CONTRACT FARMING IN MAIZE – AN ECONOMICS ANALYSIS

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1. INTRODUCTION

The globalization of Indian agriculture in recent years as resulted the need for the Production of export-oriented quality products having comparative advantage. To fulfill the commitment of the world trade organization (WTO), the recent dismantling of the system of quantitative restrictions (QRs) on imports by the union government has provoked new challenge to the Indian farmers to compete in the world market. With the WTO's demand for trade liberalization and subsidy cut to farmer, the Indian farmers are facing threats to their survival from every quarter. In this context contract farming could be one of the best solutions which may decrease the polarization of rich and poor and thus encourage Indian farmers to compete with the very large, rich and highly indirect subsidized western farmers. Contract farming can indeed to be a vehicle for the modernization of agriculture in India. It can be a means to bring about a market focus to Indian farming. Also, the contract farming system forms the most heartening part of the vision of the national policy on agriculture. The agro-based industries require timely and adequate inputs of good quality agricultural produce. This underlying paradox of the Indian agricultural scenario has given birth to the concept of contract farming which promises to provide a proper linkage between farm and market.

Contract farming is a system of farming wherein farmers grow selected crops under a 'buy back' agreement with an agency in trading or processing. It is a system for the production and supply of agricultural/horticultural produce under forward contracts between products/suppliers and buyers. The primary essence of this system of farming is to ensure continuous supply of raw materials and to meet quality and quantity requirements on a steady /seasonal basis to meet customer needs. Contract farming can be described as a half way house between independent farm production and corporate farming.

Contract farming involves four things; pre-agreed price, quantity or acreage (minimum/maximum), quality and time. Contract farming is a case for bringing the market to the farmers, which is navigated by agribusiness farms. There is no standard and homogenous in contract farming in agriculture. Simple market specification contracts or future purchase agreements in agriculture like supplying labour and machinery are more common (Wright, 1989).

Generally, there are three types of contract in agriculture *viz*., i) procurement contract, under which only sale and purchase conditions are specified ii) partial contracts, wherein only the contracting firms supply some of the inputs and produce is bought at pre-agreed prices and iii) total contracts, under which the contracting firm supplies and manages all the inputs on the farm and farmer is just a supplier of land and labour. The relevance and importance of each type varies from product to product and these types are not mutually exclusive (Hill and Ingersent, 1982 and Key and Runsten, 1999). Whereas, the first type is generally referred to as marketing contracts, the other two are of production contracts. But, there is a systematic link between product market and factor markets under the contract arrangements as contracts requires a definite quality of produce. Different types of production contracts allocate production and market risks between the producer and the processor in different ways.

Reasons for contract farming

The production, marketing and distribution of agricultural products are becoming increasingly sophisticated for i) modern advances in technology have made it feasible for agricultural products to be produced to specifications and preserved in a fresh condition ii) the optimum scale of operations has been increasing, especially in processing and distribution iii) new selling methods have emerged, emphasizing a brand image based on consistent quality. On the demand side, due to raising income, consumers are increasingly discriminating their tastes and especially all time availability of the quality products. This has made complexity in consumer demand which gives an added impetus to search for improving the co-ordination of production, processing and distribution, especially with regard to timing and quality control (Hill and Ingersent, 1982). This provides a strong rationale, from the demand side for the contract farming as a means of raw material supply.

During the 1950's and 1960's 'contract farming' emerged as an important phenomenon in the western developed countries. By 1980, about one-third of the total US farm output and as much as 100 per cent poultry meat, milk and certain vegetables were produced under contracts (Little Peter *et al*., 1994). Even in Tasmania Island of Australia, by the mid 1990's, ninety per cent of the potato production was under contracts compared with almost nil in the 1950's (Fulton and Clark, 1996). On the other hand, in the developing countries, the multinational corporations (MNCs) brought in the system of contract farming during the late 1970's and early 1980's. Besides private and multinational enterprises, contract farming is also practiced by the statal and parastatal agencies in many countries in different commodities sectors like tea in Kenya, tobacco and livestock in Thailand, rubber in Malaysia, coconut in Indonesia, palm oil in Philippines and seed in India (Nanda and Meera, 1999; White, 1997; Shiva *et al*., 1998). Contract farming had been promoted in the recent three decades as an institutional innovation to improve agricultural performance in under developed countries, some times as a key element of rural development and/or settlement projects (Ghee and Dorall, 1992). This system was accepted and used as one of the promising institutional framework for the delivery of price incentive technology and other agricultural inputs. Wide support has been received for contract farming under the Structural Adjustment Programme (SAP) and liberalization policies everywhere by the International Development Agencies like the World bank, the United States Agency for International development (USAID), the International Finance Corporation (IFC) and the Common Wealth Development Corporation (CDC, 1989) (Little and Watts, 1994 and White, 1997).

Benefits of contract farming

Contracts are generally signed prior to planting and specified how much produce the company will buy at what price. Often the firm provides credit, inputs, farm machinery rentals, technical advice and retains the rights to reject the substandard produce (Glover, 1990).

To firm

- The companies know the acreage planted and is assured of the grower's output thus reducing its supply risk.
- The company is in control of the contract provision and stipulations that can encourage quality production through the terms of agreement.
- The companies know their approximate cost of raw product in advance.
- As better growers tend to contract with the same company over several years, some stability in company – grower relationship is attained.
- Since, some of the crops have no/less domestic market (at present), the framers have no option to sell their produce outside and the company is assured to get regular supply of the produce.

To farmers

- There is an assured market of their produce, which will eliminate the risk of price fall during glut.
- Information on market price is made available ex ante. This instills confidence among the contract farmers.
- It avoids the difficulties involved in timely transportation and eradicates the exploitation by the middlemen.
- Farmer can receive assistance from the processor in the form of technical services and input supply on credit with/without interest cost.

- Companies often provide credit to the farmers, which reduce the burden of operational expenses to the farmer. This enables the farmers to escape from the evils of private moneylenders.

- Farmer is assured of better returns compared to other field crops as the companies offer relatively pre-determined prices.

Maize crop in Indian economy

Maize is one of the important course cereal crops grown in different agro-climatic conditions of India. Maize ranks third position next to wheat and rice in the world with respect to area, while its productivity surpasses all other cereal crops. Maize is grown in 70 countries of the world. The major maize growing countries are USA, China, Brazil, Mexico, France, India, Argentina and Indonesia.

In some parts of the world, maize is used as food grain for human consumption. It is being used for manufacturing industrial products like starch, syrup, alcohol, acetic and latic acids, glucose, paper, rayon, plastic, textile, adhesive, dyes, synthetic materials, rubber *etc.* In USA more than 90 per cent of the people use the maize oil for consumption purpose. It also used more in bakery products. In addition it is used as an important feed and fodder for animals. Nearly, 500 products of maize have been listed in the USA. But, in India only 3 per cent of the total maize produce is utilized by industries. Maize is a rich source of starch (60-80 per cent), proteins (8-12 per cent), fat (3-5 per cent), and minerals (1-2 per cent) (Hosamani *et al*., 2000).

The world maize production was around 612.28 million tonnes in 2006-07 covering an area of 147.5 million hectares with an average yield of 4.6 tonnes per hectare. USA occupies the first position with an area of 280.41 million hectares and production of 2350.00 million tonnes (40.35% of share) followed by china with an area of 234.74 million tonnes (20.35% of share) in total world maize production, whereas, India ranks fifth with respect to area (6.6 million hectares) and seventh with respect to production (12.00 million tonnes). The share of India in total world maize production was 2.8 per cent during the year 2006-07. But the yield levels were low at 1.8 tonnes per hectare compared to the other maize producing countries *viz*. Italy (9.42 tonnes per ha), USA (8.38 tonnes per ha), and France (8.66 tonnes per ha).

Karnataka scenario

Karnataka state has a total geographical area of 190.5 lakh hectares of which 109.9 lakh hectares is the net cultivable area (57%) of the total cultivable about 33 per cent is covered by cereals, 42 per cent covered by oilseeds and 6 per cent by commercial crops.

Maize with a total area of 6.6 lakh hectares (3.2 lakh hectares is irrigated and 3.4 lakh hectares of rainfed) is the third largest cereal crop next to the paddy (13.74 lakh ha) and sorghum (20.85 lakh ha) in Karnataka. However, as regards to production, maize ranks third among the cereals with an annual production of 16.9 lakh tones. In terms of yield Karnataka ranks first in India with 2.79 tonnes per hectare. The major maize growing districts during 2006-07 in Karnataka are Davanagere, Belgaum, Haveri, Bagalkot, Bellary and Chitradurga.

Keeping all this in view, the study has been designed to analyze contract farming along with production and price behavior of maize in the study area with following objectives

Objectives

1. To study the variability in price and production of maize in the study area.

2. To compare the cost and returns structure of maize under contract and non contract farming.

3. To study the terms of contract and mode of operations among the contracting firms

4. To study the problem faced by the contract farmer and contract firm and to suggest remedies.

Hypothesis

1. There is high fluctuation in production and price of maize in study area.
2. Maize cultivation under contract farming is more profitable.
3. Different firms follow different terms of contract and methods of operation.
4. Farmers and contracting firms face number of problems in maize contract farming.

2. REVIEW OF LITERATURE

In this chapter, with a view to evaluate the objectives of the study, findings of some of the earlier research studies have been reviewed. It was hoped that such a review of literature would provide a basis for either conforming the earlier result or contradicting them and there by suggesting the points for further improvement.

Looking to the objectives of the study, the review of literature is presented under following heads.

2.1 Variability in production and price

2.2 Comparison of cost and returns

2.3 Contract farming and contractual arrangements

2.4 Problems in contract farming

2.1 Variability in production and price

Employing the spectral analysis for world cocoa prices Joseph (1995) identified a cyclical pattern of world cocoa prices. He reported that in addition to seasonal variations, there existed a periodic fluctuation in cocoa prices due to lags in production and in consumption responses to price changes with average lengths of 14 years and 22 months, respectively.

Parikh (1971) analyzed the short-term fluctuations in coffee prices in the world market with the help of a spectral analysis. Further, he also computed coherence and phase measures to detect linear association between the two series at each of the frequency components and to measure the time differences between the corresponding frequency components. He concluded that there was a periodic component of less than 12 months in coffee prices which cause short-term fluctuations. He suggested that the spectra remain insensitive to various trend-domination procedures.

According to Geroge and Mukherjee (1986) the growth ratio of area, yield and production of rice in Kerala indicated considerable variation across the districts. He concluded that it was unlikely that the area under paddy could be increased in the state. However, there was a scope for increase in production with the advent of technological changes.

A study conducted by Das (1986) reveled high erratic nature of movement of wholesale prices of coconut, copra and coconut oil in Kerala for the period starting from 1960 to 1986. The violent fluctuation in the prices were found to be caused by more than one reason. The major factor behind this was the uncertainty of weather which lead to volatility in the supply-demand gap in the edible oil sector in general and coconut oil sector in particular.

Bogahawatte (1988) studied the seasonal variations in retail and wholesale prices of rice in Colombo market, Srilanka. Results of a univariate analysis revealed that both retail and wholesale prices of rice in Colombo market had different structure. Both retail and wholesale market prices exhibited seasonality in prices, which was more prominent in retail prices than wholesale prices.

Viju and Prabhakaran (1988) inferred that the increasing prices and yield of rubber might have accelerated the planting of rubber in new areas and resulted in substitution of coconut by rubber in Kerala. The author concluded that, the agrarian relation bill of Kerala which exempted rubber from the land ceiling level might have resulted in the conversion of large areas under other crop into rubber areas.

Satyabalan (1993) analyzed the yield variation in west coast tall coconut palm in Kerala. He suggested mother palm selection should be restricted to those palms which yields 80 nuts or more per year, as they would be able to give high yielding progeny, which won't show much yield variation.

Joseph (1995) examined the regional and temporal variations in agricultural production and productivity in Kerala. He found out that there had been a structural transformation in the cropping pattern of the state in favour of commercial crops with the average share of food crops, notably paddy, declining at an alarming rate. He inferred that the growth rate of production and productivity of coconut was by and large stagnating, while that of rubber registered an enviable performance during the period of 85-95.

Jose (1996) analyzed the yield variability in cocoa in Kerala. Based on a time series model it could be seen that the yield variation of particular quarter had an inverse relationship with yield deviation in the pervious two flowering seasons of the crop.

2.2 Comparing cost and returns

Choudhary (1997) A study was conducted in 4 randomly selected villages in Raipur district, Chhattisgarh, Madhya Pradesh, India to compare cost of production, returns, employment potential and overall profitability of rice and other *rabi* [winter] crops in various sizes of farms using tank irrigation. Irrigated area as proportion of total cropped area was highest on marginal farms but cropping intensity was lowest on these farms. On other farm size groups, variation in cropping intensity was not significant. Rice occupied the highest proportion of the cropped area followed by wheat on all farms irrespective of farm size. In the past three years most of the farmers had used tank irrigation and majority of the farmers were satisfied with the present irrigation system. However a few farmers due to locational disadvantage had problems with water distribution.

Skunmun *et al.* (2002) their study was aimed to compare growth and feeding performances, as well as economic returns from feeding male dairy, beef cattle and swamp buffalo for quality beef. 36 animals, 12 of each breed group, were used in a feeding trial to compare the cost of beef production. Two levels of concentrate feeding, 1.75% of body weight (BW) and 1.00% of BW, were used for each breed group in order to compare feeding methods i.e. high and low levels. Within each breed group, 2 animals of similar initial BW were randomly assigned to the 2 levels of feeding. The animals were fed from about 150 kg BW until reaching the final weight of about 400 kg. Under the prevailing economic conditions in Thailand, the cost of beef production from buffalo was lowest due to very low cost of feeder stocks, followed by dairy and beef. However, the cost of feeding per kg of BW gain was lowest in beef and highest in buffalo i.e. when disregarding the differences in cost of feeder stocks. Beef calves grew faster than dairy and buffalo, with better feed efficiencies. The results indicated that beef cattle could be more suitable for beef production for high-quality beef market, whereas buffalo could be more suitable for small farms where high roughage feeding is common. Male dairy calves appeared to require higher level of concentrate feeding than 1% BW in order to maintain good body conditions.

Field *et al.* (2003) this paper develops and illustrates the application of a procedure to evaluate and compare the cost effectiveness of alternative crop insurance products for cotton in terms of their impact on expected producer net returns and the variation of net returns. Farm unit-level cotton yields and state-level price distributions are estimated using a multivariate non-normal parametric modelling procedure and used to simulate the net returns to alternative crop insurance products over a 10-year planning horizon. The ranking of alternative insurance products using third-degree stochastic dominance is presented for Texas cotton producers.

Sayeed *et al.* (1994) this study was conducted to compare the cost of rearing native and crossbred dairy cows and returns received from them. For this purpose, 144 cows from 132 households from 24 villages were randomly selected. Of these, 96 were native cows and 48 were crossbred cows. The study revealed that among the structure of cost components, labour charge occupied the major share in the total cost of milk production per litre. The total cost of rearing native and crossbred cows was Bangladeshi taka 14,155 and 19,854 per annum respectively. The average net cost of milk production per litre was taka 14.12 for native cows and 10.41 for crossbred cows. Returns over cost of milk per litre for native cows were taka 0.52 and for crossbred cows were 3.40. The cost:benefit ratio of milk/litre was higher (1:1.33) in crossbred cows than native ones (1:1.04). The study also showed that compared with bulk-line cost, the price of milk/litre received by the farmers was higher in

crossbred cows than native cows. Therefore, the study recommends dairying with crossbred cows as a worthwhile and viable commercial enterprise in Bangladesh.

McIsaac and Lovering (1982) a forage-livestock computer model was used to compare the cost and returns associated with each of maize (Zea mays) silage, timothy (Phleum pratense) hay, and ryegrass (Lolium multiflorum) silage as the principal forage in a dairy farm. The model used simulated the growth, harvest, and storage of the forage and the feeding, milking, and manure-handling for the dairy herd. The costs and returns associated with timothy, maize, and ryegrass on a diary farm were estimated. Timothy hay was found to be more profitable than maize silage, and maize silage more profitable than wilted ryegrass silage on dairy farms of 40-120 cows fed on conserved forage 365 days per year.

Dileep *et al.* (2002) the economics of tomato contract farming in Ellenabad block, Sirsa district, Haryana, India, is examined. Data were obtained from interviews with contract (n=50) and non-contract farmers (n=50) as well as with officials of two tomato processing firms in the study area. The following aspects are analysed: cost, returns, and resource use efficiency of contract *vis-a-vis* non-contract tomato farming; the effect of contract farming on price, production, and income of the farmers; the yield and price uncertainty involved in tomato production, the marketing costs, and the losses incurred by the farmers; and the problems faced by the contract farmers and the processing firms. Keeping in mind the interests of the producers as well as the processing firms at the same time, measures are suggested to improve the overall production and marketing activities of the tomato industry.

Karim *et al.* (2001) in the present study attempts have been made to analyse the performance of broiler farms in terms of profitability under constant rate of price located at Bajitpur Upazila of Kishoregonj district, Bangladesh. Seventy five farmers (25 small, 25 medium and 25 large farms) were purposively selected from the area. Costs and return were calculated to find out the profitability of broiler production. The total costs per bird were estimated at Tk. 78.43, Tk. 78.51, Tk. 78.32 and Tk. 78.31 for small, medium, large and all broiler farms respectively. On the return side, the average gross returns per bird per batch stood at Tk. 89.21, Tk. 89.40, Tk. 90.71 and Tk. 89.87 for small, medium, large and all broiler farms, respectively. The profit or net returns per bird for small, medium, large and all broiler farms were Tk. 10.80, Tk. 10.85, Tk. 12.40 and Tk. 11.75, respectively. Findings of the study clearly indicate that all broiler farms made good profit and the large farms, however, earned a little higher profit.

Tatlidil an Akturk (2004) A comparative analysis is made of the contract and non-contract farming models of tomato production in Biga District of Canakkale province, Turkey. Data for the 2001-02 production period were obtained from a sample of 57 contract farms and 45 non-contract farms. Input use level, gross-margin and net profit in tomato-growing farms are examined. Farms operating by the contract farming model utilize more input per unit area, adopt technological innovations and obtain greater yields of tomatoes per unit area. The gross margin of contract farms is 13% while net profit is 19% higher when compared to non-contract farms. A statistically significant difference was found between the two types of farming models with respect to the number of seedlings, usage of fertilizer, labour wages and amount of production.

2.3 Contract farming and contractual arrangements

2.3.1 Contract farming

Glovar (1990) highlighted the experience of contract farming and out grower's scheme of seven countries in the Eastern and the Southern Africa. In those schemes, farmers sold their crops under contract to private or public enterprises for processing or export in return for various inputs, services and price guarantee. The researcher identified some of the key determinants of success and evaluated the performance. Also examined the constraints to replication. In most cases, performance in delivering services and providing income to farmers have been quite good although high management costs were widely applied. According to author, lesser control, more reliance on price incentives and farmers participation might have increased overhead costs while developing management capability among growers.

Porter and Kevin (1997) analysed and recorded the travails of farmers in Africa. Examining their own experience of contract farming in Nigeria and South Africa they have drawn attention to important issues which have received little attention in the literature, notably staffing of schemes, farmers previous experience with Multinational Companies (MNC's), water and labour issues.

Rehber (1998) presented a brief history along with explanation of contract farming concepts. Further, the reasons behind contract farming were also discussed. Success and failure of contract farming were analysed based on several research works and articles. Finally, a simplified model was presented for the success of private contractual arrangements in the light of evidence taken from the experience.

Anonymous (1999) reported a success of contract farming in Nasik district of Maharashtra state. The company supplied inputs *viz.*, high yielding variety seeds, fertilizers *etc.* to the farmers on cash and carry basis along with technical advice and purchased the produce at the prevailing market rates at the farm itself. The Nasik District Central Cooperative Bank, Dena Bank, State Bank of India and Bank of Maharashtra participated in the project. About 2000 acres of maize involving 2036 farmers and 124 acres of soybean involving 150 farmers had been covered under the scheme. The estimated availability of maize and soybean to the company after harvest was 4032 MTs and 150 MTs, respectively.

Key and Runsten (1999) examined the cause of the observed variations in the scale of production and the success of smallholder contract farming. The authors opined how the organizational structure of agro-processing firms and the characteristics of contract farmers were influenced by imperfections in the markets for credit, insurance, information, factors of production, the raw product and by transaction costs. The main disincentive for firms to contract with small holders appeared to be the transaction costs associated with providing inputs, credit, extension services and product collection and grading. Many firms had found it easier and more profitable to deal with a few large growers. The study suggested to increase small holders participation in contract farming with a renewed effort on the part of growers to organize themselves or to organise with the help of government agencies, non-profit organizations, or the agro-processors.

Singh (2000) reviewed the logic, practice and implications of contract farming for contract farmers and the local economy with evidence of contract farming experiences from African, Latin America and Asian countries in different sectors of agriculture. He found that agribusiness firms tend to deal with large producers only. Contracting lead to environmental, equity, food security and sustainability problems, though it lead to better incomes for farmers and more employment for labour initially through the introduction of new crop technologies and by providing markets and inputs. In fact, contract farming as a system affected producers positively or negatively was dependent on the context of the economy.

The researcher further studied the role of contract farming in agricultural diversification and development in terms of its practices and implications for the producers and local economy in the Punjab in India. Hindhusthan lever Limited (HLL), Pepsi and Nijjer were engaged in contract farming of tomato, potato and chilli respectively. The main benefits of contracting as perceived by contract farmers were better and reliable income, new and better farming skills, better soil management and outlet for bulk sales.

Abhiram (2001) examined the supply chain management and role of contract farming. He opined that the services of contract farming system were advantageous to both the farmers and company. The impact was clearly brought out by contract farming. Tomato yields increased three fold (from 16 to 52 Mt/ha), chilly yields increased from 6 Mt to 18 Mt/ha, farm incomes increased by more than 2.5 times, processing season linked to fruit availability increased from 28 to more than 55 days and there was an improvement in the quality of produce.

Kiresur *et al.* (2001) highlighted advantages of contract farming like reduced capital investment, no risk of price fluctuations and guaranteed income. Reduced capital investment, improved efficiency and efficient marketing were the benefits realised by the company through contract farming. He quoted several examples of contract farming of different crops in

India and also mentioned the active involvement of the Government of Karnataka to bring some of the agricultural crops such as maize, cotton, tur, bengalgram, barley and chillies under contract farming system to benefit both the farmers and the industry.

Matthew and Key (2001) under took an empirical case study of the impact of a contract-farming scheme on Senegal's rural community. Small holders in Senegal's peanut basin contract under the *Arachide de Bouche* (ARB) programme to provide confectionery peanuts for the international market. ARBS contracting farmers received seeds, fertilizers, pesticides and herbicides on credit and were required to sell back their produce to the programme. The study examined the access of poorer community members to contracts and the effect of the programme on the income of participants. The ARB programme performed very well on both counts; participants and non-participants were indistinguishable by wealth measure and farmers increased their income sustainability by participating in the programme. The study attributed the participants success to the program's mobilization of local information through its use of village intermediaries, permitting the substitution of social collateral for physical collateral and making the programme more accessible to the poor.

2.3.2 Contractual arrangements

Roy (1963) defined contract farming as those contractual arrangements between farmers and companies, whether oral or written, specifying one or more conditions of production and /or marketing of an agricultural product. He highlighted various contractual arrangements prevailing in vegetables and fruit processing sector in USA. He observed two types of contracts namely bailment coupled with contract to produce and supply and contract to produce and sell. Further, observed that the processors were supplying the seed material for cultivation at a stated price to be paid by the grower after the harvest. Fertilizer and plant protection provisions were not found in such contracts. Researcher also evidenced that the processors provided a variety of services other than technical support. The growers were found to maintain better relationship with the extension worker of the company. The growers had problems with grading of the produce in some areas. The contracts made were exclusive and growers were not supposed to sell their produce outside, other than the contractor. The violations of the contractual arrangements led to termination of contract with that crop.

Williamson (1979) examined the factors affecting the organization of production systems in a market hierarchy framework. He propounded that in such a framework the organizational criteria were minimization of production and transaction costs. Further, suggested the use of various administered vertical exchange arrangements to reduce the transaction costs and provided insight into the structure of contracts within the vertical co-ordination process and classified contractual arrangements into Classical, Neoclassical and relational contracts. He defined relational contracts as agreement in principle, which circumscribes the contracting parties relationship, including tacit as well as explicit arrangements.

Further, the author argued that increase in transaction complexity, frequency and uncertainty results in a shift in the co-ordination structure from classical to neoclassical then to bilateral and finally to relational contracts. One party typically becomes dominant in this progression.

Barry *et al.* (1992) opined in Baltimore that, due to self-interest of the agent, limited cognitive powers, information asymmetries and uncertainties about future events, it was virtually impossible to write and complete comprehensive contracts to cover all possible future events. Thus, contracts generally were incomplete. Agency costs were incurred in structuring, administering and enforcing contracts to more closely align the goals of the principal and agent. He concluded those decisions about integration or other forms of vertical control depended on the degree of asset specificity, potentially opportunistic behaviour, contract completeness and on the effect of changes in the asset control on investment of the parties to a transaction.

Sporleder (1992) compared the various inter-firm relationships with particular reference to strategic alliances. He opined that a key differentiating feature of strategic alliance was trust, flexibility and unanticipated actions were discouraged in written contract.

The exit costs were relatively low compared to other arrangements. Generally, a third party enforcement was anticipated when breach occurred in a written contact.

Ramesh (1999) observed the contractual farming arrangements in Indian vegetable and fruit processing industry with particular reference to Gherkin crop in karnataka. He found that the contracts were oral in nature and trust on each other was the backbone of such contracts. The crops requiring skilled labour and less government intervention were the best suited for contract farming. Further the author stressed the need for financing agencies and banks in financing the processors and growers.

Arunkumar (2002) opined that written agreement was used in potato and chilli contract farming in Belagaum. The agreements were drafted in short, simple terms, clarifying the responsibilities of both farmer and firms. Breach of contract was included in order to contract the possibility of extra-contractual marketing. The agreements were effective from the time of handling over the seeds to the farmer and terminated upon the farmer handling over the entire field of produce.

The researcher further studied the various aspects of modus operandi. Majority of the farmers (>50%) took up cultivation of vegetables due to persuation of the company of the staff. The influence of fellow farmers was the second major force in the case of 40 per cent of the farmers of tomato. All the companies provided technical guidance to farmers. In terms of frequency of field visits, chilli farmers had regular contracts while tomato and potato farmers had frequent contact with the officer. The farmers in chilli contract farming realized full payments within 30 and 45 days, respectively after final harvest. In potato 16 per cent of the farmers received payments after 60 days and 70 per cent of the farmers in tomato received payments in 31-45 days time.

2.4 Problems in contract farming

Srivastava and Seetharaman (1989) while providing an overview of agro-processing industries suggested backward linkages as the key element for success of fruit processing units. They observed that larger processing units often faced the problems of severe under utilisation of capacity due to inadequate and unsuitainable supply of raw materials. They concluded that the uncertainty in supply was the major reason for private processing units to forge backward with the farmers for ensuring supplies.

Pandey and Swarup (1994) out constraints relating to water management, soil and fertility, high yielding variety seeds, technical knowledge and institutional constraints in pulse production in Mohindergarh district. The findings revealed that the water management formed major problem (rank-I) followed by the non-availability of location specific drought and pest resistant high yielding variety seeds. The score relating to the technical knowledge and training of farmers indicated the communication gap, which formed constraint in achieving higher yields of crops. The other problems related to soil and fertility, institutional facilities, weeds, insects, pests and diseases ranked fourth, fifth and sixth, respectively.

Rangi and Sidhu (2000) while studying contract farming practiced by Hindustan Lever Ltd. (HLL) and Nijjar Agro Limited in tomato for processing venture at Punjab found that, tomato was mainly attacked tomato fruit borer sometimes leaf minor, aphid, cutworm and fruit fly also. To have a check on these attacks, the expenses on pesticides/insecticides were high and this also pushed up the labour cost. Continuous cultivation of tomato crop on the same field has also adversely affected yield. Nijjar Agro Limited rejected the poor quality produce brought by the farmers. The HLL did not indulge in such practice. Farmers of both the firms expressed opinion regarding the low contract prices.

Singh (2000) identified the faults of contracting system both at company and at farmers level. About two-thirds of Hindhusthan lever Limited growers and more than 50 per cent of the Nijjer growers did not face any major problem in contracting. The other reported problems were poor coordination of activities, poor technical assistance, delayed payments, outright cheating in dealings and manipulation of norms by the firm. Some of the Pepsi potato farmers had a few problems with the company system, but a large number of them (60%) were happy. The study also highlighted the implications of contract farming on cropping

pattern, land lease market, sustainability, farm income and employment. Despite, various problems and conflicts between companies and growers, 62 per cent of Hindhusthan lever Limited, 80 per cent of Nijjer and 68 and 73 per cent of Pepsi (potato and chilli, respectively) farmers wanted to continue contract farming.

Banumathi and Sita Devi (2001) an attempt was made to identify the major problems in marketing of jasmine at Chidambaram taluk of Cuddaloe district of Tamil Nadu. They found that in case of small farmers lack of finance was the problem ranked first. Perishable nature of flowers, price fluctuations, poor market information and forced sale were other important problems. Medium farmers and large farmers ranked price fluctuation and perishable nature of flower as first and second respectively. Long distance to the primary market, lack of finance and poor market information were other important problems in medium farms.

Arunkumar (2002) opined that major problems faced by the contract farmers were low contract price and irregular payments. The other problems faced were unawareness of potentiality of crops, poor technical assistance, manipulation of norms by firms and higher rejection rate. He also opined that major problems faced by contract firms were land constraints and fixing of contract price. The other problems were farmers discontent and holding up of vehicles. The contract farmers try to put lower grade into higher grade and it was difficulty to check and make sure of the grade as quantity handled was more. Farmers held up vehicles in the villages demanding that they should be paid higher prices eventhough agreement does not say so.

Shiva Kumar Gupta (2002) studied major constraint in contract farming as the difficulty in allocating the risk between the firm and farmers, where the distribution of risk was dependent largely on factors such as bargaining power, availability of alternative and access to information. In short duration crops such as vegetables, farmers tend to divert the produce to the open market rather than supply to the processing firm when the prices were high. The cost calculations of the firm crumble, as they were forced to arrange supply of raw materials from alternative sources. In long duration crops such as plantation crops, the firms often fail to honour the contract, as they knew that farmers had no alternative but to sell the products to them at lower prices.

Kattimani *et al.* (2003) undertook an empirical study of Ashwagandha in selected districts of North Karnataka revealed that, Ashwagandha is a most important and popular crop of rainfed areas under semi-arid tropics of North Karnataka. Problems faced by the Ashwagandha growers in North Karnataka were high cost of seed material, lack of knowledge on production technology, marketing problems, incidence of pest and diseases, harvesting and grading.

3. METHODOLOGY

This chapter deals with brief description of the study area, sampling design followed, the nature and source of data and analytical techniques employed. At the end of the chapter, the important terms and concepts used in the study are also mentioned to facilitate a clear understanding. The methodology is presented under the following heads.

3.1 Description of the study area

3.2 Selection of the study area and sampling procedure

3.3 Analytical tools and techniques

3.4 Concepts and terms used in the study

3.1 Description of the study area

Karnataka comprises of 27 districts of which Davanagere and Haveri districts were deliberately selected keeping in view that they are the major producers of maize under contract farming system.

3.1.2 Davanagere district

This district has a geographical area of 5, 97,597 ha spread in six taluks and 817 villages. It is surrounded by Haveri and Bellary towards North, Shimoga and Chitradurga towards south. This district has forest area of 89918 ha, land not available for cultivation consists 59481 ha, permanent pasture and grazing land accounts for 17381 ha, cultivable waste land is 38903 ha and fallow land of 84544 ha. Whereas, net sown area consists 354731 ha in which area sown more than once accounts for 93466 ha and total cropped area accounts for 448197 ha.

According to 2001 census, this district has population of 17.90 lakhs, literacy rate is 67.67 percent. Population density is 260 Sq km. the average rain fall in the district is 649 mm. crops like jowar, maize, groundnut, cotton, flower crops and chillies, grown in this district. The data on area under maize contract farming is not available.

3.1.3 Haveri district

This district fall under the northern transitional track of Karnataka state. Geographically, it lies within the interior of Deccan peninsular between 14° 19' and 14° 48' north latitude and between 70°15' and 75°50' east longitude. The geographical area of the district is 4, 85,156 ha and it has seven taluks and 699 villages and it is bounded in the north by Dharwad and Gadag district, on the south by Shimoga and Davanagere districts, on the east by Bellary and on the west by Uttara Kannada districts. This district as forest area of 47454 ha, land not available for cultivation consists 37255 ha, permanent pasture and grazing land accounts for 12209 ha, cultivable waste land is 31607 ha and fallow land of 30339 ha. Whereas, net sown area consists 367122 ha in which area sown more than once accounts for 74115 ha and total cropped area accounts for 441237 ha.

According to 2001 census this district has 14.39 lakh populations, literacy rate is 68.09 percent, population density is 156 Sq km. average rainfall of the district is 548 mm. the important crops grown in this area are sorghum, cotton, ground nut, paddy, flower crops. Haveri district has vast area in seed production. The data on area under maize contract farming is not available.

3.2 Selection of study and sampling procedure

A Multistage Sampling Procedure was adopted for the purpose of selection of representative districts, taluks and villages which are detailed below.

Table 3.1: Demographic profile of study area

Sl. No.	Particulars	Haveri	Davangere
1	Geographical area (ha)	4,85,156	5,97,597
2	Taluks (numbers)	7	6
3	Villages (numbers)	699	817
4	Population (numbers)	14,39,116	17,90,952
5	Density of population (per sq km)	156	260
6	Literacy rate (percentage)	68.09	67.67
7	Average rainfall (mm)	548	649

Source : District Statistics Office- 2006-07

Table 3.2: Land use pattern in the study area (hectares)

Sl. No.	Particulars	Haveri	Davengere
1	Geographical area	485156	597597
2	Forest area	47454	89918
3	Land not available for cultivation	37255	59481
4	Permanent pastures and grazing land	12209	17381
5	Cultivable waste land	31607	38903
6	Fallow land	30339	84544
7.	Net area sown	367122	354731
8.	Area sown more than once	74115	93466
9.	Total cropped area	441237	448197

Source: District Statistics Office-2006-07

3.2.1 Selection of study area

In first stage Davenegere and Haveri districts were selected for the study purposively, because they are the important major maize growing districts in Karnataka. Belgaum was not considered because only one contracting firm is operating in that district.

3.2.2 Sampling procedure

To evaluate the objectives of the study all farmers who adopted contract farming in maize were considered and all farmers growing maize without contract were considered as non-contract farmers.

3.2.3 Selection of taluks

In the second stage in Davanagere district Davanagere and Jagalur taluks were selected in Haveri districts Herikerur and Ranebennur taluks were selected purposively for the study because more area was under contract farming in maize in these taluks of the district. Same taluks were selected for non-contract farmers as this area was major maize growing area.

3.2.4 Selection of villages

From the selected taluks, in third stage three villages were selected from each taluk, where contracting companies Sugana and Riddi-Siddi were major players in contract farming of maize for poultry feed and starch extraction.

3.2.5 Selection of sample farmers

All the farmers adopting contract farming were selected from each village in consultation with contracting companies. Sample size consist of 120 farmer spread upon two district (at the rate of 60/district). From each district 60 contract farmer and 30 non contract farmers were randomly selected.

3.2.6 Selection of markets

From the erstwhile Davanagere district Davanagere market and from Haveri district Haveri market which had maximum arrivals of maize in respective district were selected for the study.

3.2.7 Nature and source of data

For evaluating the objectives of the study necessary data relating to contract farming were obtained from the selected farmers with the help of pre tested scheduled. The farmers were personally interviewed to ensure accuracy and comprehension. Since survey method was adopted, heavy reliance was on recall memory of the respondents. They were related to cropping pattern, land holding, asset position, family size, educational level and annual income etc. details regarding input use and out put obtained were collected. Further, the data on the quantity of produce sold the price of inputs and outputs were obtained from the sample farmers, data on payment schedule, services provided by the companies type of maize desired by them were also recorded. Problems faced by the contract farmers were also recorded. Effort was made to elicit accurate information from the sample farmers. Company personnel were also interviewed for the opinion about the contract farming and the problems faced by them were recorded.

In addition, secondary data pertaining to maize crop was collected from the contracting firm, Department of Agriculture, APMC's and District Statistical Office.

Table 3.3: The production of maize (tonnes) in different districts of Karnataka for 2000-01 to 2005-06

Sl. No	District Name	2000 -01	2001 -02	2002 -03	2003 -04	2004 -05	2005 -06
1	Bagalkote	155568	114252	96747	88775	178194	213803
2	Bangalore - Urban	4509	2509	1820	2016	2396	3426
3	Bangalore - Rural	16694	24906	15590	32697	24939	40683
4	Belgaum	285980	207852	188748	158676	384213	403152
5	Bellary	164317	144392	136529	166430	161151	235749
6	Bidar	784	483	531	765	623	987
7	Bijapur	47171	22941	29745	22156	47420	68875
8	Chamarajanagar	55210	40485	43025	30614	54222	64062
9	Chikmagalur	1237	1200	1397	946	3938	9048
10	Chitradurga	138871	133286	78792	31423	135686	92485
11	Dakshina Kannada	0	0	0	0	0	0
12	Davanagere	444305	265955	197937	156615	525175	508031
13	Dharwad	77040	14816	25591	11047	44197	80105
14	Gadag	84149	16433	28784	21434	99089	120239
15	Gulbarga	6493	5030	4674	5529	8417	5438
16	Hassan	58166	57953	58528	38480	98056	93795
17	Haveri	343254	191211	209750	120224	302649	364262
18	Kodagu	5436	10097	9867	10639	11708	11332
19	Kolar	42535	25126	21851	55102	48057	67932
20	Koppal	46104	34116	25503	38416	45103	33854
21	Mandya	1029	0	5947	7666	14421	6467
22	MYSORE	64802	67223	42859	42954	60963	77728
23	Raichur	622	368	209	1468	1458	1718
24	Shimoga	61698	50371	96597	143546	221144	169018
25	Tumkur	29163	20470	21744	21235	33235	50017
26	Udupi	0	0	0	0	0	99
27	Uttara Kannada	507	112	177	1047	2894	5627
	Total	**21,35,644**	**14,51,587**	**13,42,942**	**12,09,900**	**25,09,348**	**27,27,932**

Table 3.4 Distribution of sample farmers

District	Taluk	Village	Contract farmers	Non-contract farmers
Davengere	Davengere	Kundawada	10	5
		Anaji	10	5
		Basavanahalli	10	5
	Jagalur	Halur	10	5
		Ramnahalli	10	5
		Cnadrapura	10	5
Haveri	Herikerur	Masur	10	5
		Thavaragi	10	5
		Somanahalli	10	5
	Ranebennur	Thumbinakatti	10	5
		Halagere	10	5
		Motabennur	10	5
		Total	**120**	**60**

3.3 Statistical techniques employed

3.3.1 Compound growth rate analysis

Compound growth rate of price and production of maize were estimated by specifying the following form of the relationship.

$Y_t = ab^t U_t$……(3.1)

Where ,

Y_t = price or production of crop in year t

t = year which takes values 1,2,……n

U_t = disturbance term

'a' and 'b' parameters to be estimated

Logarithmic transformation of (3.1) provided the estimating equation.

Log Y_t = log a + tlog b + log U_t……(3.2)

Equation (3.2) was estimated by ordinary least squares technique (OLS). Compound growth rate (g) was then estimated by the identity given in equation (3.3).

$\hat{g} = (\hat{b}-1)100$……..(3.3)

Where,

$\hat{g}$ = estimated compound growth rate in per cent per year, and

$\hat{b}$ = antilog of b

The standard error of the growth rate was estimated and tested for significance

Growth of production and price are calculated based on the availability of the data. The data was available for the period 1997-2006.

3.3.2 Variability Analysis

The extent of variability in price and production was analysed through co-efficient of variation (CV) *i.e.*

$$CV = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

3.3.3 't' test

The 't' test was adopted to analyze the difference between contract farmers and non-contract farmers in input use pattern, yield , gross returns, net returns over fixed cost, net returns over variable cost and B:C ratio.

The formula used for calculating t-values is as follows

$$t = \frac{\overline{X}i - \mu}{\sqrt{S^2x}} \text{ with n-1 degrees of freedom}$$

Where,

μ = Value of sample farmers mean

S^2x = Sample estimate of the sample farmers variance

n = Sample size

3.4 Concept in cost- returns analysis

In this section, different concepts of cost and returns used in the study are presented.

Costs

The total costs (TC) were divided into broad categories viz.,

a) variable costs

b) fixed costs

a) Variable costs (VC)

These costs comprised of costs incurred on variable inputs such as seeds, farmyard manure (FYM), fertilizers, plant protection chemicals, labour (human, bullock and machine) irrigation and interest on working capital. The computations of different terms of variable cost components are as fallows;

Seed: if the companies supplied the seeds, the cost of the seeds was computed by using the actual price paid by the sample farmer, which prevailed at the time of sowing. And if companies are not supplying the seeds, the purchase price of seed from the certified agencies wee considered for the study.

Farmyard manure: the value of FYM generated in their own farm was imputed by considering the market price prevailing in the locality at the time of its application.

Fertilizer: the cost of fertilizer was based on the actual price paid by the sample farmers including the cost of transportation and other incidental charges, if any.

Labour: the cost of labour was computed by taking the wage rate paid by the sample farmer for human labour and bullock labour. The same wage rates were used while computing the imputed value of family labour and owned bullock labour.

Women labour was converted into male equivalents. The formula used for conversion was

Male equivalents of female labour = 0.66 x total number of female labour days.

Conversion factor 0.66 was taken based on the ration of wage paid to the men labour v/s women labour.

Interest on working capital: this was calculated at the rate of 11 per cent for the crop, on the total value of the seed, manure, fertilizer, plant protection chemicals, human labour, bullock labour and machine labour (based on the interest rates charged by financial institutions).

a) Fixed cost: these include depreciation on farm implement and machinery, interest on fixed capital and rental value of land.

The measurement and depreciation of fixed cost component are as follows:

(i) Depreciation charges: depreciation on each capital equipment and machinery owned by the farmers and used for plant was calculated separately, based on the purchase value using the straight line method.

Thus, the

$$\text{Annual depreciation} = \frac{\text{Purchase value - Junk value}}{\text{Useful life of the assets (Years)}}$$

The average life of an asset as indicated by each farmer was used in the computation of the depreciation. The average value of an asset after its useful life (time value) was considered based on the value expressed by the respondents. The depreciation cost of each equipment apportioned to the crop, based on its percentage use.

(ii) Rental value of land: rental value of land was calculated at the prevailing rate per acre per annum in the locality and was apportioned to the maize crop for the period for farm business analysis.

Interest on fixed capital: interest charges on fixed capital were calculated at the rate of 10 per cent, as the fixed deposits in commercial banks would fetch this rate of interest. The items considered under fixed capital are implements and machinery. Interest was considered on the value of these assets after deducting the depreciation for the year. No interest was charged on the land value since the rental value of owned land was considered, then, the amount so calculated was apportioned of the crop.

Returns

For contract farmers, after harvest the maize are marketed based on prevailing market price, the companies pay Rs50 higher than the market price. The price for Non-contract farmers was Rs.680 based on the prevailing market price at the time of data collection in both Davangere and Haveri district respectively.

Gross returns - This can be worked out by multiplying total yield of maize with price. This can be denoted as

$$\text{Gross returns (GR)} = \text{yield} \times \text{price}$$

Net returns over variable cost (TVC) - this can be obtained by deducting total variable cost from gross return. This can be denoted as

$$\text{Net returns over variable cost} = \text{GR} - \text{TVC}$$

Net returns over total cost- net returns over total cost was worked out by deducting total cost (TC) of production from gross return.

$$\text{Net returns over total cost} = \text{GR} - \text{TC}$$

B: C ratio: this can be worked out by dividing gross returns by total cost.

4. RESULTS

The finding of the study are presented in this chapter under the following headings in consonance with the objectives of the study

4.1 Growth rate and variability analysis of production and price of maize

4.2 Socio- economic characteristics of the farmers

4.3 Pattern of employment in cultivation of maize

4.4 Input use pattern in maize production

4.5 Cost and returns in maize production

4.6 Terms of contract and mode of operation

4.7 Factors favouring contract farming

4.8 Problems faced by the contract farmers and the contracting firms

4.1 Growth rate and variability analysis of production and price of maize

4.1.1 Compound growth rates of production and price of maize

The exponential function ($Y = ab^t$) revealed a clear picture about the growth rates of production and price of maize crop of Davangere and Haveri district. The production and price is considered for a period of 1996-97 to 2005-06.

Table 4.1 depicts the results of growth analysis and co-efficient of production and price under maize in Davangere and Haveri districts.

The production under maize showed negative and non-significant growth for Davangere district *i.e.* (-0.38 per cent) which means the production is decreasing every year by 0.38 per cent, whereas positive and non-significant growth for Haveri district *i.e.* (1.50) which means the production is increasing by 1.5 per cent every year but is not significant.

The result of growth analysis of price of maize in Davangere and Haveri district for the period 1997-2006.

The price of maize showed positive and significant growth for both Davangere district (5.17 per cent) and Haveri district (4.96 per cent) which means the price of maize is increasing every year by 5.17 per cent in Davangere district and 4.96 per cent in Haveri district respectively.

4.1.2 Variability analysis

Co-efficient of variation were computed to study the variations in price and production of maize crop in Davangere and Haveri districts during the period 1997-98 to 2005-06.

The variation in production of maize in Davangere district was 34.63 and in Haveri district it was 30.38 per cent which means the production varies by 34.63 per cent in Davangere district and 30.38 per cent in Haveri district every year.

The co-efficient of variation of price of maize in Davangere district during the period 1997-2006 was 17.07 per cent and 19.17 per cent in Haveri district which means the price varies 17.07 per cent in Davanagere district and 19.17 per cent in Haveri district every year.

Table 4.1: Growth rate and co-efficient of variation of production and price of maize in Davangere and Haveri district during the year 1997-2006

District	Davangere		Haveri	
	Production	**Price**	**Production**	**Price**
Slope	-0.00384	0.050428	0.014918	0.048446
Intercept	12.74	5.58	12.27	5.53
R^2	0.000839	0.837486	0.019763	0.666379
Compound growth rate (CGR)	-0.38^{NS}	5.17**	1.50^{NS}	4.96**
Mean	359745.80	589.50	243418.40	547.20
Standard deviation (SD)	124611.80	100.67	73966.07	104.92
Coefficient of variation (CV)	34.63	17.07	30.34	19.17

Note: NS- non significant
*- significant at 5%
** - significant at 1%

4.2 Socio- economic characteristics of the farmers

4.2.1 General features of contract and non-contract farmer

The general features of contract farmers and non-contract farmers are presented in table4.2. The average age of contract farmers was 43 years with an average family size of six. The annual income was found to be Rs. 73,823 per family. The education levels concerned, hardly 21.66 per cent of the farmers were illiterate and remaining 78.33 per cent were literate. Among the literates 15.83 per cent, 42.50 per cent and 20.00 per cent were studied upto primary, high school and college level, respectively.

In case of non-contract farming, the average age of the farmers was 47 years with an average family size of six. The annual income was Rs. 66,950 per family. Their educational level concerned, 23.34 per cent found illiterate and 76.66 per cent literate. Among the literates about 36.66 per cent, 31.66 per cent and 8.34 per cent of the farmers were studied upto primary, high school and college level, respectively.

4.2.2 Cropping system of the contract and non-contract farmers

Cropping system of the contract and non-contract farmers in a particular area depends upon rainfall condition, irrigation facilities, and commercial importance of the crops, food habit and climatic conditions of the area. The maize has proved to be a greater commercially important crop. Davangere and Haveri districts has most ideal climatic conditions for maize production along with some field crops *viz*., rice, jowar, chilli, cotton, sugarcane and vegetable seed production.

4.2.3 Pattern of land holding of the sample farmer

The pattern of land holding of the maize contract farmers and non-contract farmers is given in Table 4.3.

The pattern of land holding of the contract farmer was 10.95 acres out of which dry land was 8.50 acres and irrigated land was 2.45 acres, which worked out to 77.62 per cent and 22.38 per cent of the total land holding respectively. Average area under maize was 7.89 acres.

The average size of the land holding of the non-contract farmer was 9.45 acres out of which dry land was 7.25 acres and irrigated land was 2.20 acres, which worked out to 76.72 per cent and 23.28 per cent of the total land holding, respectively. The average area under maize was 6.95 acres.

4.3 Pattern of employment in maize cultivation by contract farmers and non-contract farmers

The result of the labour employed in maize cultivation per hectare are presented in Table 4.4 .

4.3.1 Pattern of employment in maize cultivation by contract farmers

In maize cultivation about 6.32 mandays of human labour used for land preparation for FYM and compost transportation and application 5.96 mandays were employed. About 7.96 mandays were employed for sowing. For weeding about 8.92 mandays, for harvesting 10.6 mandays and for threshing 13.6 mandays were used. Total of 53.36 mandays were employed for different activities in maize cultivation by contract farmers.

4.3.2 Pattern of employment in maize cultivation by non-contract farmers

In maize cultivation about 7.96 mandays of human labour used for land preparation for FYM and compost transportation and application 4.64 mandays were employed. About

Table 4.2: General information of sample farmers

Sl. No.	Particulars	Contract farmers		Non-contract farmers	
		Frequency	Percentage	Frequency	Percentage
1	Age of the farmers (years)	43	-	47	-
2	Size of family (Nos.)	6	-	6	-
3	Annual income (Rs.)	73,823		66,950	
4	Education level	n=120		n=60	
a	Illiterate	26	21.66	14	23.34
b	Literate	94	78.33	46	76.66
	Primary school	19	15.83	22	36.66
	High school	51	42.50	19	31.66
	College and above	24	20.00	5	8.34

Table 4.3: Average land holding pattern of sample farmers

Sl. No.	Particulars	Contract farmers		Non-contract farmers	
		Area	Percentage	Area	Percentage
1	Dry land (acre)	8.50	77.62	7.25	76.72
2	Irrigated land (acre)	2.45	22.38	2.20	23.28
3	Total land (acre)	10.95	100	9.45	100
4	Average area under maize (acre)	7.89	72.05	6.95	73.54

Table 4.4: Pattern of employment in maize by contract farmers and non-contract farmers per hectare

Contract farmers							Non-contract farmers				
Sl. No.	Type of operation	Family		Hired		Total human labour (mandays)	Family		Hired		Total human labour (mandays)
		M	F	M	F		M	F	M	F	
1	Land preparation	2	-	3	2	6.32	2	-	2	6	7.96
2	FYM/compost (transportation and application)	1	-	1	6	5.96	1	-	1	4	4.64
3	Sowing	2	-	2	6	7.96	2	-	2	6	7.96
4	Weeding	1	-		12	8.92	1	-		15	10.90
5	Harvesting	2	-	2	10	10.60	2	-	2	10	10.60
6	Threshing	2	-	5	10	13.60	2	-	3	11	12.26
	Total					**53.36**					**54.32**

7.96 mandays were employed for sowing. For weeding about 10.90 mandays were used. For harvesting and threshing 10.60 and 12.26 mandays were used for each activity. Total of 54.32 mandays were employed for different activities in maize cultivation by non-contract farmers.

4.4 Input use pattern in maize cultivation

The result in respect of the average quantities of input used and the output produced per acre of maize cultivation by contract farmers and non-contract farmers is presented in Table 4.5.

In contract farming on an average the farmers used 14.18 Kg of grains per hectare. The FYM used at the rate of 4.50 tones per hectare. On an average the farmer had used chemical fertilizers *viz*., N: P: K,125:50:25 kgs respectively. Around 53.36 mandays of human labour, 5 pair days of bullock labour and 6 hour of machine labour were utilized for each hectare by the sample contract farmers.

In non-contract farming, on an average the farmers used 15.12 kg of grains per hecatre. The FYM was used at the rate of 1.50 tones per hectare. On an average the farmer had used chemical fertilizer *viz*., N: P: K, 150:75:35 kgs respectively. Around 54.32 mandays of human labour 6 pair days of bullock labour and 5 hour of machine labour were utilized for each hectare by the sample non-contract farmers.

The 't' value calculated for grains was 7.21 which was significant at 1 per cent level. Similarly, for FYM 35.94, nitrogen 24.11, phosphorous 55.36 and potassium 28.80 which was significant at 1 per cent level respectively. The 't' value for human labour, bullock labour and machine labour was 7.81, 19.86 and 18.38 respectively. The 't' value for Grains and straw was 22.27 and 42.08 which was significant at 1 per cent level.

4.5 Cost and returns in maize production

4.5.1 Cost structure in maize production

The results in respect of various items of economics of cultivating maize per hectare of Contract farming and Non-contract farmers are presented in Table 4.6.

In contract farming, the total cost of production of maize was Rs. 24,698.29 per hectare, out of this; variable cost was Rs. 21,324.50 accounting for 85.70 per cent of the total cost, fixed cost was Rs. 2831 accounting for 12.00 per cent of the total cost and marketing cost was Rs.542.79 accounting for 2.30 per cent of total cost. Among the variable cost, cost on FYM cost was major cost, which was Rs.6,750 accounting for 28.62 per cent of total cost. Out of the variable cost other cost items were machine cost Rs. 6000 accounting for 25.44 per cent, human labour cost Rs. 3735.20 accounting for 15.84 per cent, seed cost Rs.1347.10 accounting for 5.71 per cent, bullock labour Rs. 1250 accounting for 5.30 per cent, interest on working capital Rs. 1111.70 accounting for 4.71 per cent and fertilizer cost Rs. 1130.50 accounting for 4.38 per cent.

Among fixed cost, rental value of land was the major chunk of the cost which was Rs.2,600 accounting for 11.02 percent of total cost and other fixed cost was depreciation Rs. 231 accounting for 0.98 per cent of the total cost. Land revenue was not taken separately in the fixed cost, as it was included in the rental value of land.

In non-contract farming, the total cost of production of maize was Rs. 20,975.78 per hectare, out of this, variable cost was Rs. 16,305.03 accounting for 77.79 per cent of the total cost, and fixed cost was Rs. 2827 accounting for 13.44 per cent of the total cost and marketing cost Rs. 1843.75 accounting for 8.77 per cent of the total cost. Among the variable cost, cost on machine labour was major cost, which was Rs.5000 accounting for 23.78 per cent of the total cost. Out of the variable cost other cost items were cost on human labour Rs.3802.40 accounting for 18.08 per cent, FYM cost Rs. 2250 accounting for 10.70 per cent, fertilizer cost Rs.1516.20 accounting for 7.21 per cent, bullock labour cost Rs.1500

Table 4.5: Input use pattern in maize production (per hectare)

Sl. No.	Particulars	Units	Contract farmers		Non-contract farmers		t-value
			Mean	SD	Mean	SD	
A	**Inputs**						
1	Seeds	Kg	14.18	0.91	15.12	0.77	7.21**
2	Farm yard manure	Tonnes	4.50	0.70	1.50	0.41	35.94**
3	Fertilizers						
a	Nitrogen	Kg	125	10.07	150	3.70	24.11**
b	Phosphorous	Kg	50	2.99	75	2.78	55.36**
c	Potassium	Kg	25	1.69	35	2.40	28.80
4	Labour						
a	Human labour	Mandays	53.36	0.91	54.32	0.80	7.18**
b	Bullock labour	Pairdays	5	0.317	6	0.318	19.86**
c	Machine hour	Hour	6	0.317	5	0.356	18.38**
B	**Output**						
a	Grains	Quintals	63.15	3.14	52.90	2.74	22.27**
b	Straw	Tones	8.94	0.13	7.81	0.18	42.08**

Note: *-Significant at 5%
**- Significant at 1%
NS- Non-Significant

Table 4.6: Cost structure in maize production (Rs/hectare)

Sl. No.	Items	Contract farmers		Non contract farmers	
		Cost	Percent to total cost	Cost	Percent to total cost
A	**Variable cost**				
1	Seeds @ Rs. 95/kg	1347.10	5.71	1436.40	6.83
2	Farm yard manure @ Rs. 1500/tone	6750	28.62	2250	10.70
3	Fertilizer cost	1130.50	4.38	1516.20	7.21
a	Nitrogen @ Rs 225/50 Kg	562.50	2.38	625	3.21
b	Phosphorous @ Rs 460/50 Kg	460	1.95	690	3.28
c	Potassium @Rs 216/50 Kg	108	0.46	151.20	0.72
4	Labour				
a	Human labour @ Rs. 70/man day	3735.20	15.84	3802.40	18.08
b	Bullock labour @ Rs 250 /pair day	1250	5.30	1500	7.13
c	Machine hour @ 1000/hour	6000	25.44	5000	23.78
5	Interest on working capital (11% per annum)	1111.70	4.71	850.02	4.06
	Sub total	21324.5	85.70	16305.03	77.79
B	**Fixed cost**				
1	Depreciation	231	0.98	227	1.08
2	Rental value	2600	11.02	2600	12.36
	Sub total	2831	12.00	2827	13.44
C	**Total cost of cultivation (A+B)**	24155.50	97.70	19132.03	91.23
D	**Marketing cost**	542.79	2.30	1843.75	8.77
E	**Total cost (C+D)**	24698.29	100.00	20975.78	100.00

accounting for 7.13 per cent, seed cost Rs. 1436.40 accounting for 6.83 per cent and interest on working capital Rs. 850.02 accounting for 4.06 per cent of the total cost.

Among fixed cost, rental value of land was the major chunk of the cost which was Rs.2,600 accounting for 12.36 per cent of the total cost and other fixed cost was depreciation cost Rs.227 accounting for 1.08 per cent of the total cost. Land revenue was not taken separately in the fixed cost, as it was included in the rental value of land.

4.5.2 Returns structure in maize production

The details of physical output and returns per hectare are presented in Table 4.7. It was observed that in contract farming average yield of maize was 63.15 quintals of grains and 8.94 tones of straw per hectare and obtained gross returns of Rs. 45,468 per hectare. They incurred a total cost of Rs. 23,586.59 per hectare, net returns over variable cost of Rs. 25255.20 per hectare, net returns over total cost was Rs.21881.41 per hectare. Benefit cost ratio worked out to be 1.84.

In non-contract farming average yield of maize was 52.93 quintals of grains and 7.81 tones of straw per hectare and obtained gross returns of Rs. 35992.40 per hectare. They incurred a total cost of Rs.21028.52 per hectare, net returns over variable cost was Rs.19634.63 per hectare, net returns over total cost was Rs.14963.88 per hectare. Benefit cost ratio worked out to be 1.71.

The 't' value calculated for contract farmers and non-contract farmers were 22.24, 29.63 , 31.31, 12.86, 16.57 and 12.86 for yield, gross returns, total cost, net returns over variable cost, net returns over fixed cost and B:C ratio which were significant at 1 per cent level.

4.6 Terms of contract and mode of operation in maize

4.6.1 Terms and condition prevailing in contracting firms

The two contracting firms are Sugana and Riddi-Siddi having their own system of contracting with farmers. Both the companies prefer dried, disease free and seeds free from contamination. Similarly fixes price at the time of agreement. Seeds are delivered 15-45 days after harvest in Sugana and in case of Riddi-Siddi 15-30 days. Transportation cost borned by companies along with loading and unloading charges. Sugana and Riddi-Siddi pay its amount at the time of transportation within 45 days. Price per quintal is Rs. 730 by both the companies they pays Rs.50 more than prevailing market rate in respective districts. For gunny bags Rs. 10 is deducted per quintals by both the companies.

Sugana prefer minimum land of 1.00 acres and maximum of 2.50 acres. Riddi-Siddi goes for contract with minimum land of 1.00 acres and maximum of 3.00 acres. Both the companies look into land with well ploughed and good organic matter. Riddi-Siddi takes an advance of Rs. 560 per acre towards input supply such as seeds supply, Sugana does not take any such advance in the contract. No companies collect charges for technical advice and pays no compensation to crop loss at all. This is presented in Table 4.8.

4.6.2 Mode of operation in maize

The company selected the contract farmer through facilitator based on the locality of the farm, size of the holdings, field history, economic condition of the farmer source of irrigation, his willingness to cultivate and his level of commitment to the contract. The contractual arrangement between company and farmer is presented in Table 4.9.

In maize contract farming it was observed that 79.33 per cent of the farmers were introduced to the crop by the company staff and 13.67 per cent by fellow farmers, 7.00 percent by friends and relatives. The farmer after expressing his willingness to undertake contract farming a oral agreement will take place between contract farmer and company staff. The name of the farmer and his land under contract farming will be mentioned in the companies register for further reference. The agreement will be with the firm until the

Table 4.7: Returns structure in maize production (per hectare)

Sl. No.	Particulars	Contract farmers	Non- contract farmers	t-value
		Value (Rs.)	Value (Rs.)	
1	Total yield (quintals)	63.15	52.90	22.27**
2	Gross returns	45468	35972	29.63**
3	Total cost	24698.29	20975.78	31.31**
4	Net returns over variable cost	24143.50	19666.97	12.86**
5	Net returns over total cost	20769.71	14996.22	16.57**
6	B:C ratio	1.84	1.71	12.86**

Note: * -Significant at 5%
**- Significant at 1%
NS: Son-Significant

Table 4.8: Terms and conditions prevailing in contract farming of different companies

Sl. No.	Particulars	Sugana	Riddi –Siddi
1	Quality parameters of seed	Dried, disease free, free from contamination	Dried, disease free, free from contamination
2	Timing of fixing price	At the time of agreement	At the time of agreement
3	Delivery of the product	15-45 days after harvest	15-30 days after harvest
4	Transportation cost	Borne by company	Borne by company
5	Loading and unloading charges	Borne by company	Borne by company
6	Payment	At the time of transportation	At the time of transportation
7	Price per quintal	Rs.730/-	Rs.730/-
8	Conditions of land preferred	Well ploughed, good drainage	Well ploughed, good drainage
9	Minimum land preferred	1.00acre	1.00acre
10	Maximum land preferred	2.5acre	3.00acre
11	Advances towards inputs	Nil	Rs. 560
12	Charges to technical advice	Nil	Nil
13	Compensation to crop failure	Nil	Nil
14	Agreement	Oral	Oral

Table 4.9: Opinion of sample farmers about mode of operation by the company

Sl. No.	Particulars	Percentage
1	Total samples (Number)	120
2	Introduced to contract farming	
a)	Company staff	79.33
b)	Fellow farmers	13.67
c)	Friends and relatives	7.00
d)	Agricultural universities	0.00
e)	Others	0.00
3	Type of agreement	
a)	Written	0.00
b)	Oral	100.00
4	Frequency of field visits by the field officers of the company	
a)	Once in a week	0.00
b)	Once in fortnight	0.00
c)	Once in a month	43.51
d)	Once in two month	56.49
5	Number of times of installment payments made to the farmers (average)	1.00
6	Day of settlement from the date of final harvest	
a)	1-15 days	78.21
b)	16-30 days	17.67
c)	31-45 days	4.12

termination of the contract. To get the maximum yield of maize, farmer were either given seeds from the company or an advice to buy seeds from the certified agencies. Invariably, the agreement between cultivators and the company was oral with all the farmers. The area to be cultivated under contract farming was decided by the farmer himself. Riddi-Siddi charges a sum of Rs 560 for one packet of seed, as seed cost from the contract farmer. But Sugana will not charge as the farmer himself as to buy the seeds. The charges towards the seeds were deducted at the time of payment if company has provided the seeds. If the farmers themselves purchase the seeds from a certified agency, the cost has to be incurred by them at the time of purchase. No other inputs like FYM and credit were extended by the firm. Only technical guidance regarding the sowing, weeding, harvesting and threshing was given in the form of field visit by the technical staff of the firm. It was observed that only 43.51 per cent of the farmer's fields were visited once in a month by the field officers and 56.49 per cent of the farms were visited once in two months. The firm fixed the procurement price of maize at Rs. 730 per qty.

The firm provides transportation facility to the farmer to transport their produce from their field to the firm. The firms follow any grade standards and check for moisture percentage for procurement of the produce. In maize contract farming farmer's account were settled in single installments with 100% in a span of 1-15 days, 16-30 days and 31-45days. However, the settling of account was cleared within 45days after final harvest by contracting firms.

4.7 Factors favouring contract farming

Opinion of the contract farmers and contracting firms regarding factors favouring contract farming were as fallows.

4.7.1 Factors favouring contract farming from the point of view of farmers

The farmers and the company opined the factors responsible for the performance of the contract farming are presented in the Table 4.10. All the farmers growing maize expressed that Assured market was responsible for success of contract farming. Other factors as stated by the farmers were higher returns (79.16%), advance payment (72.50%), transportation facility (67.50%), input supply (35.83%) and irrigation availability (26.66%).

4.7.2 Factors favouring contract farming form the point view of company

The firm dealing with contract farming attributed physical and social environment as 100 per cent factor responsible for the success or failure of contract farming (table 4.11). Apart from this, Identification of loyal farmer (100%), Experience of the farmer (100%), Technical assistance (100%), Demand for the produce (100.00%), Utilities and Communication (100%), Quality parameters (50.00%) and Experience of company (50.00%) were the other factors attributed for the success of the contract farming.

4.8 Problems faced by the contract farmers and the contracting firms

Opinion of the contract farmers and contract firms regarding the problems faced as fallows.

4.8.1 Problems of the contract farmers in maize production

Opinion of the farmers regarding the problems they had faced in the contract farming is presented in Table 4.12. major problems faced by the maize contract farmers were Delayed procurement and was accounted to 87.50 per cent, high rejection (79.16%).lack of technical assistance (69.16%), no proper method to measure quality of the product (35.83%), scarcity of owned funds (16.66%), low contract price (16.66%), lack of credit facility (13.33%) non release of funds to purchase inputs (12.50%), irregular payments (10.00%) and unawareness of potentiality of crop (10.00%) respectively.

Table 4.10: Factors favouring contract farming by the farmers

Sl. No.	Particulars	Number of farmers	Percentage
1	Assured market	120	100.00
2	Higher returns	95	79.16
3	Advance payment	87	72.50
4	Transportation facility	81	67.50
5	Input supply	43	35.83
6	Irrigation availability	32	26.66

Table 4.11: Factors that favour contract farming from the view point of company

Sl. No.	Particulars	Number of firms	Percentage
1	Physical and social environment	2	100.00
2	Identification of loyal farmer	2	100.00
3	Experience of farmers	2	100.00
4	Technical assistance	2	100.00
5	Demand for the produce	2	100.00
6	Utilities and communication	2	100.00
7	Quality parameters	1	50.00
8	Experience of company	1	50.00

Table 4.12: Problems faced by the contract farmers

Sl. No.	Particulars	Number of farmers	Percentage
1	Delayed procurement	105	87.50
2	High rejection	95	79.16
3	Lack of technical assistance	83	69.16
4	No proper method to measure quality of the product	43	35.83
5	Low contract price	20	16.66
6	Scarcity of owned funds	20	16.66
7	Lack of credit facilities	16	13.33
8	Non release of funds to purchase inputs	15	12.50
9	Unawareness of potentiality of crop	12	10.00
10	Irregular payment	12	10.00

Table 4.13: Problems faced by the contract firms

Sl. No.	Particulars	Number of firms	Total
1	Fixing of contract price	2	2
2	Selection of farmers	2	2
3	Mixing of diseased grains with that of good one	2	2
4	Improper handling of produce	2	2
5	Lack of storage facility	2	2
6	Improper drying	2	2

4.8.2 Problems of the contract firms

Opinions of the firms regarding the problems faced by contract firm are presented in Table 4.13. As only two companies engaged in contract farming, the problems faced by these two firms are presented. The major problems were fixing of contract price (100%), selection of farmers (100%), mixing of diseased grain with that of good one (100%), improper handling of produce (100%), lack of storage facility (100%) and improper drying of the produce (100%) respectively.

4.8.3 Reasons for Non-Contract farming

Opinions of the farmers regarding why they are not going for contract farming are presented in Table 4.14. Major reason was rigid rules of the company (80%). The other reasons are lack of credit facility (76.67%), high technical standards (68.33%), limited acceptance of area (61.67%), improper weighment (48.33%) and scarcity of owned funds (38.33%) respectively.

Table 4.14: Reason for not adopting contract farming

Sl. No.	Particulars	No of farmers	Percentage
1	Rigid rules	48	80.00
2	Lack of credit facility	46	76.67
3	High technical standards	41	68.33
4	Limited acceptance of area	37	61.67
5	Improper weighment	29	48.33
6	Scarcity of owned funds	23	38.33

5. DISCUSSION

The results of the investigation mentioned in the previous chapter are discussed in detailed in this chapter under the following heads.

5.1 Growth performance and variation of maize

5.2 Socio- economic characteristics of the farmers

5.3 Pattern of employment in cultivation of maize

5.4 Input use pattern in maize production

5.5 Cost and returns in maize production

5.6 Terms of contract and method of operation

5.7 Factors favouring contract farming

5.8 Problems faced by the contract farmers and the contracting firms

5.1 Growth performance and variation of maize

5.1.1 Growth performance of production and price of maize

The analysis of growth rate of production in Davanagere district during the period 1997-2006 registered a negative growth of 0.38 per cert this was due to negative growth both in area and yield in this district. It was during this period drought situation occurred in the state as a whole from the year 2002-2005 so that yield as been declined.

The analysis of growth rate of production in Haveri district during the period 1997-2006 registered a positive growth of 1.50 per cent which was statistically non-significant. Similar reason was responsible for non-significant growth as that of Davanagere district.

In both the district, the growth rates in price registered a positive growth of 5.17 per cent in Davanagere district and 4.96 per cent in Haveri district which was statistically significant during the period. As, demand for maize increased drastically during this period by agro-processing industries and poultry industries. This has resulted in significant growth.

5.1.2 Variability in production and price of maize

The co-efficient of variation is used to know the variability. The co-efficient of variation of maize production in Davanagere district was 34.63 per cent. This implied that production was less stable during the period 1997-2006. This increase in the variation of maize production was mainly due to increase in the variation in yield.

Similarly the co-efficient of variation of maize production in Haveri district was 30.38 per cent. This implied that production was less stable during the period 1997-2006. This increase in the variation of maize production was mainly due to increase in variation of yield.

The co-efficient of variation of maize price during the period in Davanagere district was 17.07 per cent and 19.17 per cent in Haveri district. This implied that price was more stable in both the district during the period 1997-2006. This decrease in variation of maize price was due to increased demand of maize by agro-processing and poultry industries.

5.2 Socio-economic characteristics of the farmers

The socio-economic characteristics of the respondents include general features, pattern of land holding and cropping pattern of the sample farmers.

5.2.1 General features of contract and non-contract farmer

The education level of the sample respondents was presented in Table 4.2. The majority of contract farmers (78.33%) were educated when compared to non-contract farmers (76.66%) some of them had even completed college level education (20.00%). The study reveled that majority of the farmers were of young aged. If youth are included in farm activities, they will have better awareness regarding modern farm concepts. Young age coupled with better education has made the farmer to think about increasing their farm income by adopting commercial agriculture. Hence, they have gone for contract farming by joining hands with the several private companies involved in maize production.

5.2.2 Pattern of land holding

The figures presented in Table 4.3 showed that the percentage of area under dry land was more compared to irrigated land. Area, under contract farming of maize constitute only 72.05 per cent in all of the total size of land holding which was lesser than the area cultivated by the non-contract farmer. This indicated that there was much scope for bringing some additional area under maize to augment farm income. However, the private companies gave permission to the farmers for 2.5-3 acres. This practice may be mainly to protect quality of the produce. But, if the farmers become strong and vigilant maintenance of the quality, they can get permission and inputs to grow maize in large areas.

5.2.3 Cropping pattern of the contract farmers

Cropping pattern followed by farmers in a particular area depends upon the rainfall condition, irrigation facilities, and commercial importance of the crops, food habit and climatic condition of the area. Cultivation of maize has proved to be greater commercial importance. Davanagere district and Haveri district comes under northern transitional track of Karnataka state.

And the districts has most ideal climatic conditions for maize production along with some field crops *viz*., sorghum, cotton, groundnut, paddy, chillies and flower crops. However maize was grown as sole crop by the sample farmers. Maize crop can be taken up successfully under *kharif* season. The farmers can exploit the better climatic conditions. Soil productivity and also engage themselves fully in their field. This enables the farmer to get higher returns compared to other crops. During 2006-07 maize was grown by the contract farmer in an area of 72.05 per cent of the land holding during *kharif* 68.18 per cent and 3.87 per cent in *rabi* season. Only those farmers who were having bore wells practiced the crop in *rabi* season.

During 2006-07 maize was grown by the non-contract farmer in an area of 73.54 per cent of the land holding, during *kharif* 64.86 per cent and 8.68 per cent in *rabi* season. Both farmers denoted more area under maize during *kharif* compared to *rabi* in their cropping pattern. As discussed earlier, rainfall in the study area was moderate and got good amount of rainfall. Farmers made use of rain water during the season and hence more number of farmers practiced maize cultivation.

5.3 Pattern of employment in maize cultivation

It was found from the Table 4.4 labour employed for maize production constituted about 53.36 mandays by the contract farmers for different operation like land preparation and other activities. Non-contract farmers used 54.32 mandays of land preparation and other cultivation activities. Non-contract farmers used 0.96 mandays more than contract farmers as they used more mandays for land preparation the reason is they used less number of labour to minimize the labour cost which enhanced the work to next day ultimately increased the number of mandays.

Similarly for other operation contract farmers make use of 13.60 mandays for threshing which is 1.34 mandays more than non-contractor, the reason is they have to thresh more cobs as compare to non-contractors. Contract farmers used 5.96 mandays for FYM application which is more than 1.32 with non-contractors, the reason is contracting firms insist

the farmers to use more FYM than compost to get quality and better yield. For sowing and harvesting contractors and non-contractors used same mandays i.e, 7.96 and 10.60 respectively, but labour hour in a day is more in non-contract farming than in contract farming. Hence, we get same result. For weeding non-contract farmers used 10.90 mandays which is 1.98 mandays more than contract farmers. The reason is weed management measures are followed by contract farmer but, such measures are not taken by non-contract farmers. This shows that there is significant difference among contract farmers and non-contract farmers employment pattern.

5.4 Input use pattern in maize cultivation

The result of the study (table 4.5) indicated that the average quantity of seeds used in contract farming (14.18 kg/hectare) was lower than the recommended seed rate (15 Kg/hectare). However, the average quantity of seed used in non-contract farming (15.12 kg/acre). Some of the contract farmers used less than the recommended seeds because hybrid seeds are used. Hence, the average has come down to 14.18 kgs per hectare.

With respect to FYM quantity applied per hectare in contract farming and non-contract farming was 4.50 tonnes and 1.5 tonnes respectively. Farmers had not followed the recommendations because of the non-availability of sufficient quantities of FYM in villages and also due to financial constraints. Farmers applied less quantity of FYM as against the recommended 7.50 tonnes per acre.

With regard to the application of fertilizers the contract farmers had used 125:50:25 kgs of N: P: K, respectively which, on other hand the non-contract farmers had used 150:75:35 kgs of N: P: K, respectively which was similar to that of recommended dosage of package of practices.

In case of human labour, bullock labour and machine hours (table 4.11); the contract farmer employed 53.36 mandays of human labour, 5.00 pairdays of bullock labour and 6.00 machine hours. While the non-contract farmer employed 54.32 mandays of human labour, 6.00 pairdays of bullock labour and 5.00 machine hours. The higher use of human labour was due to frequent weeding and high machine hours are used because of increased yield which leads to ultimate increase in threshing. This shows that there is lot of difference in contract farmers input use pattern and non-contract farmers input use pattern.

With the investment of all these various inputs, the contract farmer and non-contract farmer get an average grain yield of 63.15 and 52.90 quintals per acre respectively. Straw obtained was 8.94 tonnes in contract farming and 7.81 tonnes in non-contract farming. There is significant difference in yield and straw among contract farmers and non-contract farmers.

5.5 Cost and return in maize production

The result of the study (table 4.6 and 4.7) revealed that the per hectare cost of cultivation for maize was relatively lower in non-contract farming amounting to Rs. 20,975.78 compared to contract farming Rs.24,698.29. It was due to higher cost on FYM in addition to high expenditure on machine labor by contract farmers.

The cost on seed in non-contract farming was high compared to contract farming. This was due to, more quantity of seeds were used per hectare. The cost on FYM was high in contract farming as they use high quantity of FYM because the firms insist them to use it. Fertilizer cost was high in non-contract farmers as they used less of FYM and more of compost fertilizer compare to contract farmers.

The cost on human labour in non-contract farming was higher compared to contract farming. This was due to more laborers were used for land preparation and frequent weeding. Similar trend was found in bullock labour. Machine hour used by contract farmers were more compare to non-contract farmers because threshing of maize was high in contract farming due to high yield.

The cost incurred in marketing was higher in non-contract farming category compared to contract farming category. This was due to, the produce of contract farmer was collected by the firm from the common point, which made the contract farmer not to bare the transportation cost and cost incurred by non-contract farmer in marketing was higher transportation cost, commission charges, weighment charges and other, which was substantial amount of cost of cultivation.

Per hectare yield in contract farming was higher than the non-contract farming and per hectare net returns in contract farming was higher than the non-contract farming. Per hectare gross income was higher in contract farming compared to non-contract faming. This was due to higher price factor and higher yields in contract farming. The B:C ratio of contract farming was higher than the non-contract farming. It was due to higher gross return obtained in contract farming compared to non-contract farming. There is significant difference among contract farmer's yield and returns.

5.6 Terms of contract and method of operation

5.6.1 Terms of contract prevailing in different contracting firms

The result revealing terms and conditions prevailing in contract farming presented in Table 4.8. Sugana involved in poultry farming and Riddi-Siddi involved in starch extraction from maize grains because maize contains more starch and suitable for extraction of starch. This product is used in glucose formation.

Sugana and Riddi-Siddi fixes price at the time of agreement to contract farming with the company. Both the company does not have agreement in written form. These companies prefer grains which should be wet free and free from diseased and contaminated grains which will decrease the quality of starch and may cause diseases for poultry birds. The other requirements are free from mud and foreign matter and cobs should be stored in dry place to avoid increase in moisture. Company people come and collect threshed grains with their own vehicle paying loading and unloading charges. This saves transportation cost of farmers. Both the companies clear their payment at the time of transportation and pay the fixed price of Rs 730 per quintal. For gunny bags Rs. 10 is deducted for each quintal of grains. Sample farmers were happy with these rates and services provided by the company which might have paved the way to go for contract farming.

These two companies prefer a minimum of 1.0 acres and maximum 2.5 acres for contract by Sugana. Whereas, Riddi-Siddi goes for minimum land of 1.0 acre and maximum of 3.0 acre looking into capacity of the farmer, storage facility and irrigation availability. Riddi-Siddi collects advance of Rs.560 towards seeds supply. So that farmer will have some kind of interest and responsibility towards the crop from beginning itself.

Sugana company does not collected any such advances towards the seeds. The result further leads to the conclusion that the companies followed their own strategies in having contract farming. These strategies can be honored or modified looking into the profitability to the companies or to the contract farmer hence, this needs to be regulated in order to have a fair deal for both the parties. Similarly, fixing of prices in advance, supply of inputs and taking advance towards inputs are all varies from company to company. Therefore, contract farming activities need to be regulated in order to share the profits equally without exploitation of farmers.

5.6.2 Mode of operation

The success of contract farming was determined by the contractual relationship between the farmers and the company. The results relating to various aspects of contractual arrangements are presented in Table 4.9. A majority of the farmers (79.33%) took up maize contract due to persuasion of the company staff. The influence of fellow farmers was the second major force in the case of 13.67 per cent of the farmers and the influence of friends and relatives was 7.00 per cent. The agreement between farmers and company was oral in maize contract farming. In case of maize, the company supplied the inputs at a mutually accepted price after payments made towards seed in advance along with transportation cost

or advised to buy seed from certified agency by paying the value of seeds. In maize contract farming farmers produce has to be made available to the appointed place. Though such arrangements were suitable to majority of the farmers, there were instance of some farmers facing inconvenience in handling the produce to appointed place. The staff strength of the company was dependent on the number of factors like field visits, technical guidance and arranging camps. The field officer visits the fields twice in two months. In terms of more field visits, farmers had better contact with the officer.

An in-depth analysis of settlement pattern threw a light on the settlement practices followed in different contracts. On an average, the farmers of maize received settlement in 1.00 installments. The final settlement from the last date of harvest varied, for instance 78.21 per cent of farmers realized full payment within 1-15 days. About 17.67 per cent of farmers received within 16-30 days and 4.12 per cent of farmers received within 30-45 days from the date of harvest.

5.7 Factors favouring contract farming

5.7.1 Factors favouring contract farming from the point of view of farmers

From the results of Table 4.10, it could be concluded that Assured market had reduced the risk of price fluctuation in maize. This was one of the major factors responsible for success in contract farming of maize. Farmers also opined that contract farming gives more remuneration than selling in open market. Meanwhile the price differed for the produce in the market made the farmer to go for contract farming. So, general farmers felt very much comfort with the contract farming, as this avoid them market risk and provided higher remuneration compare to non-contract farming, which was grown generally and marketed without pre-fixed price. This means, the farmers have positive attitude towards contract farming system.

The other factors like advance payment helped the farmer to meet out the basic inputs requirement that avoided borrowing. Transportation facility was another important factor that was responsible for success in contract farming, as the company would procure the product either from the farmer's field or from appointed place; this reduced the transportation cost to the farmer. Input supply would help farmer to grow the crop with confidently as company met the basic requirement of farmer *i.e.*, seeds which was either certified by company itself or from certified agency. Finally irrigation facility was another important factor that was responsible for success in contract farming, as the farmer can grow the crop during *rabi* season and take the advantage of price.

5.7.2 Factors favouring contract farming from the view point of company

The results of Table 4.11 revealed that opinion of the firm on major factors responsible for performance of contract farming was the physical and social environment, identification of loyal farmers, technical assistance and demand for the produce. The success of any agricultural investment requires two multidimensional preconditions to be met. Firstly, the general suitability of the topography, climate, soil fertility and water availability. Secondly, the suitability of the physical environment for the specific plant genotype or animal for which there is a market demand. The extent to which all theses factors in turn determines production, yield, quality and profitability.

Identification of loyal farmer would help firm to meet their expected demand of maize through belief of the company on farmer selling the produce that he grew, to the company with which he has entered into agreement. Experience of farmers would help the company to get more yields, as they will be having the technical knowledge of growing maize in more successful manner. Through field visits company could solve the problem of farmers. Demand for the produce in the market would influence the farmer to take up the cultivation and help the firm to meet their required demand through contract farming.

The other factors like utilities and communication were important in rural areas as the existence of an adequate communication system that includes road, transport, telephones and other telecommunication services. Quality parameter were maintained for the produce by

the company through giving technical assistance which would help to get better margin for farmer to adopt the contract farming of maize. The experience of the company in contract farming is an important factor which is responsible for success of contract farming, because more the experience the firms were able to perform better in delivering the services and providing more income to contract farmers, also lowering overhead cost. In contractual arrangements, the experience of the contract company was very much important which determined the production, marketing practices and other measures. Therefore, the experience of the company (age of the company) directly affected the success/failure of contract farming.

5.8 Problems of contract farmers and the contract firms

The major problems faced by the contract farmers and contract firms are discussed below.

5.8.1 Problems of the contract farmers in maize production

It was concluded from the result of Table 4.12 that the major problems faced by maize grower were Delayed procurement which was about 87.50 per cent, followed by high rejection (79.16%), lack of technical assistance (69.13%), no proper method to measure quality of the product (35.83%) by the firm if the quality is not maintained by the farmer and non release of funds to purchase inputs at appropriate time led farmer to borrow and other low contract price, irregular payment for output, which would affect farmer to go for next crop or pay back the credit. Lack of credit facility to carry farm activity, scarcity of owned funds to take up regular farm activity and unawareness of potentiality of crop are other problems of contract farmers.

Though, the contract farming is successful, there were some problems faced by farmers as well as companies. By attending these problems, the contract farming can still strengthened and sustained.

5.8.2 Problems of contract firms

The results of the contracting firm are presented in Table 4.13. The table showed that contract firm opined that the major problem were fixing of contract price (cent per cent) due to fluctuation in market price. The other problems were improper drying of produce by farmers mainly to get more weight for their produce, selection of loyal farmers (cent per cent) to have frequent contract with the firm and sell the produce to same firm with whom he has entered into agreement. The firm expressed that the contract farmers try to put diseased grains with that of good one (cent per cent) and it was difficult to check and make sure of the quality handled was more. The firms also revealed that farmers lack of knowledge in proper handling and storing the produce.

5.8.3 Reasons for non-contract farming

It was concluded from the result of the Table 4.14 that majority of the farmers have not opted contract farming because of its rigid rules (80%) followed by lack of credit facility (76.67%), high technical standards (68.33%), limited acceptance of area for cultivation (61.67%) by the company. As the rules are not made properly and which are of high technical standards farmers cannot cope up with this as the crop does not want any such standards. Other reasons are improper weighment, scarcity of owned fund and the produce is not taken in time by the firm as storage is a problem which would lead to fungus attack and decrease in quality of the produce.

6. SUMMARY AND POLICY IMPLICATIONS

The globalization of Indian agriculture in the recent has resulted in the production of export orientated quality products having comparative advantage. To fulfill the commitment of the World Trade Organization (WTO), the recent dismantling of the system of Quantitative Restrictions (QRs) on imports by the Central Government has provoked new challenge to the Indian farmers to compete in the world market. With the WTO's demand for trade liberalization and subsidy cut, the Indian farmers are farming threats to survival from every quarter.

Parallel to this problem of fragmentation of land holding, hampering farm mechanization, this has prevented the farmer from getting optimum yields from his farm. The lack of capital forces, the farmer to compromise on the farm inputs, again resulting in the less productivity. In such a scenario, contract farming is fast emerging as the optimal model of farming.

In India, contract farming was initiated during 1920's by ITC by introducing Virginia tobacco in costal Andra Pradesh. Contract farming has existed in Karnataka for decade's mainaly in sugar mills. Maize have been recently introduced in India for commercial production mainly for agro-processing and poultry feed.

As the contract farming concept in Indian agriculture research is giving more importance and there are very few studies undertaken there is a need to assess the factors influencing contract farming as this may help other farmers and firms entering to the limited body of knowledge with present study was undertaken with the following specific objectives.

1. To study variability in price and production of maize in the study area
2. To compare cost and returns structure of maize under contract and non contract farming
3. To study the terms of contract and mode of operation among the firms contracting in maize
4. To study the problems faced by the contract farmer and firms and to suggest remedies

Limitation of the study

Contract farming has many constraints, though contract farming is basically a way of allocating risk between the firm and its farmers. The distribution of risk depends largely on such factors as bargaining power, availability of alternatives or access to information. The costs of cultivations of the firm crumble, as they are forced to arrange supply of raw materials from alternative source with attendant uncertainties.

Methodology

Sampling procedure

The farmers were chosen from Davanagere and Haveri district for the study, as these were the important and major maize growing districts in Karnataka. To evaluate objectives of the study, all the farmers adapting contract farming of maize were chosen. The companies practicing contract farming of maize in these districts were also chosen. The required data were collected through personal interviews using pre tested schedules.

Statistical techniques employed

The techniques of tabular analysis was employed for computing the costs, returns, terms of contract and mode of operation factors for running contract farming and problems faced by contract farmers and contract firms were documented using averages, means and percentages. In order to study variability in maize production and price compound growth rate

and co-efficient of variation is used. ‘t’ test has been employed to know the difference in yield and returns among contract farmers and non-contract farmers.

The salient findings of the study

Growth performance and variability in production and price of maize

The production of maize has decreased in Davanagere and Haveri district was noted in study period. The highest decrease is in Davanagere district in the year 2002. The price of maize was increasing during the study period with more increasing trend with significant growth. The variation in production was highest in Davanagere than in Haveri district. In case of price more variation was in Haveri district than Davanagere district.

General features of sample farmers

The average area allotted to the cultivation of maize through contract farming was found to be similar and it was very less compared to the land holding in the district and area allotted to the cultivation of maize through contract farming. The private companies gave permission to small areas. This practice was mainly to protect quality of the produce. But, if the farmers become strong and vigilant enough to convince the companies regarding maintenance of the quality. They can grow maize in large areas. This calls for the effort from the farmer’s side towards better quality maintenance of seed under contract farming.

Socio-economic features of contract farmers

The average size of the maize contract farmers was around six and majority of contract farmers (78.33 %) were educated as most of the farmers were educated, they were able to find the source where the required information was available. Average age of the respondents was 43 years, young age coupled with better education has made the farmers to increase their farm income by adopting commercial agriculture.

Pattern of land holding of contract farmers

The average size of land holdings of contract farmers was 10.95 acres. The average area under maize cultivation accounted for about 7.89 acres, which worked to be 72.05 per cent of total land holding. Due to non-availability of irrigation sources, growing of maize crop under rainfed condition had become a grace for them.

Cropping pattern of contract farmer

Maize has proved a greater commercial importance. Davanagere and Haveri districts have most ideal climatic conditions for growing maize along with some field crops *viz*., sorghum, cotton, groundnut, paddy, chillies and flower crops. However, maize was grown as sole crop by the sample farmers.

Pattern of employment in maize cultivation

Contract farmers employed about 53.36 mandays, of which 6.32 mandays of human labour for land preparation. For FYM and compost application 5.96 mandays were used. About 47.96 and 8.92 mandays were employed for sowing and weeding respectively. About 10.60 mandays and 13.60 mandays were used for harvesting and threshing.

Similarly non-contract farmers employed about 54.32 mandays, of which 7.96 mandays of human labour for land preparation. For FYM and compost application 4.64 mandays were used. About 7.96 and 10.90 mandays were employed for sowing and weeding respectively. About 10.60 mandays and 12.26 mandays were used for harvesting and threshing, respectively.

Input use pattern in maize production

It was found from the study that contract farmers used about 14.18 kgs of seeds per hectare, which was almost equal to recommended seed rate. Farmers used about 4.50 tonnes of FYM and applied less quantity of compost fertilizers. As the crop is hard no serious pest and diseases are attacked. About 53.36 mandays of human labour, 5.00 pair days of bullock labour were used for maize cultivation.

Similarly, non-contract farmers used 15.12 kgs of seeds per acre, which was slightly more than the recommended seed rate. Farmers used about 1.50 tonnes of FYM and applied more quantity of compost fertilizers. As the crop is hard no serious pest and diseases are attacked. About 54.32mandays of human labour and 6.00 pair days of bullock labour were used for maize cultivation.

Cost and returns in maize production

Total cost of cultivation of maize in contract and non-contract farming was Rs. 24,698.29 and Rs.20,975.78 per hectare respectively, under this FYM cost was major item which accounted for nearly Rs. 6750 in contract farming. This was due to companies insist more application of FYM than compost fertilizers in contract farming. Followed by threshing activities in both contract farming and non-contract farming.

Per crop of maize in contract and non-contract farming, on an average yields about 63.15 quintals and 52.90 quintals per hectare, respectively. The average gross returns was Rs. 45,468 and Rs. 35,972 per hectare and average net returns was Rs. 20,769.71 and Rs. 14996.22 per hectare per crop in contract farming and non-contract farming respectively. This worked out to be Rs. 1.84 and Rs 1.71 return to every rupee invested in contract and non-contract farming.

Terms of contract and mode of operation

The result revealed that Sugana made contract farmer for feeds and Riddi-Siddi for starch extraction. Both the companies fix the price at the time of agreement. To avoid fungus attack both the companies asked the farmers to store the produce in godowns. It also takes the produce within 45 days from the time of harvest. Both the companies paid loading and unloading charges and vehicle charges as well. Both the companies agreed to pay the bills at the time of dispatch of the produce. Again both firms expected well-ploughed land with minimum of one tonnes of FYM application. This is to ensure that the quality of grains must be good enough. However, Sugana fixes size of the area for contract between 0.50 to 2.50 acres per farmer. Similarly, Riddi-Siddi fixes 0.50 to 3.00 acres per farmer. The result reveled that farmers were in contract farming because of efforts of the company staff, fellow farmers and friends and relatives. Oral agreement is taking place in maize contract farming. The company staff visited the field twice in two months.

Factors favouring contract farming

Factors attributed for the performance of the contract farming according to firms were physical environment, identification of loyal farmer, utilities and communication, experience of farmer, quality parameter, and demand for the produce and experience of the company. The physical and social environments were the conditions in which crop are well sustained and loyal farmers would sell the output to the company with which he has entered into agreement were major factor lead to success of contract farming.

Factors responsible for the success of contract farming according to farmers were Assured market, higher returns, advance payment, transportation, input supply and irrigation availability. Both the company provides transportation facility and gunny bags. Riddi–Siddi provides seeds which increases yield which made the farmers to go for contract farming.

Problems faced by the contract farmer and contracting firm

The major problems faced by the maize grower were Delayed procurement which was about 87.50 per cent, high rejection rate (79.16%) lack of technical assistance (69.16%) by the firm during different farm activity. The major problems faced by the contracting firms were (cent per cent) due to fluctuation in market price. The other problems were improper drying of the produce by farmers mainly to get more weight for their produce, selection of loyal farmer (cent per cent) to have frequent contract with whom he has entered into agreement. Farmer discontent with price of the produce and if the value of the produce is reduced with respect to quality parameter. The firms expressed that the contract farmers try to put diseased and damaged grains and it was difficult to check and make sure of the grade as quantity handled was more. The reasons for non-contract farming was rigid rules of the firms followed by lack of credit facility, high technical standards, land requirement is high, improper weighment and scarcity of owned funds.

Policy implications

1. The growth rate in production has declined in the study area. Effort should be made to increase production shifting maize to rainfall areas and introducing drought resistant varieties. While, the growth rate in price has been increased significantly as crop is getting commercial importance. The study demonstrated that price (as judged by CV) is more stable than production.

2. For smooth functioning of contract farming system, companies adopt differential price mechanism in which agreed price is paid after final dispatch of the produce. The final price is calculated once the company has bought the produce which depends on prevailing market price. The firm has to buy the produce at once to differential price.

3. The contract companies has to follow written agreement to avoid breach of contract by farmers and companies. It may be made legally obligatory on the part of contract farmer and the contract companies to strictly adhere to the contract by bringing suitable legislative measures by the government.

4. The contract companies limit production activities for three acre only, with a view to protect the quality of the produce through better management. The companies may extend production activities to large areas for those who maintain definite quality of produce consistently. This may act as incentive to other farmers to maintain quality of produce which is needed by agro-processing firms.

5. As net returns in contract farming is more compare to non-contract farming farmers has to take up maize under contract farming.

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Appendix Ia: Price of maize in Davanagere APMC Market

Years	Price (Rs./quintal)
1997	470
1998	505
1999	520
2000	480
2001	590
2002	610
2003	630
2204	600
2005	780
2006	710

Appendix Ib: Price of maize in Haveri APMC Market

Years	Price (Rs./quintal)
1997	417
1998	475
1999	500
2000	495
2001	550
2002	570
2003	510
2004	500
2005	765
2006	690

Appendix Ic: Production of maize (tones) in Davanagere district

Years	Production (t)
1997	324759
1998	352138
1999	396872
2000	425671
2001	444305
2002	265955
2003	197937
2004	156615
2005	525175
2006	508031

Appendix Id: Production of maize (tones) in Haveri district

Years	Production (t)
1997	239694
1998	201182
1999	233889
2000	228069
2001	343254
2002	191211
2003	209750
2004	120224
2005	302649
2006	364262

CONTRACT FARMING IN MAIZE – AN ECONOMIC ANALYSIS

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ABSTRACT

The production of maize has decreased in Davanagere and Haveri district was noted in study period. Sugana and Riddi-Siddi were the companies taking up contract farming in both the district. The average size of land holding of contract farmers was 10.95 acres. They employed about 53.36 mandays, of which 6.32 mandays of human labour for land preparation. Similarly non-contract farmers employed about 54.32 mandays of which 7.96 mandays of human labour for land preparation. About 53.36 mandays of human labour, 5.00 pair days of bullock labour were used for maize cultivation. Total cost of cultivation of maize in contract and non-contract farming was Rs. 24,698.29 and Rs. 20,975.78 per hectare respectively, under this FYM cost was major item which accounted for nearly Rs. 6750 in contract farming. This was due to companies insist more application of FYM than compost fertilizers in contract farming. Followed by threshing activities in both contract farming and non-contract farming.

Per crop of maize in contract and non-contract farming on an average yields about 63.15 quintals and 52.90 quintals per hectare, respectively. The average gross return was Rs. 20,769.71 and 14,996.22 per hectare per crop in contract farming and non-contract farming respectively. This worked out to be Rs. 1.84 and 1.71 return to every rupee invested in contract and non-contract farming. Factors responsible for success of contract farming according to farmers were assured market, higher returns, advance payment, transportation, input supply and irrigation availability. The problems were improper drying of the produce by farmers mainly to get more weight of the produce, selection of loyal farmers to have frequent contract with whom he has entered into agreement.