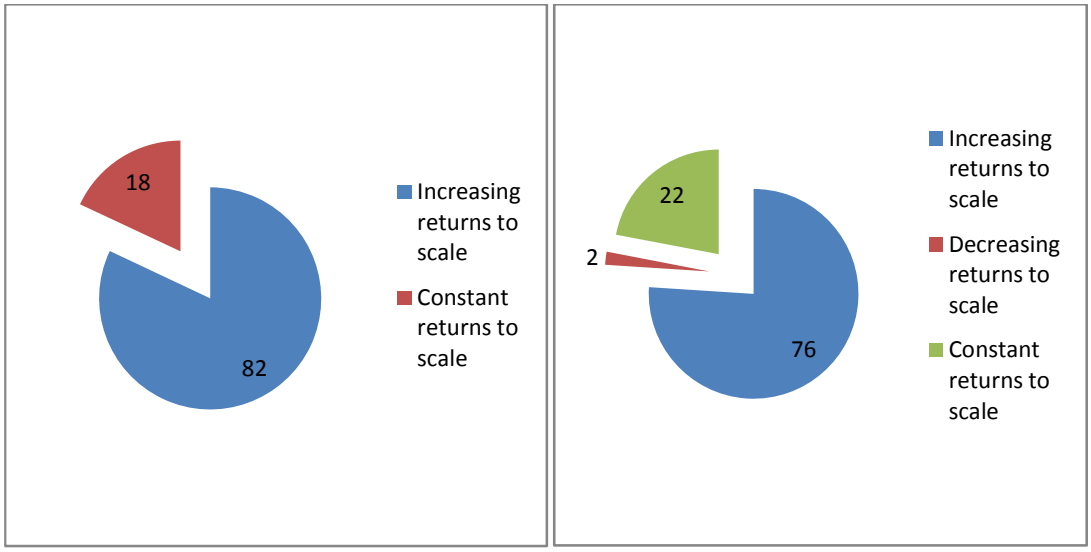
Technical Efficiency Scores among Chicory and Wheat Farmers

Efficiency scores	Sugarbeet farmers			Wheat farmers		
	OTE	PTE	SE	OTE	PTE	SE
1.00	9 (18)	26 (52)	9 (18)	10 (20)	27 (54)	11 (22)
0.91-0.99	18 (36)	24 (48)	22 (44)	10 (20)	18 (36)	18 (36)
0.81-0.90	18 (36)	-	17 (34)	21 (42)	5 (10)	17 (34)
0.71-0.80	5 (10)	-	2 (4)	7 (14)	-	2 (4)
0.61-0.70	-	-	-	2 (4)	-	2 (4)
0.00-0.60	-	-	-	-	-	-
Mean efficiency	0.91	0.98	0.92	0.88	0.96	0.91
Min. efficiency	0.71	0.93	0.73	0.64	0.86	0.64
Max. efficiency	1.00	1.00	1.00	1.00	1.00	1.00

Note: Figures in parentheses are percentage of farmers with T.E score.

Figure 7.3

Scale Efficiency of Chicory and Wheat among Contract and Non-contract Farmers



(a) Contract farmers (b) Non-contract farmers

Thus, chicory farms were operated at relatively efficient scale than wheat farms. Even being new crop in the region than wheat crop, farmers were operating comparatively more efficiently their chicory farms. By receiving technical information from the company's field manager for chicory crop, farmers gained more knowledge about their resources and practices that made possible for them to use resources more efficiently.

As observed in the above section that contract farming had a positive reaction on farmers' income and resource use efficiency. Further, it may also create demand for the farm labour. Thus, the effect of contract farming on rural employment for the contract and non-contract crops has been discussed in the subsequent section.

7.3 Labour Absorption

7.3.1 PepsiCo

The share of agricultural labourers and cultivators to total workers in Punjab was 35.94 per cent in 2011 (GoI, 2011). Vegetables require more rigorous farm workers as compared to other crops. In literature of contract farming, the possibility of employment generation with contract crops was hypothesized due to

labour intensive nature of crop production under contract and for post harvest operations such as sorting, grading, packing, etc. (Glover, 1994; Glover and Kusterer, 1990; Singh, 2005a). PepsiCo provided trained labourers for grading to the contract potato growers as they were more efficient and paced in their work. More female labour was employed by the non-contract farmers for harvesting and grading due to their lower daily wage rate as compared to male labour. The daily wage rate was ₹ 300 for male labourer and ₹ 200-250 for female labourer as per the information received during the field survey. The contract farmers used mechanical grader for grading that also required 10-12 labourer to operate it. Potato grader graded approximately 1000 bags in a day in context of contract farmers, while non-contract farmers did grading of potato manually. The labour contracts with non-contract farmers at the rate of ₹ 20-25 per bag on acre basis which included picking, grading and packing of the crop (Photo 7.1 and 7.2). The labour absorption was higher for the contract farmers. 26.7 man days per acre were required for one contracted potato crop season while in context of non-contracted potato crop; it was 21.46 man days per acre (Table 7.10). The migrant agricultural labour was also involved for the harvesting and grading of the potato.

Earlier the labour from Bihar comes only during the paddy sowing season, but now they are also coming to Punjab for potato harvesting in groups. This shows that the demand for labour has increased (By Jagdeep Singh, Sidhwan Bet, 40 years old).

Table 7.10

Average Utilization of Labour in Farm Operations

Farm operation (man-days per acre)	Contract farmers		Non-contract farmers	
Land Preparation	2.52		2.51	
Seed treatment	0.97	Male- 0.10 Female- 0.87	1.0	Male- 0.08 Female- 0.92
Sowing and dressing up	6.73		3.24	
Application of fertilizer	0.47		0.53	
Application of pesticide	0.31		0.34	
Irrigation	0.72		0.70	
Rogueing	0.35		-	
Dehaulming	0.33		0.47	
Harvesting and grading	14.3	Male- 8.85 Female- 5.45	12.67	Male- 5.31 Female- 7.36
Total	26.7		21.46	

Photo 7.1

Labour Picking the Potatoes at Non-Contract Farm

Photo 7.2

Labour manually Grading the Potato on Non-contract Farm

7.3.2 Rana Sugars Limited

Manual labour is necessary in sugarbeet cultivation for distinct operations such as cultivating, weeding, blocking, thinning and topping. 26.7 man days per acre were required for the sugarbeet crop season. Around 65 per cent of the total labour was required only for manual weeding operations. More female workers were preferred by the farmers to reduce their cost of cultivation. The female worker is also known for superior quality work due to their seriousness and nimble fingers (Singh, 2003). While in case of traditional wheat crop only 6.58 man days per acre were obligatory. No female worker was involved in the cultivation process of wheat (Table 7.11). In Punjab, female workers were found mainly in picking works of cotton, F&Vs and also in grading related works.

Table 7.11

Average utilization of Labour in Farm Operations

Farm operation (man-days per acre)	Contract farmers		Non-contract farmers
Land preparation	1.56		1.15
Sowing and rowing	1.12		0.83
Blocking and thinning	1.00		-
Application of fertilizer	1.07		1.17
Application of pesticide	0.98		1.12
Irrigation	1.08		0.98
Weeding	17.38	Male- 11.16	-
		Female- 6.02	
Harvesting	2.21		1.33
Total	26.4		6.58

The company started the sugarbeet harvesting from 27 April, 2016. The company sent its own harvester to the field on the sequence basis of sowing dates. Pulling, topping and loading work were done with harvester. 8 per cent of the contract farmers did harvesting manually. The reason behind it was during the peak season of crop harvesting due to heavy workload, the company's harvester sometimes delayed the harvesting work and even one of the farmers revealed that deduction

rate was less on the produce harvested manually due to less quantity of leaves and mud. However, with harvester also the cost remained almost same as the harvester spreads the beets in the field, so to collect those beets from field and loads it into trucks or trolleys labour was required.

7.3.3 Paras Spices Pvt. Ltd.

The use of human labour in cultivation of traditional crops like wheat-paddy in Punjab has declined over a period of time due to mechanization of main farm operations. However, the magnitude of labour absorption was more in high value crops such as chicory. Further, due to mechanization of harvesting of wheat crop manual work has reduced to just one day. On the other hand, chicory harvesting required 4.36 man days/acre. Furthermore, in chicory human labour was also obligatory for adjusting the thin plants (2.40 man days/acre) and weeding (7.21 man days/acre). 23.36 man days per acre were required for one contracted chicory crop season while for non-contracted wheat crop; it was 6.12 man days per acre (Table 7.12).

Thus, results revealed that high value crops grown through contract farming provided more employment opportunities, particularly for women as compared to the traditional non-contract crops. For potato cultivation, women used to involve in seed treatment, picking and grading of potatoes, while for sugarbeet and chicory cultivation, women indulged in manual weeding operations. Both sugarbeet and chicory crop provided about four times more employment than the traditional wheat crop.

Table 7.12
Average utilization of Labour in Farm Operations

Farm operation (man-days per acre)	Contract farmers		Non-contract farmers
Land preparation	2.34		1.20
Sowing and rowing	0.95		0.79
Adjusting sowing space	2.40		-
Application of fertilizer	2.67		1.16
Application of pesticide	1.87		0.99
Irrigation	1.56		0.98
Weeding	7.21	Male- 6.28	-
		Female- 0.93	
Harvesting	4.36		1.00
Total	23.36		6.12

7.4 Summary

The above analysis shows the positive role of contract farming on employment generation and efficient use of resources. Contract farming has improved the income of sugarbeet farmers without impact of selectivity bias. However, the usage of treatment effect model in case of potato and chicory crops shows the selectivity bias by the contact firms for the selection of farmers. The adoption of modern technology with appropriate usage of inputs made the contract farmers more technically efficient and therefore, accepting the fourth hypothesis that the contract farmers production under contract was more efficient due to companies supervision than the non-contract farmers. Also, potato contract farmers required more labour for the seed treatment and grading. Further, in case of sugarbeet and chicory, contract farmers required more labour as compared to their counterparts i.e. farmers growing traditional wheat crop. Thus, the analysis accepts the sixth hypothesis and claims that vegetables grown under contract had more labour absorption capacity as compared to traditional crops.

CHAPTER 8

FARMERS' AND COMPANY PERSPECTIVES IN CONTRACT FARMING

In Punjab, the farmers have assured market for traditional wheat-paddy crops and their acceptance for high value crops on long-term basis is possible only if the farmers do not face post-harvest problems in alternative contractual arrangements. While, at the same time, the companies also argued that despite good production, the farmers' default in delivering the produce to the companies at agreed terms and conditions. In this context, the following section elaborates both the farmers and the company's perspectives about the contract farming linkages.

8.1 PepsiCo

8.1.1 Source of contract

Majority of semi-medium (66.67 per cent) and medium (50 per cent) farmers had been contacted by the company surveyors for the first time for contracts. However, 57.57 per cent of the large farmers approached the company with the help of other farmers due to demonstration effect. Overall, more than 50 per cent of the farmers adopted contract farming with the assistance from the fellow farmers, while 36 per cent of the farmers were approached by the surveyors of the company. Only 12 per cent approached of their own to the company through surveyors for contract for the first time (Table 8.1). Thus, it can be inferred from analysis that fellow farmers played a greater role in engaging new farmers in contract farming.

Table 8.1

Category-wise Distribution of Contract Farmers by Source of Contract

Source of contract	Company agent	Fellow farmer	Self
Semi-medium	2 (66.67)	1 (33.33)	-
Medium	7 (50)	6 (42.86)	1 (7.14)
Large	9 (27.27)	19 (57.57)	5 (15.15)
All	18 (36)	26 (52)	6 (12)

Note: Figures in parentheses are percentage to total farmers in each category.

8.1.2 Provisions of contract

84 per cent of the farmers did not read various contract agreement provisions before hand and just signed it. The contents of the contract details were written in English which was not easy for the farmers to understand (Appendix C). In the first section of the contract agreement, both parties are defined followed by the various provisions of the material and the responsibilities of both parties in the second section. The third section includes the terms and termination of contract, while the fourth section includes the incentives, code of conduct and compliance policy. The length of the contract under potato crop was 7 months. The contract agreement prepared by the company was very lengthy and lacked clarity about the provisions specified by the company. Each farmer had to sign a 14 page agreement that denote their commitment, but there were no consequent clauses if the company defaults. Thus, the contractual terms and conditions indicate the supremacy of the company on the farmers. Furthermore, the dominance of the company in various clauses left the farmers with weak bargaining power. Due to English language, farmers fail to understand the contract implications, thus the company was able to exploit farmers by manipulating the contract terms. Therefore, it becomes necessary to evaluate the contractual terms and conditions through the responses of the company officials and the farmers. As the company conceded to the written contract in English and the farmers also agreed on it. A copy of the contract being provided to the farmers was conceded by the company, but only 28 per cent of the farmers agreed on it. It was also observed during the survey that mainly large farmers were aware about written agreement and demanded its copy as evidence. While, some of the farmers revealed their trust with the company through surveyors and did not feel the need of a written documentation. 70 per cent of the contract farmers availed credit facility from Karur Vysya Bank through the company. The company arranged the transportation facility for delivering the produce at the factory/cold stores and if in any case farmers had to deliver at the cold store due to some transport related issues during harvesting time, then the company paid for their transportation cost and the farmers also confirmed it. The seed in 50 km radius of the store was transported by the farmers themselves, while to those who were at a distance of more than 50 km from the store; the company delivered the seeds at the field. However, for the seed delivery, 68 per cent farmers agreed that it was supplied by the company. The company also

conversed that the extension services were provided and all the farmers also confirmed it. Further, the farmers revealed that the extension staff visited the field after about 4-5 days. The company also informed that all the contract farmers had availed weather insurance, but only 66 per cent farmers confirmed the insurance (Table 8.2). Further, 38 per cent of the farmers informed that they had to make ₹ 1000 advance payment for getting involved in the contract for the next year. However, the company claimed that it did not charge anything from the farmers for entering in contract and ₹ 1000 was an advance payment for booking of the seed. All the farmers revealed that they followed both the own and the company's agricultural practices. The difference between the farmers and the company's responses may be attributed to the fact that the company wanted to present a superior image about the services provided by them.

Table 8.2

PepsiCo Company and Farmers' Responses on Contract Provisions

Contract terms		Company	Farmers' responses	
			Yes	No
Written contract		Yes	50 (100)	-
Language		English	50 (100)	-
Copy provided		Yes	14 (28)	36 (72)
Credit facility	Provided	Yes (Through Karur Vysya bank)	50 (100)	-
	Taken		35 (70)	15 (30)
Transport cost	For produce	Borne by the company	50 (100)	-
	For seed	Beyond the radius of 50 Kms is borne by the company	34 (68)	16 (32)
Weather insurance	Provided	Yes	48 (96)	2 (4)
	Taken	-	33 (66)	17 (34)

Note: Figures in parentheses are percentage to total contract farmers.

8.1.3 Reasons for adopting contract farming

80 per cent of the contract farmers argued that they adopted contract farming for the stable prices provided by the company. They argued that there exist wider price fluctuations in potato over seasons due to variations in its production and availability in the market. It was distantly followed by assured market (64 per cent) and fixed income (50 per cent) received from the contract farming. Further, for 22 per cent of the contract farmers, saving of the transportation costs was also a major reason for adoption of contract farming as the contracting company picked the produce from the farm and delivers the inputs at the farm itself. It was advantageous for those farmers who had comparatively lower number of tractor-trolleys. Better prices in contract farming were reported by 20 per cent of the farmers. 14 per cent farmers entered in contract for getting accessibility to quality seeds and another 12 per cent entered in it as their farms get free earlier. Since, the company mainly contracts for potato seed in Punjab, early digging up of potatoes gave the farmers more time for sowing of the third crop. Onetime payment was also reported by 8 per cent farmers for joining the contract. Onetime payment was beneficial for the farmers as they could make all expenditures and investments simultaneously (Table 8.3).

Table 8.3

Distribution of Farmers by Reasons to take up Contract Farming (Multiple Responses)

Reasons for taking Contract farming	No. of farmers
Stable price	40 (80)
Assured market	32 (64)
Fixed income	25 (50)
Input & produce delivery	11 (22)
Better price	10 (20)
Quality seeds	7 (14)
Field get free earlier	6 (12)
Onetime payment	4 (8)
Assured coverage of cost	3 (6)
Extension services	3 (6)
Demonstration effect	2 (4)

Note: Figures in parentheses are percentage to total contract farmers.

8.1.4 Benefits of contract farming

The perusal of Table 8.4 explains benefits of contract farming estimated using Henry Garrett Ranking. Assured market scores the first rank with a Garrett score (79.22) followed by assured price with 70.88 mean score. The third benefit was quality seeds with 58.6 score, fourth fixed income with 57.32 score, fifth extension service with 56.14 score and the sixth was the transportation of produce by the company with a mean score of 52.82. Some of the other perceived benefits of contract farming included: technical know-how, mechanical grader incentive, field get free earlier, higher quality of produce, insurance facility, crop don't get spoiled due to assured market and higher income in that order. 90 per cent of the contract farmers wanted to continue the contract for potato crop with PepsiCo.

Earlier, I was attached with the Chambal company for contract farming, they were not allowing to grow the crop of another company and grading practice was done manually that consumes a lot of time, but on the other side, PepsiCo allows the farmers to grow another companies' crop and also provides machine grader facility, that saves the time. Even the roguing cost is also borne by the company.

-Baldev Singh, age 46 years, Sidhwan Bet block, Ludhiana

In 2015 crop season, company rejected mine whole crop due to virus attack on it and converted it from seed grade to chip grade. Nevertheless, the company procured the whole harvest by swapping the prices of A and B grade to C and D grade. However, in the whole process, I was on the safe side and earned even more profit. But company had suffered from loss due to conversion of seed variety into chip grade variety, the seeds gone out of the circle. However, the surveyor of the company argued that the company purchased produce A and B grade of the farmer at ₹ 3 per kg and C and D grade at ₹ 9.50 per kg. Around 90 per cent of the produce from an acre lies in C and D grade category and just 10 per cent lies in A and B grade category. So the farmer earned gross return around ₹ 90000 per acre.

-Sukhjot Singh, age 47 years, Sidhwan Bet block, Ludhiana

-Inderjeet Gill, Company Surveyor

Table 8.4

Henry Garrett Ranking of Contract Farmers for the Benefits of Contract Farming

Factors for benefits	Average Score	Rank
Assured market	79.22	1
Assured price	70.88	2
Extension services	56.14	5
Quality seeds	58.6	3
Technical know-how	49.28	7
Fixed income	57.32	4
Higher quality of produce	40.02	10
Mechanical grader incentive	43.34	8
No need to transport crop to market	52.82	6
Higher income	29.8	13
Field get free earlier	40.12	9
Crop don't get spoiled due to assured market	32	12
Insurance facility	38.02	11

8.1.5 Production and marketing problems faced by farmers

Contract farmers also faced some problems viz. costly seeds, shortage of labour, low price, excessive grading, etc. during cultivation and marketing of their produce. The sampled farmers were asked to rank their problems in terms of affect on them. Henry Garrett ranking technique was used for the purpose of ranking the problems of the farmers. From Table 8.5, it can be inferred that among all the problems faced, costly seeds with 70.12 average score was ranked first followed by low price for the produce with mean score 66.7. The third problem was shortage of labour (57.88), followed by excessive grading by the company (46.66) and late payment (43.1). The sixth in the list was transportation cost for the seeds (with a mean score of 39.08) followed by high rotten rate of seed provided by the company (mean score 38.22) and provision of unrequired fertilizers (mean score 37.24).

Table 8.5

Henry Garrett Ranking of Problems faced by Contract Farmers in Production and Marketing

Production and marketing problems	Average score	Rank
Shortage of labour	57.88	3
Seeds are costly	70.12	1
Low prices	66.7	2
Seed transportation cost is high	39.08	6
Excessive grading	46.66	4
Late payment	43.1	5
High rotten rate in the seed provided by the company	38.22	7
Provision of unrequired fertilizers	37.24	8

Company exploits the farmer to a large extent. The chemical kit that we can buy easily from market or even can borrow but company gives it in advance on cash only. Sometimes due to its limited utilization, a sufficient amount of its remaining unutilized. The company provides us 30 sacks of seeds to be sown in the area of one acre. But as per our experience at least 3 bags get wasted due to rotten pieces. So the company should increase the quantity of bags to 40.

Further, the company asks for advance payment for seeds at least one week before. However, when they procure the produce, the farmers have to wait for the payment for long. So I demand that company should pay us at least half of the payment at the day of procurement.

8.1.6 Perceptions of non-contract farmers about contract farming

In the study area, 50 farmers who were not involved in a contractual relationship were also interviewed regarding the issues related to contract farming. All the farmers were familiar with contract farming and among them 12 per cent also had contracts previously. Disputes related to side selling and qualities were primary

reasons for not continuing the contracts. Forty six per cent farmers wanted to engage in contractual relationship if they got chance in future.

Further, Table 8.6 analyzes the non-contract farmers' perspectives for not entering in contract farming. 40 per cent of the non-contract farmers argued that the inputs provided by the company were costly than the market prices. Another 14 per cent argued that the company provided the seeds to the known farmers only. Amongst them, 12 per cent farmers were those who earlier worked with the contracting firm and were blacklisted by the company for side-selling the potatoes. While 12 per cent considered the participation in contract as interference in their farming operations and might lose their decision making power. Another 10 per cent of the farmers believed that average returns for both contract and non-contract farmers over a longer period of time remain same.

Table 8.6
Distribution of Non-contract Farmers by their opinion for not engaging in Contract Farming (Multiple Responses)

Reasons	No. of farmers
Costly Inputs	20 (40)
Company provide seed to the known farmers only	7 (14)
Blacklisted by the company	6 (12)
More interference in farming operations	6 (12)
Same average returns in long run	5 (10)
Not allowing storage of seed	4 (8)

Note: Figures in parentheses are percentages to total non-contract farmers.

8.1.7 Company's opinion about contract farming

The company officials pointed out that they preferred to choose farmers with 5 to 10 acres of land. But during primary survey, actual situation was different, as the company has to allot a vendor ID on 10 acres of land to one farmer. However, in most of the large farmer families, the company has signed contract agreement with more than one member of the family by giving more than one vendor ID.

The company also faced some issues while executing their contract practice like side-selling and hiding of potato seed by farmers. According to the company officials, the most significant problem faced by them was the selling of produce in open market that has been produced under contract, whenever the spot market prices were higher than the contract prices. So the farmers were punished by contract exclusion. Even some of the farmers used to hide some of the produce for seed in next season, which they grew for open marketing. Due to that, the company's patent seed becomes available in the open markets. Thus, in the next season, farmers grow PepsiCo's seed without entering in contract. Whenever the price in open market declines, they sold it to PepsiCo by fulfilling their quality norms easily and in case of higher prices in open market; they used to sell their produce in open market. So in both situations such farmers used to earn more return than the contract farmers. Ultimately, that encourages the contract farmers to hide their produce for higher returns.

8.2 Rana Sugars Limited

8.2.1 Source of contract

The major source of involving in contract with firm among contract farmers was turned out to be the company's agent (76 per cent) followed by demonstration effect (14 per cent) and 10 per cent of the farmers themselves approached to the surveyor for the first time. The majority of the medium and large farmers were firstly approached by the firm (81.5 per cent and 72.7 per cent, respectively). Thus, it is evident from the analysis that the company itself also played a major role for the promotion of new sugarbeet crop in the state (Table 8.7).

Table 8.7
Category-wise Distribution of Farmers by Source of Contract

Source of contract	Company agent	Fellow farmer	Self
Small	2 (66.7)	1 (33.3)	-
Semi-medium	6 (66.7)	2 (22.2)	1 (11.1)
Medium	22 (81.5)	3 (11.1)	2 (7.4)
Large	8 (72.7)	1 (9.1)	2 (18.2)
All	38 (76)	7 (14)	5 (10)

Note: Figures in parentheses are percentage to the farmer in each category.

8.2.2 Provisions of contract

The contract practices were explored in detail on the basis of farmers' and the company officials' responses. The company claimed to have a written contract and a copy of the same was provided to the farmers. But, only 72 per cent of the farmers conceded for the written contract, while only 6 per cent actually possessed the copy of the contract. Some of the farmers pointed out that they trusted the company and did not feel the need for copy of the agreement. It was observed during field survey that the farmers were not sure about the number of parties involved in the agreement. As many as 76 per cent of the farmers enlightened that only two parties i.e. farmer and company signed the agreement, while another 24 per cent pointed out the involvement of three parties (farmer, company and bank). 76 per cent of the contract farmers were able to avail the credit facility from IDBI bank as the company itself acted as guarantor. The IDBI provided a loan of ₹ 20,000 for an acre. The maximum limit of providing loan to each farmer was ₹ 1 lakh for 5 acres. However during field survey, it also came to light that some of the large farmers were registered for the crop with the company in the name of 3-4 family members. Seed was provided by the company at 80 per cent subsidized rates to the farmers, costing about ₹ 1000/ acre to each farmer as against ₹ 5000/acre. During 2014-15 crop season, payments of the farmers were delayed for 3-4 months. As a result large number of farmers did not want to grow sugarbeet during next sowing season. Therefore, the company started loan facility to the farmers through IDBI bank. But, 50 per cent of the farmers considered availing of credit as half of the advance payment for the produce from the company. Thus, these farmers were of the view that even if the company did not procure their crop, they were on the safe side. However, other farmers said those had taken loan were not aware about 12 per cent interest charged on the loan availed. On transportation cost, the company conceded that gate area farmers themselves had to bear the cost, but in context of the farmers outside gate area, the company bore it. However, in practice, 48 per cent of the farmers confirmed that the company bore transportation cost of the produce, while 52 per cent of the farmers had to transport it of their own. The company did not provide any insurance against natural calamities. Farmers accepted that the company provided the extension services and surveyor visited the field on an average once in two weeks. The company pointed out that the farmers followed their instructions on

agricultural practices. However, 86 per cent of the farmers confirmed that they followed both own and company's agricultural practices, while 14 per cent followed their own farm practices (Table 8.8).

Table 8.8
Company and Farmers Responses on Various Contract Provisions

Contract terms		Company	Farmers' responses	
			Yes	No
Written contract		Yes	36 (72)	14 (28)
Language		Punjabi	36 (72)	-
Copy provided		Yes	3 (6)	47 (94)
Credit facility	Provided	IDBI	50 (100)	-
	Taken		38 (76)	12 (24)
Transport cost	For produce	Farmer/company	24 (48)	26 (52)
	For seed	Farmer	50 (100)	-
Weather insurance	Provided	No	-	-

Note: Figures in parentheses are percentage to total contract farmers.

8.2.3 Reasons for adopting contract farming

90 per cent of the contract farmers choose the contract crop sugarbeet as it gave more returns than wheat crop. Another 70 per cent started practicing contract farming in sugarbeet as it improved their land quality. While 50 per cent wanted to diversify away from wheat crop and 40 per cent adopted it due to demonstration effect. 32 per cent of the farmers were attached to contract farming as it helped them to get procurement slips for sugarcane easily. Fixed income from contracting, assured market, better price, etc. were some of the other reasons for getting involved in contract farming (Table 8.9).

I opted for sugarbeet, as it is better crop than wheat in terms of return, even gave better income last year when due to heavy rains, the yield level of wheat declined too much and the most important is that it also gives best results on mine poor land. Even I want to grow more area under the contracted sugarbeet crop. Even surveyors do not know many facts about crop and agricultural practices. As compared to them, we own have more agriculture experience.

- Baldev Singh, age 38 years, Dadiya, Amritsar

Table 8.9

Distribution of Contract Farmers by Reasons for taking up Contract Farming (Multiple Responses)

Reasons for taking Contract farming	No. of farmers
More income than wheat crop	45 (90)
Brings improvement in land quality	35 (70)
Diversify too new crops	25 (50)
Demonstration effect	20 (40)
Getting sugarcane slip	16 (32)
Fixed income	15 (30)
Assured market	12 (24)
Better price	8 (16)
Personnel relation with company	8 (16)

Note: Figures in parentheses are percentage to total contract farmers.

8.2.4 Benefits of contract farming

The benefits of contract farming as perceived by the farmers are described in Table 8.10. Higher income scored the first rank with a maximum average score (72.2) followed by the diversification away from traditional wheat crop with 65.22 Garrett score. The third benefit perceived was improvement in soil quality with mean score 63.66, while fourth benefit included higher profitability than wheat with a mean score 51.9 score. Assured price and market were ranked at fifth and sixth respectively. Availability of loan facility, fixed income and obtaining technical know-how were some of the other benefits of involving in contract farming ranked in that order using Garrett ranking technique (Table 7.22). However, 80 per cent of the non-contract farmers were aware about the contract farming in their area and 36 per cent wanted to get involved in the same if they got a chance in future. There were 6 per cent non-contract farmers who previously worked under the contract. However, they discontinued the contract with the company due to delayed payment and costly inputs.

Table 8.10
Henry Garrett Ranking of Contract Farmers for the Benefits of Contract Farming

Factors for benefits	Average Score	Rank
Assured market	46.44	6
Assured price	49.08	5
Getting technical know-how	27.28	9
Fixed income	33.42	8
Availability of Loan facility	41.18	7
Diversification away from wheat	65.22	2
Higher income	72.2	1
Better soil quality	63.66	3
More beneficial than wheat	51.9	4

8.2.5 Production and marketing problems faced by farmers

During cultivation of sugarbeet, the farmers faced several problems like shortage of labour, high cost of inputs, weed and pest problem in the crop. Henry Garrett technique was used to examine the production problems. Shortage of labour was ranked first. Due to emergence of weeds in the crop, more labour was required for weeding operations. During harvesting period, the summer starts, so the workers were not easily convinced for going to field. Emergence of weeds in sugarbeet was the second major problem with 49.42 mean score. As the sugarbeet is crop of short height and many weeds grow taller than the sugarbeet plant, thereby resulting in greater yield losses. High cost of inputs was the third major issue with 48.02 mean score. Increased price of inputs like chemical kit and high labour consumption for hand weeding and harvesting along with increased wages has escalated the cost of production. The fourth issue during production was the high incidence of pest attack (Table 8.11).

Table 8.11
Henry Garrett Ranking of Contract Farmers for the Production Problems

Production problems	Average score	Rank
Shortage of labour	65.2	1
High cost of input	48.06	3
Emergence of weeds	49.42	2
Pest attack	37.32	4

On the contract farms, low price with a Garrett score of 70.46 was the major marketing constraint. Late payments were the second major issue among the farmers. During 2014-15, losses for the sugar industry had mounted to an all-time high as sugar prices were perched around six-year low. Thus, the contract firm also failed to make timely payments to sugarbeet farmers. The third issue was high marketing cost (54.52 score) followed by high deduction rate (53.34 score). The fifth problem was transport difficulties with a mean score 45.94. During field survey, the farmers enlightened that for transporting one acre produce, three trolleys were required. Since one trolley has a capacity of 100-120 quintal sugarbeet crop, when the farmers deliver the produce at company, the labour remain idle in the field. Thus, it escalated the marketing cost for the farmer. Thus, hiring of more trolleys becomes essential for the contract farmers. Next constraint faced was distance of the company from the farmers' field with 43.52 score. As the crop deteriorates fast after harvesting and have to be supplied to the company preferably within 24 hours of harvesting. Storage is not possible even for a few hours. The company would like to spread delivery of produce over the longer period on the basis of raw material requirement (Table 8.12). This causes a backlog at the delivery point and quite often quantity deteriorates due to shrinkage resulting in the loss of the quantity premium. Therefore, a well coordinated plan of harvesting and supplying of produce is of utmost importance for the farmers and company.

Table 8.12
Henry Garrett Ranking of Contract Farmers for the Marketing Problems

Marketing problems	Average score	Rank
Low price	70.46	1
Late payment	64.98	2
High marketing cost	54.52	3
Distant market	43.52	6
High deduction rate	53.34	4
Transport difficulties	45.94	5
Weight loss of beets	40.1	7
Default in procurement	37.94	8

Company provides pesticides without label on the bottle. The company says to the farmer that you will get the slip for sugarcane only if you will also grow sugarbeet. Even the sugarbeet is costly crop due to that the area under it has also declined as compared to previous years. Although, the company itself operates the harvesting with its own machine and labour, yet it applied the high deduction rate on produce. We get just ₹ 4,00,000 from one acre but the company makes 13 kg sugar from only one quintal sugarbeet.

-Satnam Singh, age 23 years, Kirhian, Tarn Taran district

Few farmers mentioned that the company used to apply high deduction rate on the basis of sample. For taking sample, officials knowingly pick up the beet with the maximum leaves and mud. In three shifts, deduction on the total produce is applied. During 1st year of the contract, deduction rate was just 5-8 quintals, but last year applied much more i.e. 18-22 quintal.

(As revealed by the 16 per cent farmers during discussion)

8.2.6 Perceptions of non-contract farmers about contract farming

Further, the responses of the non-contract farmers were also recorded in order to find out the reasons for not entering into contract with the company. 28 per cent of the farmers opined that they could not participate in contract due to smaller size of land holding, while 22 per cent of the farmers attributed it to the costly inputs of the contract crop. Ownership of farm machinery was another constraint hindering the participation in contract farming for about 14 per cent farmers. Another 8 per cent pointed out that they cannot trust the private companies (Table 8.13). It was clarified by the farmers that *"we grow wheat-paddy as the government procures these crops at minimum support price. We can't grow such new crops with the assistance of private companies without government involvement. If the company runs away in between the crop season or may not procure our entire produce then where we will go? Obviously, we will leave back here with severe crisis".*

Table 8.13
Distribution of Non-contract Farmers by Opinions for not engaging in Contract (Multiple Responses)

Reasons	No. of farmers
Land is less	14 (28)
More costly crop	11 (22)
More machinery is required	7 (14)
Private companies are untrustworthy	4 (8)

Note: Figures in parentheses are percentage to total non-contract farmers.

8.2.7 Company's opinion about contract farming

The company started to procure sugarbeet produce from 27th April in 2015-16 season. The company used to provide its sugarbeet harvester at farmers' field on the basis of sowing dates. The whole produce was procured by the company after applying some deduction. The deduction was applied on the total produce after taking sample of 5 pieces of sugarbeet from the trolley. 3 pieces were selected by the company official and 2 pieces by the farmer from the lot. The company official pointed out that the farmers used to complain about high deduction rate. However, in actual, overall deduction rate was very small. Because even if the company official would select the piece of beet with mud and leaves while, the farmers generally picked the piece without contamination.

8.3 Paras Spices Pvt. Ltd.

8.3.1 Source of contract

The major source for 74 per cent of the contract farmers in linking with contracting company was turned out to be company's agents, while another 16 per cent contracted with the company through the another fellow farmers in the village. These farmers joined the contract farming after knowing about returns from the chicory at neighbourer's farm. The remaining 10 per cent of the farmers approached to the surveyor of their own for the first time. Further, it also came in light that the company first approached mainly to the medium and large farmers for contracting (Table 8.14). Thus, it can be inferred from the analysis that the company is playing an important role for the promotion of new chicory crop in the Moga district.

Table 8.14
Category-wise Distribution of Farmers by source of Contract

Source of contract	Company agent	Fellow farmer	Self
Semi-medium	3 (60)	1 (20)	1 (20)
Medium	20 (76.9)	4 (15.4)	2 (7.7)
Large	14 (73.7)	3 (15.8)	2 (10.5)
All	37 (74)	8 (16)	5 (10)

Note: Figures in parentheses are percentage to total contract farmers.

8.3.2 Provisions of contract

The firm conceded that it had a written contract with the farmers in English and a copy of the contract was being provided if it was asked by the farmers. However, only 46 per cent confirmed the written contract, while none of the farmer had a copy of the contract. According to the company officials, package of practices for chicory crop were recommended by the company surveyor. The same was confirmed by 86 per cent of the contract farmers; while 14 per cent of the farmers pointed out that they did agricultural practices on the basis of their own experiences (Table 8.15). Along with technical support, the company also confirmed that it provided agri-inputs recommended by the PAU. But, the farmers specified that the company provided only seeds along with technical support. Extension staff, on an average, visited the field at an interval of 13 days as confirmed by the farmers and was always available on call. Further, the farmers confirmed that extension staff noted down the entire details about the input usage like quantity and quality of fertilizers and pesticides, irrigation and its application in register along with farmers' signature. Transport cost for the produce was borne by the farmer and the same was agreed by both the company and the farmers. The company did not provide any loan and facility of insurance against natural calamities to the contract farmers. The company provided only seed to the farmers, which cost around ₹ 1700 per acre for 400 gm seed. The company conceded that they select farmers from all over Punjab, but they preferred to sign contract with the farmers mainly in Moga district. It was also found during the survey that 96 per cent of the contract farmers belonged to Moga district only. Moreover, a few farmers pointed out that '*chicory crop is beneficial for those farmers who are within the radius of 7 km from the company's location'*.

Furthermore, the company preferred the land, where attack of *Phalaris Minor* weed was less as there was no recommended weedicide for chicory crop in India.

Table 8.15
Company and Farmer's Responses on Contract Provisions

Contract terms		Company	Farmers' responses	
			Yes	No
Written contract		Yes	23 (46)	27 (54)
Language		English	23 (46)	-
Copy provided		If farmer asked	-	50 (100)
Credit facility	Provided	If farmer asked	-	50 (100)
	Taken		-	50 (100)
Transport cost		Farmer	50 (100)	-
Weather insurance		No	-	50 (100)

Note: Figures in parentheses are percentage to total contract farmers.

8.3.3 Reasons for adopting contract farming

Table 7.28 reveals the reasons for participation in contract farming. 92 per cent of the farmers attributed their shift to higher income earned from the chicory crop. About 30 per cent credited it with fixed income under contract farming. Further, 22 per cent opted for the contract farming due to demonstration effect. Furthermore, 16 per cent of the farmers grew the contracted crop as they obtained lower yield in wheat crop due to unsuitable soil quality (Table 8.16).

Table 8.16
Distribution of Farmers by Reasons for taking up Contract Farming (Multiple Responses)

Reasons for taking Contract farming	No. of farmers
Higher income	46 (92)
Fixed income	15 (30)
Demonstration effect	11 (22)
Land quality is bad, not suitable for wheat	8 (16)
Assured market	5 (10)

Note: Figures in parentheses are percentage to total contract farmers.

8.3.4 Benefits of contract farming

Table 8.17 illustrates the benefits of contract farming professed by the farmers using the Henry Garrett ranking. Diversification to new crops attained the highest score (69.76) followed by the higher income (67.28). The third benefit perceived by the farmers was improvement in soil quality with an average score of 60.92. Fixed income from contracted crop, assured price, no impact of animals on crop were some of the other major benefits of practicing the contract farming in that order. Another advantage of growing chicory as contract crop was the improvement in the yield level of next crop grown in the plot as its leaves could be used as green manure. Less impact of natural calamities and assured market were given the 38.1 score and 32.04 score respectively. 98 per cent of the contract farmers wanted to continue the contract for chicory crop with Paras Spices Pvt. Ltd.

Table 8.17

Henry Garrett Ranking of Contract Farmers for the Benefits of Contract Farming

Factors for benefits	Average Score	Rank
Assured market of the chicory	32.04	9
Assured price	45.48	5
Fixed income	57.92	4
Diversification to new crop	69.76	1
Improvement in soil quality	60.92	3
Improvement in yield of next crop	38.86	7
Less impact of natural calamities	38.1	8
No impact of animals on standing crop	39.64	6
Higher income from new crop	67.28	2

8.3.5 Production and marketing problems

Table 8.18 and 8.19 reveal various production and marketing problems faced by the farmers in growing chicory under contract farming. Shortage of labour with a mean score 74.68 was the major problem, which was ranked first using the Garrett ranking technique, while costly inputs with a mean score 63.98 score was ranked second. Poor quality of pesticides, weed attack on crop, shortage of water etc. were the other major production problems for the farmers (Table 8.18).

Table 8.18
Henry Garrett Ranking of Contract Farmers for the Production Problems

Problems	Average score	Rank
Shortage of labour	74.68	1
High cost of inputs	63.98	2
Lack of credit	41.84	5
Shortage of water for irrigation	34.64	6
More weed attack	42.42	4
Poor quality of pesticide	42.44	3

Low price for the chicory crop was the major problem as it had a mean score of 68.24 among the various marketing related issues. During field survey, farmers asserted that the chicory price was low in relation to the cost of inputs. The second major issue was delay in procurement of the produce. Farmers had to stand in queue for several hours or even for a day along with their tractor-cum-trolley to wait for their turn. The farmers used to start reaching at firm gate to sell their produce after mid-night i.e. before the opening hours of the company. The third issue was transport difficulties with 48.18 score (Table 8.19). As farmers themselves had to deliver their produce at company gate and to transport one acre produce, more than two trolleys were required. As one trolley on an average has capacity of 70-75 quintal for chicory. Its immediate delivery after harvesting is beneficial both for the farmers and the company. If the root is allowed to dry prior to removing the bark than the thick bark will develop as a result its removal will become increasingly difficult. The chicory roots losses its wait at a very fast rate and thus, transportation is one of the big hurdles for a long distance farmers.

Table 8.19
Henry Garrett Ranking of Contract Farmers for the Marketing Problems

Problems	Average score	Rank
Low price	68.24	1
Default in procurement	52.36	2
High marketing cost for grower	30.98	4
Transport difficulty	48.18	3

When we start digging initially at that time yield is around 180 qtl. When while digging the crop, we reaches in last acres of chicory field, the yield level rises to 220-230 qtl. So, on an average, yield remains around 200 qtl. The whole harvesting in the end is not possible.

-Balwinder Singh, age 46 years, Moga 2 block, Moga

This year company sowed less than 400 gram seed on one acre. So the crop grown thinly, therefore to do proper adjustment we have spent our time and money again by plucking the plants from others farms where the thinning was required and by sowing it on our farm.

-Chetan Singh, Age 62 years, Chugawa, Moga district

8.3.6 Opinion of non-contract farmers for contract farming

Further, 92 per cent of the non-contract farmers confirmed that they had knowledge about the chicory contract farming in their region. Forty per cent of the non-contract farmers also wanted to engage in contractual relationship. However, from the company's perspective, the inclusion of farmers in contract farming in actual depends on distance of the farm from the firm and farmers resource endowment. On the other hand, non-contract farmers considered the most important reason for their exclusion from contract farming was lesser availability of family labour and transport issue. The second major issue among non-contract farmers for being not entered in the contract was small land holdings. 10 per cent of the non-contract farmers failed to get seed as the company preferred to work with same farmers rather than choosing new farmers (Table 8.20).

Table 8.20

Distribution of Non-contract Farmers by their opinion for not engaging in Contract Farming (Multiple Responses)

Reasons	No. of farmers
Labour and transport issue	21 (42)
Less size of operational holding	15 (30)
Could not get seed	5 (10)
Requirement of more machinery	3 (6)
Non-suitability of land	2 (4)

Note: Figures in parentheses are percentage to total non-contract farmers

8.3.7 Company's opinion about contract farming

The company started to procure the chicory from 1st May onwards in 2015-16 season. In first round, the company staff gave 5 slips to every farmer for selling their produce. The company procured the whole crop of the farmer. After sieving the soil with machine, put it back into trolley for return. The company officials conceded that farmers tried to cheat them while measuring the weight of their produce by adding mud and leaves in produce knowingly. Deduction was applied on total produce by the company on the basis of measuring average 5 kg produce after brushing the chicory roots (Appendix I). Moreover, farmers also agreed on the point that some of the farmers tried to cheat the company ultimately that affected all the farmers.

Few farmers used to gave false information to the company. They used to acquaint less acres of contract crop and more yield from per acre to the staff. As the labour comes for sowing the crop and they don't measure the land. Due to that other farmers also suffer as the company officials say that high yield level is coming from per acre that is giving high profit to the farmer therefore there is no need to increase the price. Even some farmers tried to hide the actual to real avoid the seed payment.

-Bhagwant Singh, Age 48 years, Puranewal, District Moga

8.4 Summary

All the three firms had written contracts with farmers. RSL had contract in local language Punjabi while other two had it in English language. PepsiCo farmers opted for contract farming due to stable prices, while the farmers of RSL and Paras Spices Pvt. Ltd. opted due to higher income from contracted crop as compared to the traditional wheat crop. The major problem faced by the PepsiCo farmers were costly seed provided by the company, while farmers of RSL and Paras Spices Pvt. Ltd. pointed out the labour shortage as major problem. The non-contract farmers were not engaging in contract farming due to costly inputs, smaller landholding and high cost of transportation.

CHAPTER 9
SUMMARY AND CONCLUSIONS

9.1 Introduction

Punjab's agrarian economy was acknowledged for its opulence since the introduction of green revolution, however in 1980s, agriculture sector started showing the signs of deceleration and stagnation in yield level of major crops. As the state agriculture moved towards specialization of wheat and paddy crop that has formed the serious concern for the sustainability of profitability in the long run and maintenance of eco-system. Thus, the policy makers and various studies recommended for the diversification towards F&Vs (Singh, 2004; Dhillon and Singh, 2006). It is argued that diversified agricultural economy is expected to enhance farm income and reduces the risks of the producer. However, the traditional marketing of F&Vs is quite complex and risky phenomenon in India as there is long chain of intermediaries in the marketing that leads to very small fraction of every rupee of profit to the farmer. In this context, alternative institutional arrangements such as contract farming can play a vital role to minimize transaction costs related to uncertainty and market failures associated with high value crops. It is also argued that linking farmers to contracting firms may also cause a shift in the cropping pattern toward high value crops and consequently, result in diversification away from traditional crops like wheat-paddy.

There exist several studies which explore the linkages between contract firms and the farmers. Most of the contract firms excluded small farmers from the contractual arrangements because of higher transaction costs (Kumar, 2006; Glover and Kusterer, 1990; Singh, 2012; Singh, 2016). Various studies affirmed higher net returns among contract farmers as compared to their counterparts due to higher prices (Rangi and Sidhu, 2000; Dev and Rao, 2005; Nagaraj *et al*., 2008; Singh, 2009; Swain, 2010). However, firms procured only specified quality of the produce from the farmers. Further, the farmers of Pepsi, HLL and Nijjer also reported several problems like poor coordination of activities, low prices, preferences for large farmers, delayed payments, outright cheating in dealings, manipulation of norms by the firms, etc. (Singh, 2004; Singh, 2012). Thus, there exists much diversity among contracting firms about the procurement operations and linkage

building with the farmers as the contracting practice differs from crop to crop that it is unfeasible to generalize the viability of contract farming over time. Thus, in context of Punjab, an attempt has been made to explore the contract farming potential of the new crops introduced by some of domestic contract farming companies along with one of the oldest MNC in state besides exploring the efficiency of production, diversification potential of the crops and factors influencing farmer's participation in contract farming. The specific objectives of the study are: (1) to examine nature of contracts and procurement operations of the contract farming firms; (2) to compare socio-economic characteristics of the contract and non- contract farmers; (3) to analyse costs and returns among contract and non-contract farmers for the same/alternative crops; (4) to examine factors determining the farmer's participation in contract farming; (5) to analyse the role of contract farming in farm diversification and employment; (6) to examine the technical efficiency in crop production across contract and non-contract farmers; (7) to study the perceptions of the farmers and the firms regarding the practice of contract farming system; and (8) to suggest suitable policy measures to revive the state's agrarian economy in the presence of contract farming.

9.2 Methodology

The study is mainly based on primary data conducted during December, 2015 to June, 2016. Three companies, one MNC viz. PepsiCo and two local companies viz. Rana Sugars Limited (RSL) and Paras Spices Pvt. Ltd. involved in direct procurement and processing of potato, sugarbeet and chicory respectively were selected for the study. The districts were identified on the basis of maximum area under the contract with each company. Accordingly, Ludhiana and Moga districts for Pepsico, Moga for Paras Spices Pvt. Ltd., and Tarn Taran and Amritsar districts for RSL were identified. A sample of 50 farmers under contract with each company was taken through the stratified random sampling. Another sample of 50 potato non-contract farmers in the vicinity of the PepsiCo and 50 wheat farmers in the vicinity of RSL and Paras Spices Pvt. Ltd. each selling in the traditional market was also taken based on the proportion of farmers in each category in each location through the stratified random sampling technique. Thus, the study was carried out with 150 contracted and 150 non-contracted farmers constituting a sample of 300 farmers. Both sugarbeet and chicory are *rabi* crops and there is no

open market for the sugarbeet and chicory as such and the firms itself were the sole buyer in the Punjab. Thus, economic analysis of the crop viability is possible only with the alternative wheat crop in the vicinity of the sugarbeet and chicory growers.

9.3 Operations of Contracting Firms in Punjab

PepsiCo practiced contract farming with 400 farmers at about 2500 acres of land. RSL had 3000 contract farmers under sugarbeet with around 9000 acres, while Paras Spices Pvt. Ltd. practiced contract farming with 150-200 farmers in Punjab on about 450 acres of land. All the three companies were involved in providing agri-inputs to the farmers either directly or through some other agri-input companies. PepsiCo delivered seeds at farmers' farm at 60 per cent of the payment in cash, while another 40 per cent was deducted from the produce. Similarly, RSL supplied seeds at 75 per cent subsidized rate and Paras Spices Pvt. Ltd. at ₹ 1700/acre. PepsiCo provided chemical kit at ₹ 3220/acre on distributer rate through Bayer that costs about ₹ 4,000/acre to farmer if purchased from the market, while RSL provided fertilizers at 25 per cent subsidized rate. The field agronomist of PepsiCo, RSL and Paras Spices Pvt. Ltd. visited the farms with the gap of 2, 7 and 15-20 days, respectively to provide technical guidance to the farmers. PepsiCo also gave yield based incentive to encourage farmers to increase yield level on the basis of A and B grade production. If a farmer produces 70 per cent A and B grade produce, he was given an incentive of ₹ 35/quintal Similarly, on 75 per cent A and B grade produce, an incentive of ₹ 40/quintal was given, while on producing 80 per cent A and B grade produce, ₹ 50/quintal incentive was given. The company provided a bonus of ₹ 1.1/ kg that included bonus of ₹ 0.30 for chemical kit, ₹ 0.20 for grading, ₹ 0.10 for insurance and ₹ 0.50 for permanent shed facility along with fixed price for seed potato. If RSL failed to procure crop of the farmer, the firm was conditioned to pay the amount equal to the prevailing MSP of wheat for the yield of 20 quintal/acre. PepsiCo procured all grades of seed potato produce except the rotten and cross-cut potatoes on the basis of different grade price. RSL and Paras Spices Pvt. Ltd. procured the entire produce of the crop under contract from the farmers without any grading after applying deduction on the basis of mud and leaves in the produce as there was no another market for the crops in the state. PepsiCo directly procured from the

farmers at the farm gate itself while, RSL and Paras Spices Pvt. Ltd. procured at company at the pre-agreed price. PepsiCo provided the transportation facility to the farmers, while in case of Paras Spices Pvt. Ltd., farmers themselves had to deliver the produce. However, RSL provided ₹ 10 more than the fixed price for produce as transport charges to those farmers, who supplied over a distance of 20 km, while for those who brought it from more than 100 km, the company arranged truck facility and transport cost was equally borne by both the parties. PepsiCo made payment through Karur Vysya bank within 10 days after the delivery of last produce by deducting 40 per cent seed cost from the produce, while Paras Spices Pvt. Ltd. made payments within one week after procuring the produce through cheque after deducting the input costs and the payments were generally done on Wednesday. RSL made payments within one month after procuring the produce by deducting the input costs. PepsiCo also provided a loan facility of ₹ 25,000 per acre through Karur Vysya Bank, subjected to a maximum amount of ₹ 2,50,000 without any interest. RSL also provided loan facility of ₹ 20,000/ acre to farmers for sowing sugarbeet with a maximum amount of loan ₹ 1,00,000.

9.4 Socio-Economic characteristics of Contract and Non-contract Farmers

The results of the study revealed that all the firms preferred to work with large farmers as 66 per cent of the potato, 22 per cent of the sugarbeet and 38 per cent of the chicory contract farmers belonged to large farmer category. Further, average size of operational land holding was also higher among potato (38.44 acres), sugarbeet (24.36 acres) and chicory (25.7 acres) contract farmers as compared to non-contract farmers (22.2 acres, 11.9 acres and 12.3 acres, respectively). The share of leased-in land in operational holding was also higher among contract farmers as against to non-contract farmers for all the three firms. The contract farmers of PepsiCo and RSL on an average attended the school relatively for more number of years than the non-contract farmers, while the reverse was true in case of Paras Spices Pvt. Ltd. Further, the proportion of illiterates was also higher in case of PepsiCo and RSL non-contract farmers as compared to their contract farmers while it was same for both categories of Paras Spices Pvt. Ltd. The average age of the contract farmers was slightly lower than the non-contract farmers that meant relatively younger farmers adopted modern supply chains. The income from non-farm sector was higher among contract

farmers of all the firms i.e. ₹ 6600/month in case of PepsiCo, ₹ 10,080/month in case of RSL and ₹ 4660/month in case of Paras Spices Pvt. Ltd. as compared to their non-contract farmers ₹ 4500/month, ₹ 5,240/month and ₹ 2430/month, respectively. Further, the average income from allied farm activities was also higher among RSL and Paras Spices Pvt. Ltd. contract farmers as compared to their non-contract farmers, while it was lower in case of PepsiCo contract farmers as compared to their counterparts. The contract farmers of all the firms also had higher ownership of farm machinery than non-contract farmers.

9.5 Diversification across Contract vis-à-vis Non-contract Farmers

Among PepsiCo contract farmers, the highest proportion of area was devoted to paddy (38.63 per cent) followed by potato (20.62 per cent) and wheat (17.09 per cent). The area under contract crops was only 13 per cent, while 87 per cent of the gross cropped area (GCA) was under non-contract crops. The medium and large farmers under potato contract also grew it for open market as the company provided seed for the maximum 10 acres, while some farmers grew it for spreading the risk as sometimes open market prices rose more than the contract prices. On the other hand, in case of non-contract farmers, paddy occupied the highest proportion of GCA (36.6 per cent), followed by potato (25.7 per cent), moong (16.1 per cent), wheat (11.2), mint (4.7 per cent) and maize (4.0 per cent). The extent of diversification achieved through contract farming in case of potato crop was disappointing as indicated by SID. The value of SID among contract farmers (0.44) was lower as compared to that among non-contract farmers (0.52).

In case of RSL, contract farmers had 11 per cent area under sugarbeet and 10 per cent under sugarcane. The contract farmers had lesser proportion of GCA under wheat (27 per cent) and paddy (39.6 per cent) as compared to the respective figures of non-contract farmers was 42.3 per cent and 46.8 per cent. The cropping intensity among non-contract farmers was turned out to be higher than contract farmers. As the contract farmers had about 10 per cent of the GCA under sugarcane annual crop as compared to just 0.4 per cent of the GCA in case of non-contract farmers. The comparatively more diversification was observed in case of contract farmers than that of non-contract farmers. The SID value turned out to be 0.33 in case of contract farmers as compared to 0.11 in case of non-

contract farmers. In case of Paras Spices Pvt. Ltd., the contract farmers put 8.2 per cent of the GCA under chicory. The non-contract farmers had higher proportion of GCA under wheat (43.7 per cent) and paddy (47.8 per cent) as compared to 29 per cent and 45.5 per cent, respectively in case of contract farmers. The SID value was 0.26 in case of contract farmers as compared to 0.08 in case of non-contract farmers.

9.6 Economic Impact of the Contract Farming

The production cost of potato was turned out to be higher for contract farmers (₹ 47,456.5/acre) as compared to that for non-contract farmers (₹ 33,294.1/acre). However, the contract farmers did not incur any marketing costs while selling the produce to the contract firm as the produce was farm-picked by the firm. Further, labour for grading along with grader was also provided by the company to the contract farmers, while non-contract farmers, themselves had to bear the grading cost, which amounted ₹ 5,349.3 per acre. The average yield of the potato was higher among non-contract farmers (128.8 quintal/acre) than that among contract farmers (85.58 quintal/acre). The company procured A and B grade produce at ₹ 10/kg, C grade at ₹ 8/kg, while D and Z grades were procured at ₹ 4.5/kg each. However, non-contract farmers sold seed grade at ₹ 8.2/kg, table grade at ₹ 6.6/kg and *goli* at ₹ 1/kg. The net return in case of contract farmers was higher ₹ 17208/acre than that in case of non-contract farmers (₹16149.4/acre).

In case of RSL, the cost of production for sugarbeet crop was ₹ 38,371 per acre and for wheat crop, it was ₹ 20,718 per acre. The contract farmers spent about 17 per cent of the total cost only on weeding. The transportation cost was also high among contract farmers as they themselves had to deliver their produce at the company but on the other hand non-contract farmers sold their produce in their own village or nearby villages' focal point. The average yield in sugarbeet was 304.2 quintal/acre and in wheat, it was 17.18 quintal/acre. The average price was ₹ 167.6 per quintal and gross return per acre was turned out to be ₹ 50,967.4 among contract farmers. The average price for non-contracted wheat crop was ₹ 1550 per quintal and gross return was worked out to be ₹ 26,629 per acre. Thus,

the net return in case of sugarbeet crop was ₹ 10,200/acre as compared to ₹ 5,230/acre in case of wheat crop.

In case of Paras Spices Pvt. Ltd., the cost of production for chicory crop was turned out to be ₹ 45,048/acre and for wheat crop was only ₹ 20,856/acre. The average yield in chicory crop was 198.1 quintal/acre and in wheat, it was 16.7 quintal/acre in Moga district. The average price received for chicory was ₹ 340 per quintal and gross return per acre were turned out to be ₹ 67,354. For wheat crop, the farmers received average price ₹ 1550 per quintal and gross return was only ₹ 25,885 per acre. The net return in case of contract farmers was ₹ 19,450/acre as compared to ₹ 4601.7/acre in case of non-contract farmers. Thus, the contract farmers of all the three companies realized higher net returns than non-contract farmers. The contract farmers for all the three crops viz. potato, sugarbeet and chicory sold their entire produce to the company immediately after harvesting. While potato non-contract farmers sold their 83 per cent produce and stored the remaining for seed or to sell in the lean season. Further, wheat non-contract farmers sold around 85 per cent of the produce and the remaining was stored for domestic use and seed in the vicinity area of sugarbeet and chicory contract farmers.

9.7 Determinants of Farmers' Decision to Participate in Contract Farming and Impact on Income

The treatment effect model shows that participation in contract farming raised the gross income of potato and it was positively affected by the farm size, off-farm income, agricultural machinery, proportion of area under non-traditional crops and being a contract farmer. In case of sugarbeet crop, gross income was positively affected by the farm size and participation in contract farming. For chicory crop, household size, farm machinery and farm size had a positive and significant influence on the contract farming participation. It can be conjectured that the contract farming participation was a non-random selection in case of PepsiCo and Paras Spices Pvt. Ltd. as the *ath* parameter was statistically significant. However, the *ath* parameter was not statistically significant in case of sugarbeet farmers, implies that there was no selection bias. This indicates that selectivity bias holds no influence on sugarbeet income earned from contract farming.

9.8 Technical Efficiency

The farmers grown potato, sugarbeet and chicory crop under contract farming were found to be more efficient than the non-contract farmers. The mean technical efficiency score under VRS for the contract farmers was 0.95 in case of potato, 0.97 in case of sugarbeet, 0.98 in case of chicory; whereas for non-contract farmers, it was 0.92 for potato, 0.95 and 0.96 for wheat crop. By receiving technical know-how from the extension specialists of the contracted companies for the new contracted crops, the farmers gained more knowledge about their resources and practices that made possible for them to use assets more efficiently. Thus, better agricultural practices along with technological development by the contracting firms made them more efficient.

9.9 Labour Absorption

The vegetable contracted crops created more employment opportunities particularly for the women as these required more rigorous workers at farm. PepsiCo provided trained labourers for grading to the contract potato growers while, non-contract farmers employed more female labour for harvesting and grading due to their lower daily wage rate as compared to male labour. In sugarbeet cultivation, labour was required for 26.7 man days per acre. For manual weeding operations, female workers were preferred by the farmers to reduce their cost of cultivation. While in case of traditional wheat crop, only 6.58 man days per acre were obligatory. No female worker was involved in the cultivation process of wheat. 23.36 man days per acre were required for contracted chicory crop season while for non-contracted wheat crop; it was 6.12 man days per acre.

9.10 Contract Farming from the Producers' and Company's Perspective

In case of PepsiCo, 84 per cent of the farmers did not read various contract agreement provisions before hand and just signed it. Only 28 per cent farmers had the copy of contract being provided by the company and others revealed their trust with the company through surveyors and did not feel the need of a written documentation. 70 per cent of the contract farmers availed the credit facility from Karur Vysya Bank through the company. 80 per cent of the contract farmers argued that they adopted contract farming for the stable prices provided by the company. They argued that there exist wider price fluctuations in potato over

seasons due to the variations in its production and availability in the market. All the non-contract farmers were familiar with contract farming and among them 12 per cent also had contract previously. Disputes related to side selling and qualities were primary reasons for not continuing the contract. Forty six per cent of the non-contract farmers wanted to engage in contractual relationship if they got chance in future. The company officials pointed that they preferred to choose farmers with 5 to 10 acres of land. However, in actual to most of the large farmers, the company has signed contract agreement with more than one member of the family by giving more than one vendor ID.

The benefits of potato contract farming were estimated using Henry Garrett ranking. Assured market scores the first rank with a Garrett score (79.22) followed by assured price with 70.88 mean score. Quality seeds, fixed income, extension services and transportation of produce by the company were other major benefits of potato contract farming in that order. Further, Henry Garrett ranking technique was also used for ranking the problems of the farmers. Costly seeds with 70.12 average score was ranked first followed by low price of the produce with mean score 66.7. Other problems were shortage of labour, excessive grading by the company, late payment, transportation cost for the seeds, high rotten rate of seed provided by the company and provision of unrequired fertilizers.

In case of RSL, only 72 per cent and 6 per cent of the farmers conceded for the written contract and about copy provision, respectively. 76 per cent of the contract farmers had taken the credit facility from IDBI bank. During 2014-15 crop season, payments of farmers were delayed even for 3-4 months. Due to which large number of farmers didn't wanted to grow sugarbeet for next year. So the company started loan facility to the farmers through IDBI bank. But 50 per cent of the contract farmers thought that the company had given them half payment in advance and even had consideration in mind that if the company would not procure their crop than also they would be on the safe side. 90 per cent of the contract farmers selected the contract crop sugarbeet as it gives more income than wheat crop. 32 per cent farmers were attached to contract farming as it helped them to get procurement slips for sugarcane easily. Among non-contract farmers, 80 per cent farmers were aware about the sugarbeet contract farming in

their area and 36 per cent of them, also wanted to get involved in the same if get chance in future. There were 6 per cent non-contract farmers who previously worked under the contract. However, they discontinued the contract with the company due to delayed payment and costly inputs. The major benefits of sugarbeet contract farming as perceived by the farmers were higher income with a maximum average score (72.2) followed by the diversification from traditional wheat crop with 65.22 Garrett score. Henry Garrett technique was also used for examining the production and marketing problems. Shortage of labour, weed attack, high input cost, low price, late payment and high marketing cost were some of the major problems. The major reason among non-contract farmers for not entering in the contract was smaller size of land holding and costly inputs of the new contracted crop.

In case of Paras Spices Pvt. Ltd., the major reasons for adoption of new chicory crop among farmers was higher fixed income, demonstration effect and land quality was not suitable for wheat. Only 46 per cent confirmed the written contract, while none of the farmers had a copy of the contract. The company conceded that they used to select farmers from all over Punjab however; it was found during the survey that 96 per cent of the contract farmers belonged to Moga district only. The benefits of chicory contract farming through Henry Garrett ranking suggested that diversification away from wheat was the major benefit with 69.76 score followed by higher income (67.28 score). 98 per cent of the contract farmers wanted to continue the contract for chicory crop and forty per cent of the non-contract farmers also wanted to engage in contractual relationship. Along with benefits, farmers also faced some of the marketing issues in contractual practice. The foremost issue was low price with 68.24 mean score followed by default in procurement procedure (52.36 Garrett score) and transport difficulty (48.18 Garrett score). Non-contract farmers considered the most important reasons for their non-involvement in contract farming was less availability of family labour and transport issue, smaller land holdings and couldn't get seed as the company preferred to work with same farmers rather than choosing new farmers.

9.11 Conclusions and Policy Suggestions

The comprehensive analysis of companies- PepsiCo, RSL and Paras Spices Pvt. Ltd. involved in direct contract farming of Punjab reveals that emergence of agri-business firms has created an option for farmers to increase their income and diversification away from traditional wheat crop. All the three firms procured the entire produce of the contracted crops at the pre-fixed prices. Notably, the firms gave guaranteed market as well as assured prices and farmers were left to shoulder only production risks. Thus, private players' role in extension and training the farmers is a welcome step, but malpractices such as fixation of 10 acres under contract restricts the participation of small, marginal and even semi-medium farmers. Further, in present case study, remuneration from sugarbeet and chicory crop was attractive enough that the farmers can move away from traditional wheat cultivation. Furthermore, the potato contract farmers earned slightly higher income than non-contract farmers, but stability in prices over the years seems to be profitable. While, for non-contract farmers whenever there was glut production, the prices fell down sharply in open market. As in 2015 and 2017 season, the non-contract farmers received on an average ₹ 160-250/quintal. No doubt, in 2017 season, Punjab government rescued the farmers by instructing education department to buy potatoes from farmers at ₹ 500/quintal for mid-day meal scheme. Even Shiromani Gurdwara Parbandhak Committee (SGPC) purchased directly from the farmers at ₹ 800/quintal but this does not seems to be permanent solution. In context of potato crop, the farmers had options to sell their produce to another contract firm like Mahindra Shubh Labh Ltd. or in open market in case of higher prices. So the chances of side selling were possible, but strictly execution of blacklisting for defaulters played an important role to avoid this activity. However, in case of sugarbeet and chicory crops, farmers had to solely dependent upon their concerned companies for seeds and marketing of produce. Thus, the contract design of any firm plays an important role to make its contract farming successful for both parties. However, the company is more on safe side when there is no alternative market available in the state as they can exploit a farmers due to their monopsonistic nature, but at the same time, the company also do not have any another option to procure their raw material so to run processing plants, they have to procure the farmers' entire produce. Thus, the government can encourage farmers to get attach with agri-business firms by giving them

knowledge through newspapers about assured income over the years. PepsiCo mainly worked with medium and large farmers, while RSL and Paras Spices Pvt. Ltd. was ready to work even on one acre land but preference given by them was also three acres to choose farmers. But, some of the small and marginal farmers themselves also did not feel confident for entering in contract with private firms as they felt risky about them as there was no role of any government agencies in contract practices. All the three surveyed firms worked independently without any government involvement as the implementation of Punjab Contract Farming Act, 2013 is still pending. Thus, the study indicates some critical issues in the direct contract farming implementation that need immediate attention of policy makers. The major suggestions to facilitate agrarian transformation in the presence of the contract farming system are outlined as under:

1. Inclusion of small and marginal farmers in contracts

The contract crop acreage restriction per farmer by the MNC restricted the participation of marginal, small and even semi-medium farmers. The biasedness in favour of medium and large farmers will perpetuate the practice of reverse tenancy in state, where contract farmers leased-in land from marginal and small farmers. For the long term perspective in terms of intervention in agricultural markets, the inclusion of small and marginal farmers cannot be ignored in contract practice as around 34 per cent of the farmers in Punjab and 84 per cent in India belonged to this category. The small farmers have tremendous potential to achieve higher returns from the cultivation of vegetables (Birthal *et al*., 2007a). The participation of small and marginal farmers can be ensured by encouraging farmers groups as was the case in Thailand, where potato growers have contract groups, which also deal with MNC on behalf of its members (Singh, 2005b). It will also reduce the transaction costs of the contracting firms in dealing with too many small farmers. The participation of the small farmers can also be ensured by imposing a pre-condition with the involvement of government agency to include certain proportion of small and marginal farmers in contract.

2. Intervention of public agencies

All the three contracting firms provided their own package of practices in order to get the crops of desired quality. The companies were involved in promotion of pre-selected crops rather than the overall rural development. The intervention of public

agencies such as agriculture departments and extension departments of universities can strengthen the existing system of growing only few crops under contract by promoting other vegetable crops that also remain in demand. The farmers did not feel much confident in working with private companies due to lack of trust. The involvement of the public agencies will not only help to build the confidence with the private companies, but development of the agri-business firms can also be stimulated.

3. Bringing transparency and modifications in existing contracts

I. Transparent price fixation mechanism for the contracted crops

Undoubtedly, contracting firms have specified prices in contracts, but in actual practice, farmers pointed out that prices paid by the company are low with respect to grade of the produce supplied to the company and input costs of the contracted crops. Thus, a transparent pricing structure must be evolved and mentioned in the contract so that the farmers do not feel cheated by the company.

II. Specification of pesticide and weedicide usage in contracts

The two firms, RSL and Paras Spices Pvt. Ltd. do not recommend any weedicide for contracted crops, which are new for the farmers. They are also not aware of any weedicide. As a result, manual weeding cost in sugarbeet and chicory is quite high (₹ 6592/acre and ₹ 7420/acre respectively). Similarly, PepsiCo provides incentive for the chemical kit purchased from Bayer, which points that the company promotes sale of other agri-input company rather than enhancing farmers' welfare. Many a times, chemicals in the kit also remain un-used. Thus, the contracting companies should specify quality and quantity of the pesticides and weedicides to be used in contracted crops in contract agreement with the farmers. It can bring down cost of the production of the contracted crops and result in increase in net returns of the farmers.

III. Registration of contracts

All the three firms had unregistered contract agreement with the farmers. In case of any dispute, farmers do not have any option to take any action against the firm. RSL delayed payments of some of the farmers for more than 2-3 months during 2014-15 season and as a result, many farmers walk out of the contract for next season. Moreover, the company do not specify in its agreement regarding the

payment of the produce. Such malpractices can be reduced if the firms are registered with some government agency such as marketing committee.

IV. Covering weather insurance

Two domestic contracting firms do not mention anything about the crop loss in the event of bad weather conditions, while the MNC has specifically written in its contract that in case of any weather related contingency, the firm is not at all responsible for the crop. Thus, the firms are not willing to share production risk of the farmers. The coverage of such insurance in the contract will facilitate the farmers' participation and will also help to build a long term linkage with the contracting firms.

4. Increasing competition among agri-business firms

RSL and Paras Spices Pvt. Ltd. worked with the farmers only in the vicinity of their company's location due to perishable nature of crops and high transaction costs. The quality of sugarbeet and chicory deteriorates within 24 hours thus; its delivery is not possible in such a short time span from far away regions. Ultimately, they exclude the farmers of other districts from the contract farming. But, there is also need for such firms in other districts of the state to promote region specific crops to bring the desired level of diversification. It will also increase the bargaining power of the farmers while selling the produce as the competition among firms will increase.

5. Diversification through sustainability of farming sector

The results of the study reveal that the existing agri-business firms promote only *rabi* contract crops. There is also a need of some agri-business firms, which also promote production and procurement of *kharif* crops so that the diversification away from paddy crop becomes possible. No doubt, the Punjab Contract Farming Act, 2013 brings 108 crops under its purview but the international experience shows that contract farming does not seems to be successful in basic field crops. However, to make contract farming successful, the selection of crops for cultivation under contract required pragmatic approach as the less perishable crops seems to be unprofitable for the contracting firms (World Bank, 2003).

9.12 Scope for Future Research

Due to paucity of time and financial constraints, some issues remain uninvestigated in this study. Some areas of research under contract farming, which can be explored in future, are outlined as under:

- The environmental impact of these new contract crops on groundwater and soil fertility needs to be explored over a period of time.
- It also needs to be explored whether contracting firms play any role in reducing indebtedness among farmers or not?
- The study explores that contract farming has increased employment opportunities for the labourers, but whether their working conditions have improved due to more work opportunities or not, needs to be explored.

BIBLIOGRAPHY

Abebe, G.K., Bijman, J., Kemp, R., Omta, O. and Tsegaye, A. (2013). Contract Farming Configuration: Smallholders' Preferences for Contract Design Attributes. *Food Policy* **40:** 14-24.

Ahuja, H.L. (2007). Advanced Economic Theory- Microeconomic Analysis. pp. 365. S. Chand & Company Ltd., New Delhi.

Barrett, C.B., Bachke, M.E., Bellemare, M.F., Michelson, H.C., Narayanan, S. and Walker, T.F. (2012). Smallholder Participation in Contract Farming: Comparative Evidence from Five Countries. *World Development* **40 (4):** 715-730.

Baumann, P. (2000). Equity and Efficiency in Contract Farming Schemes: The Experience of Agricultural Tree Crops. Working Paper 139. Overseas Development Institute. 111 Westminster Bridge Road, London.

Begum, I.A., Alam, M.J., Buysse, J.,Frija, A. and Huylenbroeck, G.V. (2012). Contract Farmer and Poultry Farm Efficiency in Bangladesh: A Data Envelopment Analysis. *Applied Economics.* Taylor & Francis (Routledge), 44.

Bellemare, M.F. (2010). Agricultural Extension and Imperfect Supervision in Contract Farming: Evidence from Madagascar. *Agricultural Economics* **41:** 507-517.

Bellemare, M.F. (2012). As You Sow, So Shall You Reap: The Welfare Impacts of Contract Farming. *World Development* **40 (7):** 1418-1434.

Bellemare, M.F. and Novak, L. (2016). Contract Farming and Food Security. *American Journal of Agricultural Economics* **0 (0):** 1-22.

Benziger, V. (1996). Small Fields, Big Money: Two Successful Programs in Helping Small Farmers Make the Transition to High Value-Added Crops. *World Development* **24 (11):** 1681-1693.

Bhagavath, V. (1998). Technical Efficiency Measurement by Data Envelopment Analysis: An Application in Transportation. *Alliance Journal of Business Research.* 60-72.

Bhanumathy, V. and Ravichandran, S. (2011). Developing Public Private Partnership through Contract Farming- A Case Study of Gloriosa Superba Cultivation in Jeyankondam Block of Tamil Nadu. *Indian Journal of Agricultural Marketing* **25 (3):** 205-210.

Bijman, J. (2008). Contract Farming in Developing Countries: An Overview. Working Paper, Wageningen University: Department of Business Administration.

Birthal, P. S. (n.d.). *Making Contract Farming Work in Smallholder Agriculture*. <http://www.ncap.res.in/contract_%20farming/Resources/5.1%20Pratap%20S%20Birthal.pdf>. Accessed 2017 Feb, 13.

Birthal, P.S., Jha, A.K., Tiongco, M.M. and Narrod, C. (2008). Improving Farm-to-Market Linkages through Contract Farming- A Case Study of Smallholder Dairying in India. IFPRI Discussion Paper 00814.

Birthal, P.S., Joshi, P.K. and Gulati, A. (2005). Vertical Coordination in High-Value Food Commodities: Implications for Smallholders. IFPRI, MTID Discussion Paper No. 85.

Birthal, P.S., Joshi, P.K., Roy, D. and Thorat, A. (2007). Diversification in Indian Agriculture towards High Value Crops- The Role of Smallholders. IFPRI Discussion Paper 00727

Birthal, P.S., Jha, A.K. and Singh, H. (2007a). Linking Farmers to Markets for High-Value Agricultural Commodities. *Agricultural Economics Research Review* **20 (Conference issue):** 425-439.

Bolwig, S., Gibbon, P. and Jones, S. (2009). The Economics of Smallholder Organic Contract Farming in Tropical Africa. *World Development* **37 (6):** 1094-1104.

Braun, J. V., Hotchkiss, D. and Immink, M. (1989). Nontraditional Export Crops in Gautemala: Effects on Production, Income and Nutrition. Reasearch Report No. 73, International Food Policy Research Institute, Washington, D.C.

Catelo, M.A.O. and Costales, A.C. (2008). Contract Farming and Other Market Institutions as Mechanisms for Integrating Smallholder Livestock Producers in the Growth and Development of the Livestock Sector in Developing Countries. PPLPI Working Paper 45.

Chand, R. (1999). Emerging Crisis in Punjab Agriculture. *Economic and Political Weekly* **34 (13):** A2-A10.

Chand, R. and Singh, J. (2016). *Agricultural Marketing and Farmer Friendly Reforms across Indian States and UTs*. National Institution for Transforming India.<http://niti.gov.in/writereaddata/files/document_publication/Index_Agri_reform_%20Oct2016.pdf>. Accessed 2017 April, 1.

Charnes, A., Cooper, W.W. and Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. *European Journal of Operational Research* **2:** 429-444.

Coelli, T. (1996). A Guide to DEAP version 2.1: A Data Envelopment Analysis (Computer Program). *Centre for Efficiency and Productivity Analysis (CEPA).* Working Paper No.:8/96: 49.

Da Silva, C.A.B. (2005). *The Growing Role of Contract Farming in Agri-Food Systems Development: Drivers, Theory and Practice*. Agricultural Management, Marketing and Finance Service. < http://www.fao.org/fileadmin/user_upload/ags/publications/AGSF_WD_9.pdf >. Accessed 2016 Oct, 28.

Deshpande, C.S. (2005). Contracting Farming as Means of Value-Added Agriculture. Departnnent of Economic Analysis and Research. National Bank for Agriculture and Rural Development, Mumbai. Occasional Paper-42.

Dev, S. M. (2012). *Small Farmers in India: Challenges and Opportunities*. Indira Gandhi Institute of Development Research, Mumbai. <http://www.igidr.ac.in/pdf/publication/WP-2012-014.pdf>. Accessed 2016, Feb, 21.

Dev, S. M. and Rao, N.C. (2005). Food Processing and Contract Farming in Andhra Pradesh– A Small Farmer Perspective. *Economic and Political Weekly* **40 (26):** 2705-2713.

Dhillon, S.S. and Singh, N. (2006). Contract Farming in Punjab: An Analysis of Problems, Challenges and Opportunities. *Pakistan Economic and Social Review* **44 (1):** 19-38.

Eaton, C. and Shepherd, A.W. (2001). Contract Farming- Partnership for Growth. Food and Agriculture Organization of the United Nations, Rome.

Erappa, S. (2006). Contract Farming in Karnataka: A Boon or a Bane? Research Report: IX/ADRT/113. Agricultural Development and Rural Transformation Centre, Institute for Social and Economic Change, Bangalore.

Freguin Gresh, S., Anseeuw, W. and D'haese, M. (2012). Demythifying Contract Farming: Evidence from Rural South Africa. Paper presented at International Association of Agricultural Economics.

Gandhi, V.P. and Namboodiri, N.V. (n.d.). Marketing of Fruits and Vegetables in India: A Study covering the Ahmedabad, Chennai and Kolkata Markets. <http://www.iimahd.ernet.in/publications/data/2004-06-09vpgandhi.pdf>. Accessed 2016 Nov, 8.

Gill, S. S. (2004). Small Farmers and Markets. *Economic & Political Weekly* **39 (23):** 2356-2358.

Glover, D. (1994). Contract Farming and Commercialization of Agriculture in Developing Countries. In J.V. Barun and E. Kennedy (Eds.), Agricultural Commercialization Economic Development and Nutrition (pp. 166-175), Johns Hopkins.

Glover, D. and Kusterer, K. (1990). Small Farmers, Big Business: Contract Framing and Rural Development. New York: St. Martin's Press.

Glover, D. and Lim, T.G. (eds.) (1992). Contract Farming in Southeast Asia- Three Country Studies. Vinlin Press Sdn. Bhd., Kuala Lumpur.

Government of India (2011). *Census of India*. Distribution of Workers by Category of Workers. Ministry of Home Affairs.

Government of India (2014). *Indian Horticulture Database 2014*. National Horticulture Board. Ministry of Agriculture. www.nhb.gov.in

Government of India (2014a). *Level and Pattern of Consumer Expenditure 2011-12*. Report No. 555(68/1.0/1), National Sample Survey Office, Ministry of Statistics & Programme Implementation, New Delhi.

Government of India (2015). *Agricultural Statistics at a Glance.* Department of Agriculture, Cooperation and Farmers Welfare. Ministry of Agriculture and Farmers Welfare.

Government of India (2016). *Horticulture Statistics at a Glance 2015*. Horticulture Statistics Division. Department of Agriculture, Ministry of Agriculture and Farmer Welfare. Oxford University Press, New Delhi.

Government of India (2017). *NITI Aayog Finalising Model Law of Contract Farming.* Agricultural & Processed Food Products Export Development Authority (APEDA). Ministry of Commerce & Industry. <griexchange.apeda.gov.in/news/Newssearch.aspx?newsid=24695>. Accessed 2017 April, 20.

Government of Punjab (2011). *District Wise Major Crops in Punjab*. Publication No. 943. Prepared under 13th Finance Commission Grant covered under

the Milestone “Improvement of Data in respect of Farm Activities”. Economic Advisor, Chandigarh.

Government of Punjab (2013). *Punjab Contract Farming Act*. Punjab Govt. Gaz. (Extra), April 16, 2013, (CHTR 26, 1935 SAKA). <http://foodprocessingindia.co.in/state_pdf/the_Punjab_Contract_Farming_Act_2013.pdf>. Accessed 2014 Nov, 1.

Government of Punjab (2013-14). *Economic Survey. Chandigarh.* www.pbplanning.gov.in.

Government of Punjab (2015). *Statistical Abstract of Punjab*. Chandigarh: Directorate of Economics and Statistics.

Government of Punjab (2015-16). *Economic Survey. Chandigarh.* www.pbplanning.gov.in.

Greene, W.H. (2003). Econometric Analysis. Pearson Education India.

Grosh, B. (1994). Contract Farming in Africa: An Application of the New Institutional Economies. *Journal of African Economies* **3 (2):** 231-261.

Grover, D.K., Singh, J.M., Singh, J. and Kumar, S. (2012). Impact of Emerging Marketing Channels in Agriculture: Benefit to Producer-Seller and Marketing Costs and Margins of Potato and Kinnow in Punjab. AERC Study No: 28. Punjab Agricultural University, Ludhiana.

Grover, D.K., Singh, J.M., Singh, J. and Kumar, S. (2014). Impact of Emerging Agribusiness Establishments on Potato Marketing in Punjab. *Indian Journal of Marketing* **44 (6):** 37-50.

Gulati, A., Ganguly, K. and Landes, M.R. (2009). *Toward Contract Farming in a Changing Agri-food System.* <http://www.ncap.res.in/contract_%20farming/Resources/2.1%20Ashok%20Gulati.pdf>. Accessed 2015 Sept, 28.

Guo, H., Jolly, R.W. and Zhu, J. (2005). *Contract Farming in China: Supply Chain or Ball and Chain?* Paper Presented at Minnesota International Economic Development Conference, University of Minnesota, April 29-30. <http://www.researchgate.net/publication/239754412>. Accessed 2015, July, 23.

Haji, J. (2010). The Enforcement of Traditional Vegetable Marketing Contracts in the Eastern and Central Parts of Ethiopia. *Journal of African Economies* **19 (5):** 768-792.

Haji, J. and Andersson, H. (2006). Determinants of Efficiency of Vegetable Production in Smallholder Farms: The Case of Ethiopia. *Acta Agriculturae Scandinavica, Section C- Food Economics* **3 (3-4):** 125-137.

Haque, E. and Ahmad, A.H. (August, 2014). Chicory Potential still Waiting to be Tapped. *The Hindu.* <http://www.thehindubusinessline.com/markets/commodities/chicory-potential-still-waiting-to-be-tapped/article6360758.ece>. Accessed 2016 Dec, 15.

Henningsen, B.A., Mpeta, D.F., Adem, A.S., Kuzilwa, J.A. and Czekaj, T.G. (2015). The Effects of Contract Farming and Productivity of Small-Scale Sunflower Farmers in Tanzania. International Conference of Agricultural Economists. <http://ageconsearch.umn.edu/bitstream/212478/2/Mpeta-The%20Effects%20of%20Contract%20Farming%20on%20Efficiency%20and%20Productivity%20of%20Small-Scale%20Sunflower%20Farmers-793.pdf >. Accessed 2017 Feb, 22.

Hu, W.Y. (2013). Effect of Contract Farming on the U.S. Crop Farmers' Average Return. *Agricultural Economics* **59 (5):** 195-201.

Johl, S.S. and Kapur, T.R. (2001). Fundamentals of Farm Business Management. Kalyani Publishers, New Delhi.

Joshi, P.K., Joshi, L. and Birthal, P.S. (2006). Diversification and its Impact on Smallholders: Evidence from a Study on Vegetable Production. *Agricultural Economics Research Review* **19:** 219-236.

Key, N. and Runsten, D. (1999). Contract Farming, Smallholders and Rural Development in Latin America: The Organisation of Agro-processing Firms and the Scale of Outgrower Production. *World Development* **27 (2):** 381-401.

Kumar, J. and Kumar, P.K. (2008). Contract Farming: Problems, Prospects and its Effect on Income and Employment. *Agricultural Economics Research Review* **21:** 243-250.

Kumar, P. (2006). Contract Farming through Agribusiness Firms and State Corporation: A Case Study in Punjab. *Economic and Political Weekly* 5367-5375.

Kumar, P. (2007). Resource Provision, Productivity and Contract Farming: A Case Study of Punjab. Paper presented at Conference organized by ICAR-NCAP and USAID, May, 5-6.

Kumar, P., Singh, P.K., Swapna, M. and Pathak, A.D. (2013a). Souvenir- IISR-Industry Interface on Research and Development Initiatives for Sugarbeet in India. Indian Institute of Sugarcane Research (IISR). Association of Sugarcane Technologists of India (ASTI), Lucknow.

Kumar, S. and Gulati, R. (2008). An Examination of Technical, Pure Technical and Scale Efficiencies in Indian Public Sector Banks using Data Envelopment Analysis. *Eurasian Journal of Business and Economics* **1 (2):** 33-69.

Kumar, S., Chand, P., Dabas, J.P.S. and Singh, H. (2010). Characteristics and Determinants of Contract Design of Wheat Seed Farming in India: A Basis of Decision Making. *Indian Journal of Agricultural Economics* **65 (4):** 621-638.

Kumar, S., Chandra, S., Singh, D.R. and Chaudhary, K.R. (2013). Contractual Arrangements and Enforcement in India: The Case of Organic Basmati Paddy Farming. *Indian Journal of Agricultural Marketing* **68 (3):** 449-456.

Kumar, S., Devender, Chakarvarty, K., Chand, P. and Dabas, J.P.S. (2007). Mode of Operation and Performance of Contract Farming of Cottonseed in Haryana. *Agricultural Economics Research Review* **20:** 99-116.

Lim, T.G. and Dorall, R. (1994). Contract Farming in Malaysia: With Special Reference to Felda Land Schemes. In: Glover, D. and Lim, T.G. (Eds.) Contract Farming in Southeast Asia: Three Country Studies, pp. 71-118. Vinlin Press Sdn. Bhd., Kaula Lumpur, University of Malaya.

Little, P. D. and Watts, M. J. (eds.) (1994). Living Under Contract- Contract Farming and Agrarian Transformation in Sub-Saharan Africa. The University of Wisconsin Press, England.

Manarungsan, S. and Suwanjinder, S. (1992). Contract Farming and Outgrower Schemes in Thailand. In: Glover, D. and Lim, T.G. (Eds.) Contract Farming in Southeast Asia: Three Country Studies, pp. 10-70. Vinlin Press Sdn. Bhd., Kaula Lumpur, University of Malaya.

Manjunatha, A.V., Speelman, S., Huylenbroeck, V. and Chandrakanth, M.G. (2009). Impact of Groundwater Markets in Peninsular India on Water use

Efficiency: A Data Envelopment Approach. 27th International Association of Agricultural Economists Conference, Beijing, China.

Miglani, V. and Kalamkar, S.S. (2012). Pricing Policy in Contract Farming: A Case of Onion in Maharashtra. *Indian Journal of Agricultural Marketing* **26 (3):** 107-122.

Minot, N. and Ronchi, L. (2014). Contract Farming: Risks and Benefits of Partnership between Farmers and Firms. *Trade and Competiveness Global Practice.* The World Bank Group. 344.

Minot, N., Epprecht, M., Anh, T. T.T. and Trung, L.Q. (2006). Income Diversification and Poverty in the Northern Uplands of Vietnam. (Vol. 145). Washington, DC: International Food Policy Research Institute.

Minten, B., Randrianarison, L. and Swinnen, J.F. (2009). Global Retail Chains and Poor Farmers: Evidence from Madagascar. *World Development* **37 (11):** 1728-1741.

Mishra, B.S. (2009). Contract Farming on Potato: An Attempt to Include Poor Farmers in the Value Chain (A Learning from BASIX Intervention). In: Harper, M. (Eds.) Inclusive Value Chains in India- Linking the Smallest Producers to Modern Markets, pp. 92-109. World Scientific Publishing Co. Pte. Ltd.

Mittal, S. (2007). Can Horticulture be a Success Story for India? Working Paper No: 197. Indian Council for Research on International Economic Relations (ICRIER), New Delhi.

Miyata, S., Minot, N. and Hu, D. (2009). Impact of Contract Farming on Income: Linking Small Farmers, Packers and Supermarkets in China. *World Development* **37 (11):** 1781-1790.

Morvaridi, B. (1995). Contract Farming and Environment Risks: the Case of Cyprus. *The Journal of Peasant Studies* **23 (1):** 30-45.

Morvaridi, B. (n.d.). Environmental Degradation in Eastern Turkey: The Case of Contract Farming. Middle Eastern Natural Environments. 108-122. <http://environment.yale.edu/publication-series/documents/downloads/0-9/103morvaridi.pdf>. Accessed 2017 Jan, 5.

Mwambi, M. M., Odual, J., Mshenga, P. and Saidi, M. (2016). Does Contract Farming improve Smallholder Income? The Case of Avocado Farmers in

Kenya. *Journal of Agribusiness in Developing and Emerging Economies* **6 (1):** 2-20.

NABARD (2015-16). Accelerating the Pace of Capital Formation in Agriculture and Allied Sector. State Focus Paper 2015-16. National Bank for Agriculture and Rural Development. Punjab Regional Office, Chandigarh. <https://www.nabard.org/pdf/Executive_summary_(English)_SFP_2015_16_Punjab.pdf>. Accessed 2017 Jan, 6.

Nagaraj, N., Chandrakanth, M.G., Chengappa, P.G., Roopa, H.S. and Chadakavate, P.M. (2008). Contract Farming and its Implications for Input-supply, Linkages between Markets and Farmers in Karnataka. *Agricultural Economics Research Review* **21:** 307-316.

Nanda, M. (1995). Transnationalisation of Third World State and Undoing of Green Revolution. *Economic and Political Weekly* **30 (4):** PE20-PE30.

Narayanan, S. (2013). Profits from Participation in High Value Agriculture: Evidence of Heterogeneous Benefits in Contract Farming Schemes in Southern India. *Food Policy* **44:** 142-157.

Pandit, A., Pandey, N.K., Rana, R.K. and Lal, B. (2009). An Empirical Study of Gains from Potato Contract Farming. *Indian Journal of Agricultural Economics* **64 (3):** 497-508.

Pathak, A.D., Kapur, R., Kumar, R., Srivastava, S. and Singh, P.r. (2014). Sugar Beet: A Historical Perspective in Indian Context. *Sugar Tech* **16 (2):** 125-132.

Pingali, P. and Khwaja, Y. (2004). Globalisation of Indian Diets and the Transformation of Food Supply Systems. Inaugural Keynote Address, 17th Annual Conference of the Indian Society of Agricultural Marketing, Hyderabad, 5-7 February, www.fao.org/es/esa

Pionetti, C. (2005). Sowing Autonomy: Gender and Seed Politics in Semi-arid India. International Institute for Environment and Development (IIED), London.

Poole, N.D., Del Campo Gomis, F.J., JuliáIgual, J.F. and Vidal Giménez, F. (1998). Formal Contracts in Fresh Produce Markets. *Food Policy* **23:** 131–142.

Poulton, C., Dorward, A. and Kydd, J. (2010). Future of Small Farms: New Directions for Services, Institutions, and Intermediation. *World Development* **38 (10):** 1413-1428.

Prowse, M. (2012). Contract Farming in Developing: A Review. Agence Francaise de Development A Savoir.

Pudasaini, S.P. (1983). The Effects of Education in Agriculture: Evidence from Nepal. *American Journal of Agricultural Economics.*

Puhani, P. (2000). The Heckman Correction for Sample Selection and its Critique. *Journal of Economic Surveys* **14 (1):** 53-68.

Ramamurthy, P. (2000). The Cotton Commodity Chain, Women, Work and Agency in India and Japan: The Case for Feminist Agro-Food Systems Research. *World Development* **28 (3):** 551-578.

Ramaswami, B., Birthal, P.S. and Joshi, P.K. (2009). Grower Heterogeneity and the Gains from Contract Farming- The Case of Indian Poultry. *Indian growth and Development Review* **2 (1):** 56-74.

Rangi, P.S. and Sidhu, M.S. (2007). Contract Farming in Punjab: Some Issues. In Bawa, R.S., Raikhy, P.S. and Dhindsa, P.K. (Ed.). *Globalization and Punjab Economy: Issues in Agriculture and Small Scale Industry*. Pp.211-227. Guru Nanak Dev University, Amritsar.

Raynolds, L.T. (2002). Wages for Wives: Renegotiating Gender and Production Relations in Contract Farming in the Dominican Republic. *World Development* **30 (5):** 783-798.

Rehber, E. (2007). Contract Farming: Theory and Practice. The Icfai University Press, Hyderabad.

Rosset, P., Rice, R. and Watts, M. (1999). Thailand and the World Tomato: Globalization, New Agricultural Countries (NACs) and the Agrarian Question. *International Journal of Sociology of Agriculture and Food* **8(Special Thematic Issue):** 71-94.

Roul, C. (2001). Bitter to Better Harvest- Post Green Revolution: Agricultural and Marketing Strategy for India. Northern Book Centre, New Delhi.

Runsten, D. and Key, N. (1996). Contract Farming in Developing Countries: Theoretical Aspects and Analysis of some Mexican Case Studies. Economic Commission for Latin America and the Caribbean. <https://raulhinojosa.files.wordpress.com/>. Accessed 2015 June, 26.

Saenger, C., Qaim, M., Torero, M. and Viceisza, A. (2013). Contract Farming and Smallholder incentives to produce High Quality: Experimental Evidence from the Vietnamese Dairy Sector. *Agricultural Economics* **44:** 297-308.

Sahota, T.S. (2013). Contract Farming for Production and Procurement of Mint-Lessons from Personnel Experience. In: Bhullar, G.S. and Bhullar, N.K. (Eds.) Agricultural Sustainability- Progress and Prospects in Crop Research, pp. 269-281. Academic Press.

Saigenji, Y. and Zeller, M. (2009). Effect of Contract Farming on productivity and income of small holders: The case of tea production in north-western Vietnam. International Association of Agricultural Economists Conference, Beijing, China.

Sambuo, D. (2014). Tobacco Contract Farming Participation and Income in Urambo; Heckma's Selection Model. *Journal of Economics and Sustainable Development* **5 (28):** 230-237.

Sarkar, M.A. R., Rashid, M. H. A. and Sarker, M. R. (2011). Contract Farming in Tomato Seed Production in Rangpur District of Bangladesh: A Financial Analysis. *Progress. Agric* **22 (1&2):** 169-179.

Setboonsarng, S., Leung, PS. and Cai, J. (2006). Contract Farming and Poverty Reduction: the Case of Organic Rice Contract Farming in Thailand. ADB Institute Discussion Paper No. 49, May.

Shanker, B., Posri, W. and Srivong, T. (2011). A Case Study of Contract Farming Chain Involving Supermarkets and Smallholders in Thailand. *Canadian Journal of Development Studies* **31 (1-2):** 137-153.

Sharma, N. (2014). Contract Farming in Punjab: Institutional Framework, Determinants and Efficiency. Ph.D. thesis, IIT, Roorkee.

Sharma, N. (2015). Determining Growers' participation in Contract Farming in Punjab. *Economic and Political Weekly* **51 (2):** 58-65.

Sharma, N. (2016). Does Contract Farming Improve Farmers' Income and Efficiency? A Case Study from Punjab. *Economic and Political Weekly* **51 (40):** 63-69.

Sharma, N. and Singh, S.P. (2013). Contract Farming and Farmer Participation in Punjab. *Man and Development.* 85-102.

Sharma, V.P. (2008). India's Agrarian Crisis and Corporate-Led Contract Farming: Socio-economic Implications for Smallholder Producers. *International Food and Agribusiness Management Review* **11 (4):** 25-48.

Sharma, V.P. (2013). India's Agrarian Crisis and Smallholder Producers' Participation in New Farm Supply Chain Initiatives: A Study of Contract Farming. In: Sharma, V.P., Vorley, B., Huang, J., Suleri, A.Q., Digal, L. and Reardon, T.A. (Eds.) Linking Smallholder Producers to Modern Agri-Food Chains- Case Studies from South Asia, Southeast Asia and China, pp. 16-54. Allied Publishers Private Limited, New Delhi.

Sharma, V.P. and Jain, D. (2011). High Value Agriculture in India: Past Trends and Future Prospects. W.P. No. 2011-07-02. Indian Institute of Management, Ahmedabad.

Siddiqui, K. (1998). Agricultural Exports, Poverty and Ecological Crisis- Case Study of Central American Countries. *Economic and Political Weekly* **33 (39):** A128-A136.

Simmons, P., Winters, P. and Patrick, I. (2005). An Analysis of Contract Farming in East Java, Bali and Lombok, Indonesia. *Agricultural Economics* **33:** 513-525.

Singh, G., Gupta, T. and Guleria, A. (1985). Economic and Management Aspects of Sugar Beet Cultivation and Processing in India. CMA Monograph 105. Oxford & IBH Publishing Co., New Delhi, Bombay, Calcutta.

Singh, J. and Sidhu, R.S. (2004). Factors in Declining Crop Diversification: Case Study of Punjab. *Economic and Political Weekly* **39 (52):** 5607-5610.

Singh, M., Singh, J. and Kumar, S. (2015). Comparative Economics of Contract and Non-Contract Farming of Barley in Punjab. *Journal of Agricultural Development and Policy* **25 (2):** 46-56.

Singh, M.P. (2007*).* Contract Farming and Emerging Agrarian Structure: The Case of Punjab. Ph.D. thesis, Jawaharlal Nehru University, New Delhi.

Singh, N. (2016). Agricultural Diversification and Contract Farming in Punjab. *Agricultural Situation in India* **72 (10):** 19-31.

Singh, P. (2008). Federalism, Nationalism and Development: India and the Punjab Economy. Routledge- Taylor and Francis Group, London and New York.

Singh, R. (2009). Effectiveness of Contract Farming Practices for Agricultural Development and Equity- A Case of Hoshiarpur District in Punjab. Consortium for Trade and Development (Centad), New Delhi.

Singh, S. (2000). Contract Farming for Agricultural Diversification in the Indian Punjab: A Study of Performance and Problems. *Indian Journal of Agricultural Economics* **55 (3):** 283-294.

Singh, S. (2002). Contracting out Solutions: Political Economy of Contract Farming in the Indian Punjab. *World Development* **30 (9):** 1621-1638.

Singh, S. (2003). Contract Farming in India: Impacts on Women and Child Workers. International Institute for Environment and Development. Gatekeeper Series No. III.

Singh, S. (2004). Crisis and Diversification in Punjab Agriculture: Role of State and Agribusiness. *Economic and Political Weekly* **39 (52):** 5583-5590.

Singh, S. (2004a). Contract Farming and Forest Management. *Economic and Political Economy.* 2693- 2695.

Singh, S. (2005). Political Economy of Contract Farming in India. Allied Publishers Private Limited, New Delhi.

Singh, S. (2005a). Contract Farming for Agricultural development- Review of Theory and Practice with Special Reference to India. Working Paper-2, Centad.

Singh, S. (2005b). Contract Farming System in Thailand. *Economic and Political Weekly* **40 (53):** 5578-5586.

Singh, S. (2006). Corporate Farming in India: Is It Must for Agricultural Development? Indian Institute of Management, Ahmedabad. W.P. No.2006-11-06.

Singh, S. (2007). Leveraging Contract Farming for Improving Supply Chain Efficiency in India: Some Innovative and Successful Models. ISHS Acta Horticulture 794: II International Symposium on Improving the Performance of Supply Chains in the Transitional Economies**. <**http://www.actahort.org/>. Accessed 2015 August, 12.

Singh, S. (2009). Supply Chains for High Value Crops: A case Study of Mint in Punjab. *Indian Journal of Agricultural Marketing* **23 (1):** 93-102.

Singh, S. (2009a). Organic Produce Supply Chains in India- Organisation and Governance. CMA Publication No. 222. Allied Publishers Pvt. Ltd., Ahmedabad.

Singh, S. (2012). New Markets for Smallholders in India- Exclusion, Policy and Mechanism. *Economic and Political Weekly* **47 (52):** 95-105.

Singh, S. (2012a). Modern Food Value Chains in India: Emerging Potential for the Poor. SAMSKRITI, New Delhi.

Singh, S. (2012b). Marketing Channels and their Implications for Smallholder Farmers in India. In: McCullough, E.B., Pingali, P.L. and Stamoulis, K.G. (Eds.). The Transformation of Agri-food Systems: Globlization, Supply Chains and Smallholder Farmers, pp. 279-310, Earthscan.

Singh, S. (2016). Rethinking Diversification of Agriculture in the Indian Punjab: An Examination of Strategy and Mechanisms. In: Singh, L. and Singh, N. (Eds.), Economic Transformation of a Developing Economy: The Experience of Punjab, India, pp. 77-96. Springer.

Singla, N.K. (2012). Fresh Fruit and Vegetable Retail Chains and their impact on Farmers in Punjab. Ph.D. thesis, Guru Nanak Dev University, Amritsar.

Sivramkrishna, S. and Jyotishi, A. (2008). Monopsonistic Exploitation in Contract Farming: Articulating a Strategy for Grower Cooperation. *Journal of International Development* **20:** 280-296.

Smale, M., Just, R.E. and Leathers, H.D. (1994). Land Allocation in HYV Adoption Models: An Investigation of Alternative Explanations. *American Journal of Agricultural Economics* **76:** 535–546.

Spice. (2003). Contract Farming Ventures in India: A Few Successful Cases. National Institute of Agriculture Extension Management- Hyderabad. **1 (4). <**http://www.manage.gov.in/pgdmABM/spice/March2k3.pdf>. Accessed 2015 July, 10.

Swain, B.B. (2010). Productivity and Farmer's Efficiency under Contract Farming: A Case Study of Rice Seed Cultivation in Southern India. <http://www.mse.ac.in/Frontier/j10%20Braja.pdf>. Accessed 2015 April, 9.

Swain, B.B. (2016). Does Technological Linkage in Contract Farming Increase Farm Productivity and Efficiency? The Case of Hybrid Paddy Seed Cultivation in Undivided Andhra Pradesh. *Agricultural Economics Research Review* **29 (2):** 211-224.

Torres, G. (1994). The Force of Irony: Studying the Everyday Life of Tomato Workers in Western Mexico. Wageningen University. <http://edepot.wur.nl/132854>. Accessed 2016 Nov, 17.

Trebbin, A. and Franz, M. (2010). Exclusivity of Private Governance Structures in Agrofood Networks: Bayer and the Food Retailing and Processing Sector in India. *Environment and Planning A.* **42:** 2043-2057.

Tripathi, R.S., Singh, R. and Singh, S. (2005). Contract Farming in Potato Production: An Alternative for Managing Risk and Uncertainty. *Agricultural Economics Research Review* **18 (Conference No.):** 47-60.

Umamageswari, M., Sharif, M. and Dubey, L.R. (2013). An Economic Analysis of Papain Production under Contract Farming in Western Zone of Tamil Nadu. *Agriculture Update* **8 (1 & 2):** 183-187.

UNCTAD (2009). World Investment Report. Transnational Corporations, Agricultural Production and Development, United Nations.

UNIDROIT (2014). The Legal Dimension of Contract Farming- Promoting Good Contract Practices between Producers and Buyers in Contract Farming Operations in the Asian Context. Food and Agriculture Organization of the United Nations, Study S80A – Doc. 20.

Venkateshwarlu, D. and Corta, L.D. (2001). Transformations in the Age and Gender of Unfree Workers on Hybrid Cotton Seed Farms in Andhra Pradesh. *The Journal of Peasant Studies* **28 (3):** 1-36.

Vermeulen, H., Kirsten, J. and Sartorius, K. (2008). Contracting Arrangements in Agribusiness Procurement Practices in South Africa. *Agrekon* **47 (2):** 198-221.

Viswanadham, N. (2006). Achieving Rural and Global Supply Chain Excellence-The Indian Way. Centre for Global Logistics and Manufacturing Strategies, Hyderabad.

Von Bulow, D. and Sorensen, A. (1993). Gender and Contract Farming: Tea Outgrower Schemes in Kenya. *Review of African Political Economy* **56 (Challenging Gender Inequalities in Africa):** 38-52

Warning, M. and Key, N. (2002). The Social Performance and Distributional Consequences of Contract Farming: An Equilibrium Analysis of the Arachide de Bouche Program in Senegal. *World Development* **30 (2):** 255-263.

Watts, M. (1992). Peasants and Flexible Accumulation in the Third World: Producing under Contract. *Economic and Political Weekly* **27 (30):** PE90-PE97.

Watts, M. J. (1994). Life under Contract: Contract Farming, Agrarian Restructuring and Flexible Accumulation. In: Little, P.D. and Watts, M.J. (Eds.) Living Under Contract- Contract Farming and Agrarian Transformation in Sub-Saharan Africa, pp. 21-77. The University of Wisconsin Press, England.

Will, M. (2013). Contract Farming Handbook- A Practical Guide for Linking Small-scale Producers and Buyers through Business Model Innovation. Federal Ministry for Economic Cooperation and Development.

Winters, P., Simmons, P. and Patrick, L. (2005). Evaluation of a Hybrid Seed Contract between Smallholders and a Multinational Company in East Java, Indonesia. *The Journal of Development Studies* **41 (1):** 62-89.

Witsoe, J. (2006). India's Second Green Revolution? The Sociopolitical Implications of Corporate-Led Agricultural Growth. In: Kapur, D. (Eds.) India in Transition: Economics and Politics of Change. GE Foundation, Philadelphia.

World Bank. (2003). India: Revitalizing Punjab's Agriculture. Rural Development Unit, South Asia Region, The World Bank, Washington. Report No. 37069.

World Bank. (2008). India Taking Agriculture to the Market. Agriculture and Rural Development Unit. Report No. 35953-IN.

www.pmkchicory.com

www.pepsicoindia.co.in

www.parasspices.com

www.ranasugars.com

http://onlinelibrary.utah.gov/research/utah_symbols/historicvegetable.html