Assessment of Marketed and Marketable Surplus of Major Foodgrains in Gujarat

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Foreword

The Centre for Management in Agriculture (CMA) at the Indian Institute of Management, Ahmedabad (IIMA) has, since its inception, been actively engaged in applied, policy and problem-solving research in agri-business, rural and allied sectors. The research studies on a wide range of problems in the fields of input supply management, commodity systems, procurement, agro-processing, rural credit, agricultural exports, livestock, fisheries, forestry, food safety and quality issues, retailing, producer institutions, indigenous innovations, and international trade including WTO issues, have been carried out by CMA faculty and research staff over the years.

Marketed and marketable surplus estimation is very important to provide for appropriate marketing infrastructure and assess farmer household wellbeing. The situation with respect to marketed surplus varies across states depending on level of agricultural development and commercialization of the sector. It also differs by crop and season in the same region as well across regions. Thus, it becomes imperative to assess the nature and level of marketed surpluses at the state level and factors determining it. In this context, state level assessments are of great value.

This study by Dr. Munish Alagh, as part of the co-ordinated study on the topic, on various major crops across districts in Gujarat, attempts an assessment of the level of such surpluses and their determinants based on primary survey of different categories of farmers in the state. The determinants examined include: accessibility of the market, condition of the feeder roads, availability of storage capacity, transport methods and costs, information on prices and markets, etc. I hope that the study will be a useful document for researchers, practitioners and policy makers in the context of changing and diversifying agriculture in Gujarat.

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1.1 Introduction

1.1.1 The Backdrop

The available data on Marketable and marketed Surplus based on surveys conducted by the Directorate of Marketing and Inspection during earlier decades has become obsolete. There have been persistent demands from the users for revision and updating of the data not only on Marketable Surplus ratios but also on variety of other crucial items like - farm retention for family consumption, seed, feed and wastages etc. This information is extensively used by Government Departments, Ministries and Organisations like the Department of Statistics, Ministry of Planning and Department of Agriculture & Cooperation (DAC) in framing estimates of 'Net National Product' of agricultural sector, consumption, expenditure, savings, capital formation etc. This information is also used in long and short-term supply and demand projections as well as for estimating availability of important commodities for consumption. The Ministry of Commerce and Industry uses the Marketable Surplus Ratios for assigning weights to different agricultural commodities in compilation of "All India Index Numbers of Wholesale Prices". The marketable surplus ratios are also very useful for planning procurement operations and market development programs what is now called the agricultural supply chain. Besides, it is of immense help to researchers of various agricultural universities/institutions at national level, Food & Agriculture Organization of the United Nations (FAO) and other international organizations.

Gujarat is among one of the fastest growing states in India. During the 10th five year plan the state grew annually at a rate of 10.4%, official statistics reveal a high rate of agricultural growth since the early years of the new millennium averaging at 8.6% per annum (Mehta, 2012b). In the nineties and early part of the new millennium, Gujarat witnessed overall improvements in yields of important food crops, even though the cropping pattern gave way to commercial crops which are more remunerative to the farmers. Clearly in this fast growing agriculture a necessary subject of research is the quantum and proportion of the marketed part of the total production of foodgrains in the state. Below we explore this factor in detail.

This introductory chapter includes a description of the Methodology, Concepts and Literature Review. The second chapter describes the States Agriculture. The third chapter contains the empirical findings and the final chapter summarizes the major findings and conclusion.

1.1.2 Objectives of Study

The main objectives of the study are:

1. To estimate marketable and marketed surplus of selected foodgrains in Gujarat.
2. To estimate farm retention for consumption, seed, feed, wages and other payments in kind, etc.,
3. To examine the role of various institutional, infrastructural, socioeconomic factors that influence households decision on marketed surplus.

1.1.3 Methodology and Coverage

The study covers districts with maximum production of the relevant crops, wheat, bajra and tur. At first stage five districts were chosen, Vadodara and Panchmahals for tur, Kheda for wheat and bajra, Junagadh for wheat and Banaskantha for bajra. The sampling involved selection of appropriate blocks and villages based on statistical data available from the District Offices. Finally village level detailed farming information relevant for estimating marketed surplus was obtained from survey at the village level. This included – sale price, productivity, machinery used, cropping pattern, irrigation mechanisms etc. Finally, farm-level ratios were collected from selected households through pre-tested questionnaire. The data was then tabulated and analysed. Care was taken in selection of blocks, villages and households to ensure that blocks and villages were selected with higher production and yield of selected crop (according to data available at District Agricultural Office). Cultivator households from these districts were selected as per Multi stage sampling, first through judgement sampling based on yield and production figures found from study of the records of the district agricultural office, appropriate villages were selected and then through quota sampling design based on farm size appropriate households were selected.

Following is a brief profile of the sample selected:

Table 1.1: Sample Coverage of Farmers by Crop and District

Farm Class	Tur		Wheat			Bajra		Total
	Vadodara	Panch-mahal	Junagadh	Kheda	Banas-kantha	Kheda	Banas-kantha	
Marginal	1	2	0	0	0	2	0	**5**
Small	1	9	0	7	1	14	3	**35**
Medium	24	19	32	45	27	61	44	**252**
Large	24	19	47	15	18	22	31	**176**
Total	**50**	**49**	**79**	**67**	**46**	**99**	**78**	**468**

Note: The total no. of farmers interviewed was 359. But because in the case of wheat and bajra in Banaskantha and Junagadh district the same farmer was interviewed both for wheat and bajra farm size is greater than 359.
Source-Sample Data

Table 1.2: Basic Profile of Sample Selected in the Project

District	Vadodara	Panchmahal	Kheda	Junagadh	Banaskantha
Total blocks	12	11	10	14	14
Blocks covered	Karjan	Halol	Nadiad	Junagadh	Palanpur
	Vadora	Kalol	Mahemdabad	Mendarada	Vadgam
	Vaghodia	Ghoghumba		Manavadar	Deesa
Villages covered	Mangrol	Vada Talav	Valetava	Majevadi	Palanpur
	Kumbola	Jepura	Vedtal	Goladhhar	Lunava
	Runvad	Bakrol	Narsanda	Mendrada	Saripada
	Ghoda	Shaktipura	Sihunj	Datrona	Malan
	Anroli		Jariya	Manavadar	Vadgam
Total village covered	5	4	5	5	6
Main crop covered	Tur	Tur	Wheat / Bajra	Wheat	Bajra
Total sample	50	50	101	80	78

Source: Sample Data

1.1.4 Main Features of Agriculture in Selected Districts

Kheda

Kheda district is in Central Gujarat. There are ten talukas, two sub-divisions in the district (1) Nadiad & (2) Kapadwanj. Under Nadiad division the talukas are – Nadiad, Mahuda, Mahembdabad, Kheda and Matar. Under Kapadwanj division the talukas are – Kapadwanj, Kathlal, Balasinor, Virpur, and Thasra. In Kapdwanj district, cropping pattern in kharif involves

cultivation of bajra and chikori. Chikori is a very profitable crop. In Nadiad division, rice is the main crop grown in Matar and Kheda. In Kapadwanj division the main crop is bajra. Yield per hectare is high in this area. After bajra in summer, wheat is cultivated in rabi season, if irrigation facility is available. After Rice crop, farmers sow wheat because there is retained moisture and nitrogen in land. Tarapur and Nadiad are main markets for selling produce. The majority of farmers sell produce at the field to traders. Majority of the farmers retain the produce for self-consumption. Some portion of bajra is sold whereas, 100% of the wheat crop is sold. They get higher price for summer bajra compared to kharif bajra due to difference in the quality. Farmers never stock bajra and wheat for later sale. Farmers need working capital for the next agricultural season, therefore sell a large part of production immediately in the market.

Panchmahal

There are two sub-divisions (1) Godhra and (2) Lunawada. The cropping pattern in Panchmahal is mainly mixed cropping maize and tur. They depend on rainfed cultivation. As far as tur is concerned, tur crop is a six month crop. After 3 months, green tur is available. Every 15 days they collect green tur from the farm and sell in the market to grow, they will receive a comparatively higher market price but the majority of farmers harvest green tur and sell it in the market. Some farmers are involved in interlinked markets and hence sell their produce to the local traders as repayment of the credit. Some farmers take green tur and sell in the market as they need the capital/working capital for the next season (for purchasing seed and fertilizer and other agricultural activities). Farmers insist that government declare market price at the time of sowing. The government's policy is to declare price at the time of production. Having taken the sowing and input application decisions the farmers in adverse circumstances incur substantial losses.

In Panchmahal the main markets are Rameshra, Shivnagar and Halol. The majority of farmers sell 60 to 70% of production in the market. Farmers also distribute tur to neighbors, labour working in the field and require some for other customary requirements.

Junagadh

The main rabi crop in Junagadh is wheat. Although some farmers have tube wells, major source of irrigation is ordinary well. Junagadh is a major wheat producing district in Gujarat. Yield per hectare is 4000-4500 kg. In kharif season, farmers produce groundnut and cotton. Some farmers produce cotton crop. The produce is not retained because of unavailability of warehousing facility.

At the time of harvesting the weight of wheat is more compared to wheat stored for long duration after production. Majority of the farmers sell their produce to local traders. FCI buys production in limited quantity. They do not directly sell to FCI because there is a belief that FCI representatives screen product quality and if the production is rejected for higher quality standards they receive less price. FCI also purchases from the local traders. In fact local traders reportedly make profits from buying from the farmers and selling to the FCI. They take advantage of the cash needs of the farmers.

Banaskantha

Banaskantha contributes significantly to agricultural production of the state and ranks at the top in the production of potatoes in India.

There are two sub-divisions of the director of agriculture office – (1) Palanpur and (2) Deesa. The main crop is bajra and potato is a cash crop. The highest yield of potato in Gujarat is in Banaskantha. For irrigation facility major sources are wells and tube wells. Joint tubewell ownership among farmers is there in the district. In kharif season, farmers cultivate bajra, groundnut, til and cotton. In rabi potatoes, wheat, cumin and fodder and in the summer season the major crops are bajra, vegetable and fodder. The main occupation of the district is farming and animal husbandry is subsidiary. From animal husbandry they earn around 40% of the household income. Some farmers sell water from their deep tubewells. Farmers take advance from the local traders and sell agricultural production to them. Every week they sell potatoes in the local market. APMC market (Deesa and Palanpur) is far away and majority of the farmers sell their produce at the fields. Farmers repeat the wheat seeds for two years.

Vadodara

The blocks in the district are twelve. Farmers get low price for their product. They do not get proper price in APMC Market. Traders do not give price as per government support price. They often grow tur for self consumption. They do not do contract farming. Farmers are aware about price of tur but they do not get proper price from traders on account of their cash needs and lack of storage facilities. Wild animals foraging farm lands are a big problem.

In table 1.3 we present the percentage share of highest ranked districts in terms of Area, Production and Yield of the selected foodgrain crops – tur, bajra and wheat in Gujarat. Junagadh is the highest ranking district in Gujarat in terms of area, production and yield of wheat. Banaskantha holds a similar position in bajra and Vadodara in tur.

Table 1.3: District wise % Share of Area, Production and Yield of Wheat, Bajra and Tur of 3 Year Annual Average (December 2007, December 2008 and December 2009) in Gujarat

Districts	Area%	Production%	Yield Kg/ha.
Wheat			
Junagadh	14.3	19.43	3607.33
Ahmadabad	11.9	7.41	3557.67
Rajkot	7.6	10.24	3319
Kheda	5.9	5.60	2873.67
Banaskantha	5.8	5.57	2904.67
Bajra			
Banaskantha	29.3	23.3	1025
Kheda	7.9	8.3	1706.67
Mahesana	7.7	7.7	1697.33
Tur			
Vadodara	26.6	29.6	1443.67
Bharuch	16.6	13.02	1208.33
Panchmahals	10.1	15.83	1033.67

Source: CMIE

1.2 The Concepts of Marketed and Marketable Surplus

Marketable Surplus is a theoretical ex ante concept which represents the surplus which the farmer/producer has available with himself for disposal once the genuine requirements of the farmer's family consumption, payment of wages in kind, feed, seed and wastage have been met. Marketed Surplus as compared to Marketable Surplus is a practical ex-post concept and refers to

that part of the marketable surplus which is marketed by the producer i.e., not only the part which is available for disposal but that part which is made available to the market or to the disposal of the non-farm rural and urban population. The farmer, in case of commercial agriculture is motivated by profit considerations, so he takes his whole produce to the market and purchases his requirement from the market, but in the case of subsistence agriculture the concept of marketed and marketable surplus becomes relevant as the farmer generally produces for his own subsistence and it is only the remainder left after meeting his own requirements, that is taken to the market for sale. The concept of "Marketable Surplus" is subjective because the feature of retention of the farmer is a matter of subjective guess. The concept of "Marketed Surplus", on the other hand, is objective, because it refers specifically to the marketed amount i.e., to the actual quantity which enters the market.

In most cases the marketed part may be more than the theoretically marketable part because out of the marketable part the farmer may be willing to sell only a part. He may hoard part of it in anticipation of rising price of the grain or for some other reasons. In certain cases, marketed surplus may be greater than the marketable surplus. This happens when the farmers are driven to distress sales. There may be in the case of a subsistence farmer who has produced just to meet his family consumption requirements. But he may take some portion of his produce to the market to meet his immediate cash obligations. In such cases, the marketed surplus released by the farmer will not be the real one also the portion marketed will be greater than what he considers marketable because of distress sales. (Sadhu and Singh, 2002)

1.2.1 Computation of Marketable and Marketed Surplus

Marketable Surplus

It is computed by the formula A – B = MS

Where MS is Marketable Surplus, A - stands for net availability of the given crop in the year of reference and B - stands for the following items in the same year:

  i.   Consumption by the farm family,
  ii. Consumption by permanent labour engaged on the farm,
  iii. Consumption by the temporary labour occasionally employed on the farm,
  iv. Quantity retained for seed,

v.   Quantity retained as feed for farm animals,

vi.   Quantity retained for barter,

vii.   Payments in kind:

         a.   to permanent labour,

         b.   to temporary labour,

         c.   for machinery and equipment,

         d.   for customary payments,

         e.   to land owners as rent,

         f.   to land owners as share of produce,

         g.   for re-payment of loan,

         h.   land revenue,

         i.   irrigation charges, and

         j.   others.

viii.   Physical losses:

         a.   in threshing and winnowing

         b.   in transport from threshing floor to storage, and

         c.   in storage at producer's level.

Consumption by the Farm Family

The term "Consumption by the farm family" of the cultivator households has two distinct connotations in so far as its impact on marketed and marketable surplus is concerned. For marketed surplus, it refers to the quantity actually retained for consumption by the family irrespective of the actual total requirements for the purpose. For Marketable Surplus it refers to the quantity that ought to be retained by the farm family for its consumption or the quantity required for consumption.

In case of marginal and small farmers the quantity actually retained is usually less than the quantity actually required for consumption owing to the compulsions or constraints of the size of holding and production. They are, therefore, required to buy back quantities by which they fall short of their consumption requirements. They may make up the deficit with the help of borrowings, wages or gifts etc. In any case they buy back some quantities from the total stocks,

which move out of the farm. The term family consumption, in case of such farmers, therefore, denotes the quantity that ought to be retained by a farm family for its consumption requirements for the whole year.

The use of the term "Surplus" would thus be justified only if the quantity actually required for consumption, rather than the quantity actually retained for consumption is taken into account for arriving at the quantity of marketable surplus actually available for non farm consumption.

In case the quantity actually retained for consumption (and not the quantity actually required for consumption) is taken into account, the quantity calculated is the marketed surplus, that portion of production which actually enters the market, which is in this sense a gross concept including distress sales (Newman, 1977). In case of marketable surplus, instead of quantity retained for family consumption, the quantity required for consumption is taken into consideration for calculation of marketable surplus and in this sense it is a net concept subtracting distress sales and repurchases that occur therein. The quantity required for family consumption has been calculated by adding the "Quantity retained for family consumption + Quantity purchased for family consumption + Total receipts in kind for family consumption".

The marketable surplus will thus be according to the formula:

$A - B = MS$

Where A stands for production, and B includes all the items mentioned earlier except that "quantity required for consumption" has been treated to include the quantity required for "family consumption" as explained above and MS stands for "marketable surplus". This quantity is actually available for non-farm consumption and is, therefore, true Marketable Surplus.

Computation of Marketed Surplus

In case the quantity actually retained for consumption (and not the quantity actually required for consumption) is taken into account, the quantity calculated is the marketed surplus i.e., the quantity sold will include the distress sales.

The marketed surplus will thus be according to the formula:

A – B = MS

Where A stands for production and B includes all the items mentioned above apart from viii) (c) i.e., viii) Physical losses: c) In storage at producer's level. The term "Consumption by the farm family" of the cultivator households refers to the quantity actually retained for consumption by the family irrespective of the actual total requirements for the purpose.

For Accounting Purpose we have,

Marketable Surplus=Net availability of the Crop in the year – Retention including all seed, feed and wastage – Subtracting Purchases, Distress Sales and Repurchases therein.

Marketed Surplus=Net availability of the Crop in the year – Retention included seed, feed and wastage losses apart from losses at producer level – Purchases + Distress Sales (i.e., Distress Sales are included in marketed surplus also Repurchases occurring after distress sales are not subtracted from Net Availability) (Newman, 1977).

1.2.2 Factors Influencing Marketable Surplus:

The Directorate of Marketing and Inspection Report of 2002 studies this issue more deeply. The quantum of marketable surplus is influenced by the factors operating both in the pre-production and post-production stages.

Pre-production Factors

The factors operating in the pre-production stages are those which determine the level of production i.e., physical area under the crop, investment of resources including inputs, productivity of the crop, expectations of monetary returns from the sale of crop etc.

Post-production Factors

The post-production factors influencing marketable surplus are physical demand for human and animal consumption on the farm, local customs and practices regarding cash and kind payments, socio-economic conditions of the producers, price policies and price realisation etc.

Infrastructural and other Facilities

These influence production and marketable surplus and other entities in turn get reinforced or weakened by infrastructural and other facilities existing in the economy in general, and rural economy in particular. Some of these are:

i) Availability of Irrigation Facilities

It is very well known that irrigation facility influences the productivity coupled with other inputs.

ii) Connectivity by Roads

This is the most important facility for villages, particularly if these are connected by pucca all-weather roads. Absence of this connectivity becomes a handicap and a blockade in exchange between rural and urban sector. This influences the difficulties and cost of transportation, compelling sales in villages, restriction of flow of supplies to and demand from urban trade centres and increased uneconomic elements in price spread between the producers and the consumers. These drawbacks in turn lead to some of the basic pit-falls of the agricultural sector such as cropping pattern, less responsive forces of market, subsistence farming rather than market oriented farming.

iii) Distance of a Village from the Market(s)

The distance between the village and a market is one of the determinants of the type of crops to be produced and marketed in different areas. As the distance from the village to the market increases, the village goes beyond market influence and the result is subsistence farming in such villages. A longer distance with good road and quick means of transport is fairly less serious draw back than short distance without proper roads and proper means of transport.

iv) Services of Regulated Market(s)

Regulated markets provide services for fair participation on the part of the buyers and sellers by eliminating imperfections and also by eliminating malpractices. Since the regulation of market is for the benefit of the farmers or producers, it has positive impact on production and the marketable surplus, in general.

v) Storage Facilities in Village(s)

Proper storage facilities are essentially a basic need to save the produce from the physical losses caused by improper sanitation and hygiene. Improper sanitation and hygiene is instrumental for deterioration of quality due to infection of fungus, moulds and physical losses due to infection of insects and pests like rodents. Proper storage is necessary to retain the farm surplus at the producers' level for disposal at a later stage of the season when supply and demand are better placed and to recall the surplus matching with the demand of the entire season. Thus this factor also contributes to the production pattern and the marketable surplus.

From this interesting listing we can isolate the following specific factors determining marketable surplus:

1.2.3 Factors Determining Marketed Surplus

Let us analyze the factors determining marketed surplus. Srinivasan (1961) in a penetrating analysis based on his experience as a Director of Department of Marketing and Inspection of the Ministry of Agriculture lays this issue bare. Dated, it is relevant even now.

"Thus it is seen that a multitude of factors act and interact on each other in the determination of marketed surpluses of foodgrains and commercial crops throughout the country. The vagaries of weather and the usual uncertain ties and hazards associated with agriculture are accentuated by man-made measures and psychological inhibitions, customs, usages and practices without even a rationale. These add to the difficulties confronting those who have to estimate the market arrivals of crops and the marketed surpluses of the same and the retention by the producers. It is extremely difficult in working out this equation to allow for the interference of so many factors.

He has an interesting classification of factors on which marketed surplus depends. These are:
1) Whether the crops in question are food crops or industrial crops
2) The greatest single factor in the determination of marketed surplus is the retention for personal and family consumption

3) Feeding of permanent and casual labourer – payment in kind for certain operations as harvesting

4) Crop Retained for feed of live-stock

5) Retention for seed-dependent on variety to be sown, area sown under particular crop, method of sowing. Local conditions and whether the crop is sown pure or mixed with other crops

6) Standard of living – coarse grains or cereals; customs-dietary patterns; change in food habits; price and substitution

7) Transport facilities – role in marketing of a crop

8) Monetization

9) Size of holding, marketed surplus increases with size

10) Price consciousness combined with capacity to withhold produce; off farm income

11) Production of other crops including cereals

12) Need for cash by producers, including access to cooperative credit

13) Production for domestic use or for sale

14) Availability of marketing facilities

15) Total quantity produced

16) Substitution due to rise in income, or rise in prices

17) Role of government policies

18) Practice of cultivators

19) Financial position of producers

20) Condition of storage

1.3 Marketed Surplus and Marketable Surplus Concept: A Brief Literature Review

1.3.1 Relationship between Marketed Surplus and Marketable Surplus

- Marketed surplus is more than marketable surplus when the farmer retains a smaller quantity of the crop than the actual requirements for family and farm needs. It is specially true for small and marginal farmers whose need for cash is immediate (Distress Sales).

- In case of large farmers having better retention capacity or in case of fall in relative price to a competing crop leading to substitution there is retention of the crop and marketed surplus may be less than the marketable surplus.
- In case of perishable commodities and for the average farmer marketed surplus is equal to the marketable surplus (Acharya and Agarwal, 1994).

1.3.2 Relationship between Prices and Marketable Surplus

Two main hypotheses have been advanced to explain the relationship between prices and the marketable surplus of foodgrains.

1. Inverse Relationship: Mathur and Ezekiel (1961) postulate that the farmer's cash requirements are nearly fixed; and given the price level, the marketed portion of the output is determined. This implies that the farmers' consumption is a residual, this also implies that given a certain price, the marketed surplus and marketable surplus will vary inversely with the price level. This behavior assumes that farmers have inelastic cash requirements. So the given cash requirements are to be satisfied from the marketed surplus, which will decrease when the price will rise and increase when the price will fall.

The argument is that, in the poor economy of underdeveloped countries, farmers sell that amount of the output which gives them the amount of money they need to satisfy their cash requirements; they retain the balance of output for their own consumption purposes. With a rise in the prices of foodgrains, they sell a smaller quantity of foodgrains to get the cash they need and vice versa. In other words, with a rise in price farmers sell a smaller and with the fall in price, they sell a larger quantity. It has been argued (Krishnan, 1965) that the marketed surplus varies inversely with the market price. It is contended that a higher price for a subsistence crop may increase the producer's real income sufficiently to ensure that the income effect on demand for the consumption of the crop outweighs the price effect on production and consumption. So in fact there is more real income with the farmer to consume the crop as compared to the higher price leading to greater production.

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2. Positive Relationship: Krishna (1962, 1967) put forward the case for a positive relationship between prices and the marketed surplus of foodgrains in India. This relation is based on the assumption that farmers are price conscious. By farmers being more price conscious what will happen is that as prices will rise farmers will sell more and retain less. As a result there is increased surplus. The converse, too, holds true. Raj Krishna has pointed that the elasticity of the marketable surplus is not negative so long as the substitution effect is non zero. That is, when the price rises the consumer prefers competitive crop and so marketable surplus increases.

Three models to indirectly investigate the size and magnitude of the elasticity of the marketed surplus of a subsistence crop are given below.

A) Krishna model

$M = Q-C$

$E = rb-(r-1)(g+mkh)$

Where

M = Marketed Surplus of the crop

Q = Total production of the crop

C = On Farm consumption of the crop

r = Reciprocal of sales ratio (Q/M)

b = Output price elasticity of the crop

g = Consumption price elasticity of the crop.

m = Sales ratio (M/Q)

h = Consumption income elasticity

$k = PQ/L$=Ratio of the total value of production to the total net income of the producers

a) Behrman Model (1966)

$M_1 = Q_1-C_1$

$E = rb_1-(r-1)[q+kh(1+b_1)]-(r-1)hb_2(1-k)$

Where

M_1 = Marketed Surplus of Q_1

b_1 = Price Elasticity of Q_1 with respect to P_1/P_2

b_2 = Price Elasticity of Q_2 with respect to P_1/P_2 and all other notations having the same meaning as defined earlier.

c) Krishnan Model (1965)

$E_m = -(\beta - \alpha)r / 1 - r \qquad 0<r<1$

Where,

R = Proportion of output consumed on farm

β = Consumption income elasticity

α = Consumption price elasticity

Krishna starts by defining market supply as

$M \equiv Q - C$

Where M was marketed surplus of a crop,

Q its output and

C its consumption by the household.

If P denoted Relative price and I the income of the farmer, then the expression was differentiated with respect to price

$\partial M / \partial P = \partial Q / \partial P - \partial C / \partial P - \partial C / \partial I * \partial I / \partial P$

If the peasant were only a producer of the crop of concern, the increase in income due to an increase in the price of the crop would be equal to the number of units of this crop which he produced. If the peasant were only a consumer of this crop, the decrease in income would be equal to number of units he consumed. So since he is both a producer and consumer.

$\partial I / \partial P = Q - C = M$

Substituting this equation into the previous equation results in:

$\partial M / \partial P = \partial Q / \partial P - \partial C / \partial P - M * \partial C / \partial I \ \text{I}$

Rearranging the terms and multiplying by P/M we get

P/M*

$\partial M / \partial P = Q / M * P / Q * \partial Q / \partial P - (Q / M - 1)(P / C * \partial C / \partial P + M / Q * PQ / I * I / C * \partial C / \partial I)$

e = rb-(r-1)(g+mkh)

The result that Krishna obtains is,

Other things being equal, the elasticity of market supply varies inversely as the income elasticity of home consumption and the proportion of revenue from the crop to total income and inversely as the elasticity of total output and the absolute elasticity of substitution effect on home consumption.

Knowing the direction in which e is moved by the movement of each of the parameters, b, g, k and h the author found it possible to estimate the lower and upper limits of e by choosing two sets of values of these parameters such that they gave us these limits. An important element of the authors calculations was that e is never negative so long as the substitution effect is non-zero. If b is positive, albeit small, the likelihood of a perverse market supply behavior is extremely small.

The depletion of the market supplies of food crops due to crop failures is often misinterpreted as a reflection of a backward sloping market supply function. Thus if supply goes down because weather is bad it is perceived that the farmer's behavior is perverse. Krishna's analysis was a warning against such misinterpretations (Acharya and Agarwal, 1994).

Price Elasticity of the Marketed Surplus of a Subsistence Crop:
Behrman (1966) is concerned primarily with the price response of the marketed surplus of a single crop for various adjustment periods. A model is derived for the estimation of this response. The derivation of the one previous model, which was formulated by Krishna is examined. The implications of the two models for Punjabi wheat are contrasted. Finally, the model of the first section is used to provide rough estimates of the price elasticity of the marketed surplus of Thai rice.

Krishnan (1965) examines the prevalent notion of inverse relationship between price and marketable surplus. He based his analysis on Mathur and Ezekiel (1961).

The crux of the matter is that in the short-run the total supply of foodgrains is fixed. Assuming that for near-subsistence farmers the cash requirements are fixed and therefore an inverse relationship may be postulated, why should a similar assumption be made for farmers above the subsistence level? To escape from this impasse they further assume that farmers save in kind rather than money.

An algebraic expression for the elasticity of marketable surplus is derived by Krishnan (1965)

Let

$\overline{Q}$ = total output of foodgrains given in the short run (net of seed requirements etc.)

P = price of foodgrains

$Y_a = \overline{Q}P$ =income of farmers

R = proportion of output consumed by the farmers themselves

M = $\overline{Q}$ (1-r)=marketable surplus

$r\overline{Q} = F(P, \overline{Q}P)$

Let the specific form of the demand function be of the constant elasticity type.

Then,

$r\overline{Q} = AP^{-\alpha} (\overline{Q}P)^{\beta}$

$= A\overline{Q}^{\beta} P^{\beta-\alpha}$

$R = A P^{\beta-\alpha} \overline{Q}^{\beta-1}$

$M = 1\text{-r})\overline{Q} = \overline{Q} - AP^{\beta-\alpha} \overline{Q}^{\beta}$

Differentiating this equation with respect to P, we obtain

$\partial M / \partial P = -A\overline{Q}^{\beta} P^{\beta-\alpha-1} (\beta-\alpha)$

The elasticity is given by

$\partial M / \partial P * P / M = -A \overline{Q}^{\beta} P^{\beta-\alpha-1}((\beta-\alpha) * P/\overline{Q} - A\overline{Q}^{\beta} P^{\beta-\alpha}$

$= -(\beta-\alpha) A\overline{Q}^{\beta} P^{\beta-\alpha}/\overline{Q} - A \overline{Q}^{\beta} P^{\beta-\alpha}$

This can be rewritten as

$E_M = -(\beta-\alpha)$ r/1-r

In the above expression β and α are the income and price elasticity's of the farmers demand function and r is the proportion of output consumed by them.

If the price elasticity of demand is greater than the income elasticity, then the marketable surplus curve will have a positive slope. On the other hand, if the income elasticity exceeds the former, the whole expression will be negative and the marketable surplus will have a negative slope. In the latter case when the price rises, the income effect outweighs the substitution effect and therefore, own consumption increases.

The short-run nature of the phenomenon has been neglected sometimes by introducing an elasticity of supply with respect to price also into the equations. In that situation, the elasticity of the marketable surplus may become positive, if the supply elasticity outweighs the elasticity of consumption. That is if more is produced there will be more marketed surplus. Krishna (1962), for instance, introduces the elasticity of supply into the expression. Krishna also assumes a demand function for the farmer in which bulk of his income does not enter at all. He assumes that farmers consumption is a function of price and the income from the sales of the marketable surplus only. In the notation of Krishnan, his demand function is as follows:

$D=F(P, P(1-r)Q)$

Given a positive elasticity of supply and a demand function with the above variables, it is no wonder he concludes that the elasticity of marketable surplus "is never negative so long as the substitution effect is non-zero".

Bardhan (1970) concludes about marketed surplus with regard to state of development of farmers that "…. at the present stage the agricultural sector as a whole in countries like India may not necessarily market more grains during a year when grain price is going up, but this might be *less evident for relatively more prosperous regions or farmers*." And further "….our results do show that the price elasticity of marketed surplus in the short run may be negative and since this forms a part of the long-run price elasticity the value of the latter, even when positive, will be lower than otherwise. Our results also seem to indicate that the *poorer is the set of cultivators considered the more important is this possibility*."

Bardhan and Bardhan (1971) construct a time series for marketed surplus of *cereals* for India as a whole. The elasticity of marketed proportion of cereals output with respect to price of cereals relative to manufactured consumables bought by the agricultural population is positive and has a value of near unity. The elasticity with respect to price of commercial crops relative to cereals is negative and has an absolute value significantly below unity. The elasticity with respect to the technological progress parameter is negative and has an absolute value that is significantly above unity.

Chand, 1991 finds that the marketed surplus of *wheat* in Punjab showed great responsiveness to prices compared to its output supply. For *commercial crops*, the output supply and marketed surplus did not differ significantly from each other. Notwithstanding the low effect of producer and factor prices on output and market supply, their impact on net income of farmers was amazing.

Chattopadhyay and Sen (1988), came to the conclusion that the marketable surplus of any *subsistence crop* depends on the availability of cultivated land under the crop. Besides this, among the factors that permit the farmer to increase his marketable surplus the most important one is his *family size*. If the family size is big, the marketable surplus will be relatively lower, even for the big-sized farms. Per capita availability of cultivated land among the larger farms is certainly higher compared to the smaller ones, but per capita availability of land under a specific crop need not be higher in the larger *size* groups than the smaller farms. The phenomenon of marketable surplus should be examined not in terms of *size-classes* of holdings but with the acreage of individual crops separately against each size-class.

Dubey (1963) argues that proportion of agricultural production that is marketed by the peasant has been assigned a significant role in some recent analyses of problems of economic development in *underdeveloped countries*. It has been generally assumed that this proportion tends to behave in a perverse way. This neutralises some of the favourable effects of increased productivity in agriculture and creates problems of financing the growth of non-agricultural activities. In this paper an attempt is made to study the basis for this view. It must be

emphasised that the argument of this paper is not that the problem of development in *underdeveloped areas* is capable of an easy solution because the marketed surplus doctrine is not correct. Rather, the object is to show that the problem of agriculture in these countries is one of the ways and means to increase productivity and not one of combating a peasant psychology which is no longer true.

The empirical results in Medani (1975) indicate that price is a significant determinant of marketing decisions of *subsistence crops* in traditional agriculture at all phases. Estimates of price coefficients range in magnitude from one phase to the other, but no specific pattern has emerged for the distribution of these coefficients. Marketable surplus is positively associated with market price at all phases.

An attempt is made by Hati, 1976 to present certain non-linear mathematical relations between the marketable surplus of *paddy and farm-size*, as well as the marketable surplus of paddy and the net receipt of paddy. Attempt is also made to chart out a mathematical relation between the proportion of net receipt of marketable paddy and farm-size. Unlike in earlier work on this subject, what is taken note of is the marketable surplus and not the actually marketed surplus.

Dharam Narain's (1961) principal finding for the rural economy of India as a whole was that, "marketed surplus as a proportion of the value of produce declines upto 10-15 acres *size-group*, after which it records a steady 'increase". Another significant result of his study was that farms below this level and those above it account for almost equal proportions of marketed surplus. This led him to conclude that "Only half of the marketed surplus is what may be called a commercial surplus, while other half may be called a distress surplus".

Reddy (1987) carried out a study for marketable surplus of paddy by *size classes* in Andhra Pradesh whose results showed a larger proportion of marketable surplus for larger farmers. A similar study by Upender et al. (1998) in the same state had however a similar proportion marketable for all size classes. Ahmed (1999) differentiated between *fine and coarse winter paddy*, whereas Rangi (1993) and Parmod Kumar (1999) showed a very high proportion of marketed surplus of paddy for Punjab and Haryana respectively.

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Chapter 2: Gujarat Agriculture - A Macro Overview

2.1 Districts of Gujarat

The state was created in 1960 out of the 17 northern districts of the former Bombay State:

Ahmedabad, Amreli, Banaskantha, Bharuch, Bhavnagar, Dang, Jamnagar, Junagadh, Kheda, Kachchh, Mehsana, Panchmahal, Rajkot, Sabarkantha, Surat, Surendranagar, and Vadodara (Baroda).

In 1964 Gandhinagar district was formed from parts of Ahmedabad and Mehsana, and in 1966, Valsad district was split from Surat. On 2nd October, 1997 Anand district was split from Kheda, Dahod district was split from Panchmahal, Narmada district was split from Bharuch, Navsari district was split from Valsad and Porbandar district was split from Junagadh. In 2000 Patan district was formed from parts of Banaskantha and Mehsana. On 2nd October, 2007 Tapi is created as the state's 26th district. Gujarat now comprises 33 districts (Figure 1).
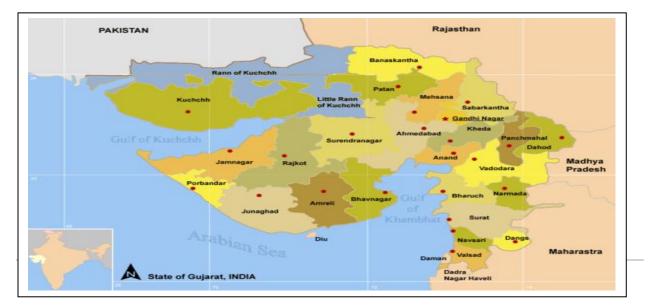
Figure 1: Map of Districts of Gujarat

2.2 State Agricultural Profile

Climate: We use the Thornthwaite classification to classify climate in Gujarat. Devised by the American climatologist and geographer C. W. Thornthwaite, this climate classification method monitors the soil water budget using evapotranspiration. It monitors the portion of total precipitation used to nourish vegetation over a certain area. It uses indices such as a humidity index and an aridity index to determine an area's moisture regime based upon its average temperature, average rainfall and average vegetation type. The moisture classification includes climatic classes with descriptors such as hyperhumid, humid, subhumid, subarid, semi-arid and arid. Humid regions experience more precipitation than evaporation each year, while arid regions experience greater evaporation than precipitation on an annual basis. In terms of the standard climatic types, tropical climates viz. sub-humid, arid and semi-arid are spread over different regions of the state. Out of total area of the state 58.60% fall under arid and semi-arid climatic zone. The arid zone contributes 24.94%, while the semi-arid zone forms 33.66% of the total area of the state. The regions in the extreme north comprising the district of Kachchh and the western parts of Banaskantha and Mehsana, the northern fringe of Saurashtra (Jamnagar) and its western part have arid climate the rest of the State has semi-arid climate. The district of Valsad, Dangs, Surat, Vadodara and Kheda in the extreme south of the State have sub-humid climate.

Agro-Climatic Zones

South Gujarat (Heavy Rainfall Area): This region includes the whole of the Dangs, parts of Valsad district and parts of Surat district which have rainfall of 1500 mm and more. The soil type is deep black with few patches of coastal alluvial, laterite and medium black soil. The crops grown are cotton, jowar, paddy, vegetables, horticultural crops and sugarcane.

South Gujarat (Moderate Rainfall Area): This region includes Parts of Valsad, Surat and Bharuch district, it has rainfall of 1000-1500 mm, the type of soil is deep black clayey soil, the crops grown are cotton, jowar, wheat, sugarcane and horticultural crops.

Middle Gujarat: This includes the areas between river Narmada and Vishwamitri including Panchmahal district, Vadodara district, part of Bharuch district and Borsad taluka of Kheda

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district. The Rainfall level is of 800-1000 mm, the soil is deep black, medium black to loamy sand. Crops grown include cotton, bajra, tobacco, pulses, wheat, paddy, maize, jowar and sugarcane.

North Gujarat: This is the area between rivers Vishwamitri and Sabarmati and part of Mehsana, Ahmedabad and Banaskantha district including whole of Sabarkantha district, part of Ahmedabad district, whole of Kheda district, whole of Mehsana district and part of Banaskatha district. The rainfall level is between 625 and 875 mm, the soil type is sandy loamy to sandy soils. Crops grown are tobacco, wheat, jowar, minor millet, vegetables, oil seeds, spices and condiments.

Bhal and Coastal Areas: This includes the area around the gulf of Khambhat and Bhal and coastal region in Bharuch and Surat districts.

Particularly,

(1) Olpad talukas of Surat district

(2) Hansot and Wagra talukas of Bharuch district

(3) Dholka and Dhandhuka talukas of Ahmedabad district

(4) Vallabhipur and Bhavnagar talukas of Bhavnagar district

(5) Limbdi talukas of Suredranagar district

Rainfall between 625 and 1000 mm, Soil is medium black, poorly drained and saline. Crops are groundnut, cotton, bajra, dry wheat, pulses and jowar.

South Saurashtra:

(1) Whole of Junagadh district

(2) Part of Bhavnagar district (Sihor, Ghogha, Savarkundla, Gariadhar, Palitana, Talaja, & Mahuva talukas)

(3) Part of Amreli district (Dhari, Kodinar, Rajula, Jafrabad, Khambha, Amreli, Babra, Lilia, Lathi & Kunkavav talukas)

4) Part of Rajkot district (Jetpur, Dhoraji, Upleta & Gondal talukas)

The rainfall level is 625-750 mm, shallow medium black calcareous soil. Crops grown are groundnut, cotton, pulses, wheat, bajra, jowar and sugarcane.

North Saurashtra:

This region includes,

(1) Whole of Jamnagar district

(2) Part of Rajkot district (Padadhari, Lodhika, Jasdan, Rajkot, Wankaner, Morvi, Jamkandorna and Kotda Sangani talukas)

(3) Part of Surendranagar district (Wadhvan, Muli, Chotila and Salya talukas) and

(4) Part of Bhavnagar district (Gadhada, Umrala and Botad talukas)

Rainfall is between 400-700 mm. The soil is shallow and medium black. The Crops grown are groundnut, cotton, wheat, bajra, jowar and sugarcane.

North West Zone:

This region includes,

(1) Whole of Kachchh district

(2) Malia taluka of Rajkot district

(3) Halvad, Dhrangadhra and Dasada talukas of Surendranagar district

(4) Sami, Harij and Chanasma talukas of Mehsana district

(5) Santalpur, Radhanpur, Kankrej, Diyodar Vav and Tharad talukas of Banaskantha district and

(6) Viramgam and Daskroi city of Ahmedabad district.

The level of rainfall is 250-500 mm. With the type of soils being sandy and saline, the crops grown are cotton, jowar, groundnut, bajra and wheat.

Table 2.1: Agro Climatic Regions of Gujarat

Region	District	Rainfall in mm	Climate	Soils
Southern Hills	Dangs, Valsad	1793	Semi arid, dry sub humid	Deep black coastal alluvium
Southern Gujarat	Surat, Bharuch	974	Semi arid, dry sub humid	Deep black coastal alluvium
Middle Gujarat	Baroda, Kheda, Panchmahals	904	Semi arid	Medium black
North Gujarat	Ahmedabad, Gandhinagar, Mehsana, Sabarkantha, Banaskantha	735	Arid to semi arid	Gray brown coastal alluvium
North West	Kachchh	340	Arid	Gray brown deltaic alluvium
North Saurashtra	Amreli, Bhavnagar, Jamnagar, Rajkot, Surendrangar	537	Semi arid	Medium black calcareous
South Saurashtra	Junagadh	844	Dry sub humid	Coastal alluvium, medium black

(Source: Website of Government of Gujarat, State Agricultural Profile. Department of Agriculture and Cooperation, Government of Gujarat.)

Brief description of Agro Climatic Regions of Gujarat is presented in table 2.1.

2.3 Structural Transformation of the State Agricultural Economy

The growth experience of Gujarat during the pre-reform period of 1980-92 and the reform period of 1991-2004 is described below.

Identifying strengths and weaknesses, Gujarat was not a better performing state than the nation in terms of economic growth during the 1980s. It lagged behind the nation in almost all sectors. However, with increased speed of economic policy reforms in the post 1991-92 period, Gujarat improved in its growth performance remarkably. If growth acceleration in the post 1991-92 period is attributed to economic policy reforms at the national level, it is obvious that Gujarat has benefited from such reforms much more than other states. (Dholakia 2007)

The share of agriculture in the state economy vis-à-vis other sectors in Gujarat has been low. It is not just recently that the state of Gujarat has been considered a high growth state, its performance has always been better than the all-India in terms of economic growth.

Emphasis on development of commercial crops in the state has not resulted in higher incomes in the agricultural sector itself. There is therefore need for public investment in agriculture, in order to improve both productivity and incomes in the sector.

The share of the primary sector in state GDP had fallen to 19% by 1999-2000 and this low proportion continued thereafter. This is a result of a decline in the absolute level of real agricultural output in the years following 1999-2000 and a simultaneous increase in output in the secondary and tertiary sectors.

While in India as a whole it is the services sector that has grown the fastest, the secondary sector has shown the most rapid growth in Gujarat.

On the other hand, the share of the tertiary sector in 2005-06 was 41.87%, lower than the 50% share of the sector at the all-India level.

The share of the primary as well as the secondary sectors is highly fluctuating in the state as compared to the all-India situation. The most obvious trend is the sharply declining one of the primary sector. The high fluctuations in the shares of the primary and secondary sectors are reflected in higher variance values in Gujarat than for the all-India data.

Prices have moved in favor of the agricultural sector. However, per capita income in the primary sector has always been the lowest of all three sectors. In the 1990s, the agricultural sector developed a closer relation with the secondary and tertiary sectors, from which it had been historically isolated in the state. The agricultural sector's role in an economy may be to provide agro-industrial inputs and/or wage goods (mainly foodgrains). Cotton, oilseeds and tobacco are especially important in the state. The share of high-value crops such as spices, fruit and vegetables in total output has increased after 1990-91. Agriculture's role not as a wage good, but

as a provider of industrial inputs becomes evident in the increased correlation between the agricultural and industrial sectors. This has however changed since 2002.

While demand from the secondary and tertiary sectors increased, demand from within the primary sector stagnated with declining incomes. The policy emphasis on agro-industry and commercial crops has not succeeded in increasing overall income of the primary sector. The agricultural sector has served to fuel economic growth in other sectors, but that economic growth has not fed into the sector itself.

After the 1980s the Gujarat economy has progressed to the second stage of economic growth. However, the integral relationship between the agricultural and non-agricultural sectors still continues. The increased integration of the agricultural sector into the economy in the 1990s is likely to have been based on increased demand for agricultural inputs useful for agro-industry rather than on increased demand for wage goods. The years of the present decade are marked by an explosive growth in the agricultural sector. However downturns in production still occur almost every alternate year.

In these circumstances, a vision of the agricultural sector as a dynamic sector and a sustained source of industrial growth, seems premature unless adequate steps are taken to weatherproof production. In light of the low relative incomes in the sector, there is a significant constraint on private investment in agriculture. This task will have to be undertaken through public investment.

A second and most important area of concern is that the agricultural sector, in spite of its relatively small contribution to state income, still continues to employ the largest proportion of workers. The sector is characterized by two trends – a rising agricultural price ratio and a declining per worker income level. These indicate that the higher relative agricultural prices have benefited a selective few farmers but not the majority in the agricultural sector. The orientation of the Agro Vision document is towards refocusing the agricultural sector as an industrial input provider, but this vision ignores the distributive aspect within the sector. Dynamic agricultural growth based on commercial crops – if stabilized and weatherproofed with the help of

irrigation – can be a source of increased incomes within the sector, but special efforts have to be made to see to it that the benefits of this growth are spread evenly within the sector. (Dixit 2009)

When we observe the table 2.2, we realize that Agriculture's share in National Income has been falling this decade in Gujarat.

Table 2.2: Sectoral Break-up of GSDP at Factor Cost at Constant (2004-05) Prices % of GSDP: Gujarat: 2008 to 2011, India 2008 to 2011

Sector	3 year average 2008-11, Gujarat	3 year average 2008-11, India
Gross State Domestic Product (GSDP)	**100**	**100**
Agriculture, forestry and fishing	12.8	14.4
Industry	41.1	28.3
Services	46.1	57.6

Source: CMIE Database

Clearly the share of services in Gujarat is lower than the rest of India and Industry is dominant in Gujarat, comparatively.

2.4 Features of Growth of Crop Agriculture in Gujarat

Gujarat is significant in terms of area sown at the National Level in bajra, maize, tur, onions, cabbages, brinjal and okra, bananas, papaya, chiku, groundnut, castor, til, cotton seed, fennel, cumin, fenugreek, ajwain, garlic, cotton and tobacco.

At the state level, the following crops are dominant in terms of area: rice, wheat, bajra, maize, potatoes, groundnut, cotton seed and cotton.

And in terms of Production at the National level the production of the following crops in Gujarat is significant: Bajra, Tur, Onions, Brinjal, Okra, Bananas, Papaya, Chiku, Groundnut, Castor, Til, Cottonseed, Fennel, Cumin, Fenugreek, Ajwain, Garlic, Cotton, Tobacco. Cropping pattern of Gujarat is shown in table 2.3.

Table 2.3: Cropping Pattern in Gujarat (Average Area and Production)

Crops	Gross area sown average 2001-02 to 2010-11 of particular crop as % of All-India gross area sown of this crop average 2001-02 to 2010-11	Gross area sown average 2001-02 to 2010-11 of particular crop as% of state gross area sown average 2001-02 to 2010-11	Production average 2001-02 to 2010-11 of particular crop as % of All India production of this crop average 2001-02 to 2010-11
Foodgrains	3.25	34.81	2.84
Cereals	3.19	27.77	2.77
Rice	1.59	6.05	1.36
Wheat	3.28	7.85	3.15
Coarse Cereals	5.51	13.88	5.59
Jowar	1.81	1.35	2.22
Bajra	9.58	7.85	13.46
Maize	6.29	4.21	4.23
Ragi	1.45		0.91
Small Millets	3.46		6.12
Pulses	3.5	7.04	3.86
Tur	7.92	2.48	9.84
Gram	2	1.27	2.15
Other Pulses	3.09	3.28	3.06
Vegetables, Roots and Tubers	5.27	0.91	5.61
Potatoes	2.96	3.56	4.03
Tomatoes	5.08		6.62
Onions and Other Vegetables	8.68		13.36
Onions	7.63		14.7
Edible Brassicas	6.67		5.79
Cabbages	7.83		6.36
Cauliflowers	5.53		5.27
Other Vegetables	5.56	1.41	4.99
Brinjal	10.51		10.31
Okra	10.64		9.26
Bananas	8.38		13.68
Guavas	4.58		6.21
Mango	5.04		5.48
Citrus Fruits	4.13		4.71
Papaya	14.31		18.82
Other Fruits	5.64		7.52
Chiku	17.48		20.38

Pomengranates	4.07		5.94
Major Oilseeds	11.37	25.52	14.89
Groundnut	31.32	16.75	36.52
Rapeseed and Mustard	4.49	2.35	5.77
Castor	46.24	3.09	70.88
Sesamum (Til)	18.77	2.88	20.2
Cotton Seed	22.99	17.12	29.64
Spices and Condiments	13.47	3.42	11.38
Fennel Seed	81.29		89.04
Cumin Seed	51.45	1.69	55.14
Ginger	1.71		1.1
Fenugreek Seed	11.67		11.84
Chillies	1.16		
Ajwain	21.71		29.27
Garlic	16.1		22.63
Cotton	22.99	17.12	29.64
Sugarcane	4.39	1.7	4.83
Tobacco	19.2		21.66
All Crops	6.54	100	

Source-CMIE Database

Up to early-1990s, *bajra* (pearl millet) and *jowar* (sorghum) were the main foodgrain crops, and cotton and groundnut were the main non-food crops. Area under cereals has declined from around 3600 thousand hectare in 1990-91 to 3400 thousand hectare in the period 2006-11. Area share of *bajra* that had remained constant at around 13% till early-1990s has reduced to half in TE 2009-10. Similarly, area under *jowar* declined from 6.2% of GCA to only 1.3% during this period. On the other hand, average area under wheat has more than doubled, from 5.7 lakh ha in TE 1992-93 to nearly 11 lakh ha in TE 2009-10 and now shares 34% of the total cereal area. Area under rice has remained more or less stable at 5 to 6% of the GCA. Acreage under groundnut that was 18 to 19% of GCA throughout the 1980s, has declined to 15.8% in the recent period. Substantial shifts in area under cotton have been witnessed during the post-reforms period, its share has improved considerably.

The share of cotton has reached 20.5% by TE 2009-10. About 12.2 lakh ha of area has been diverted from other crops, mainly coarse cereals and pulses, towards cotton in the post-reform period.

Cropping pattern in the state has changed in favor of superior, more remunerative cereals like wheat and high-value crops such as oilseeds, cotton, spices, fruits and vegetables, floricultural and medicinal plants. Groundnut and cotton, being the main cash crops, have retained their dominant position in the cropping pattern. Area under coarse cereals has declined because of their lack of competitiveness over other crops. On the other hand, area under oilseeds such as castor, mustard and sesame has expanded significantly. In the recent period cotton is rising fast.

2.5 Recent Trends in Agricultural Production

Among the major food crops, the yield growth of *bajra* (at 2.3%) between 2001 and 2010 could not offset the declining acreage under it. The process of replacement of *bajra* by other crops gained momentum after 2000-01 (-4.53%) and is responsible for the entire fall in its output (at -2.3%). *Jowar* also recorded a decline in area growth (-0.53%). The production of *jowar* has also shown an upward trend despite productivity registering a slowdown after 2000.

Table 2.4 summarizes the trends in area, production and yield for major crop cultivated in Gujarat.

Area under wheat has shown a statistically significant and phenomenal growth rate (10.7%) after 2000-01 and production has recorded an increase of 12.5% per year. Yield levels have also improved significantly after 2000-01 (at 2.4% per annum) contributing to the unprecedented rise in its output.

Production of pulses during 2000-01 to 2010-11 has increased at the annual rate of 7.3% (statistically significant). While the growth rate of area was modest at 1.6%, its productivity showed a considerable breakthrough rising at 6%. Among other food crops, potato, fruits & vegetables and spices (mainly chilly) have registered fairly high growth rates.

The annual growth rates for spices from 1990-91 onwards were modest. After 2000-01, the growth rate for spices was as high as 19.3%. Output of potato has nearly doubled in the post liberalization phase. Gujarat is a major groundnut-producing state; its average contribution to the total production in the country is 37%. In the post-liberalization phase, even though groundnut acreage is facing stagnation or replacement by other crops, its yield performance is better owing to several years of good rainfall that facilitates early sowing. Overall, the output of oilseeds in Gujarat is growing at a high rate of 4.1% almost entirely driven by the productivity growth (4.8%).

Cotton is currently the single most important nonfood crop of Gujarat. There has been a marked improvement in cotton production in post-liberalization phase. After 2000-01, area under cotton increased at the rate of 5.3% and its productivity grew at 11.4%. During the period 2000-01 to 2010-11, growths in area and productivity have combined to cause production growth rate of 15.4%. The single most important factor driving this growth is the widespread adoption of Bt cotton.

Tobacco is a minor crop in the Gujarat economy (claiming less than 1% of gross cropped area), but is an important crop for the districts of Central Gujarat. The average productivity of tobacco is decreasing steadily.

The growth performance for major crops reveals that the post-liberalization phase was marked by improvements in yield levels for all the major food crops, groundnut and cotton. Foodgrains as a category recorded a decline in acreage up to 2000-01. Between 2001 and 2010, the share of foodgrain area in gross cropped area stabilised at around 34%. While *bajra, jowar* and maize recorded a decline in acreage growth, wheat area expanded very rapidly (estimated to be 10.7% annually) that arrested the falling importance of foodgrains in the agricultural economy of the state. Commercialization process and crop diversification towards non-food crops (cotton, spices, horticulture) are positive developments. Castor and sesame besides groundnut are the other commercial crops that are amenable to processing and have expanding domestic and global demand (Mehta 2012).

Table 2.4: Trend of Shift in Area, Production and Productivity in Gujarat

(A= Area in lakh ha, P= Production in lakh M.T., Y= Yield Kg./ha.)

Crop		1961-70 (Av.)	1971-80 (Av.)	1981-90 (Av.)	1991-2000 (Av.)	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
Cereals	A	44.62	44	41.56	36.54	29.75	30.8	30.2	32	29.5	31.9	34.2
	P	24.88	36.07	42.05	46.48	29.36	48.3	40.3	59.5	46.7	57.2	71.3
	Y	558	820	1011	1272	986	1567	1335	1496	1583	1795	2085
Pulses	A	4.79	5.44	8.76	8.98	7.42	7.79	7.49	8.33	7.1	8.06	9.42
	P	1.68	2.35	5.18	5.65	2.49	4.22	3.66	6.22	4.81	5.87	7.58
	Y	350	432	591	629	336	542	489	747	678	728	804
Oilseeds	A	22.24	22.24	25.8	29.05	28.6	28.6	29	29.7	29.8	30	33.7
	P	12.54	17.5	21.33	27.85	17.38	37.5	18.8	56.6	29	44.9	49.9
	Y	563	787	827	959	608	1309	648	1907	973	1496	1484
Cotton	A	17.39	19.05	13.1	13.86	16.75	17.4	16.7	16.4	29.8	20.8	20.3
	P	15.48	19.46	16.18	23.86	12.83	16.8	18.8	40.3	29	73.8	75
	Y	151	174	210	293	130	165	191	417	165	604	627
Tobacco	A	0.89	0.99	1.25	1.39	1.13	1.1	1.28	0.68	0.71	1.14	1.03
	P	0.82	1.51	2.08	2.42	1.86	1.79	2.27	1.25	1.14	2.09	1.98
	Y	921	1525	1664	1741	1653	1621	1767	1831	1597	1833	1922
Sugarcane (Jaggery)	A	0.31	0.6	1.2	2.05	2.57	2.66	2.52	1.76	1.97	1.97	1.89
	P	1.78	4.05	8.59	15.75	18.18	17.1	17.6	12.7	14.6	14.6	14.6
	Y	5741	6750	7158	7682	7073	6407	6966	7182	7407	7407	7740

Source: Website of Agriculture and Cooperation Department, Government of Gujarat

Chapter 3: Empirical Analysis

3.1 Sample Farmer Profile

As a prerequisite to our main analysis, it remains customary to briefly describe some characteristic features of the sample households we deal with in this study, which in turn facilitates greater understanding of the socio-economic backdrop of the population. Table 3.1 describes general characteristics of the sample households. An interesting characteristic we observe is that the average age of the decision-maker is close to 50, this clearly shows that as with general census households farming families are headed in this area by middle aged males. Marginal farmers head of the household is even older at 62 years. The fact that farm household size is more than 4-5 persons as in the census implies that family is not nuclear but is larger. The average size is 6.7. The size of households of marginal and large farms is above 7. Large farmers can support a large family size. Marginal farmers have a low land base but the family members depend on agriculture. The main occupation is crop farming throughout and dairying dominates as a subsidiary occupation (86%) with service (4.6%), farm labor (1.85%) and others (7.4%) also being subsidiary occupations. Dairying is a subsidiary and important occupation in rural India now and this is particularly true for Gujarat. This is more so for Central Gujarat and districts like Kheda and Vadodara as compared to districts in Saurashtra. There are also areas where in migration of farm labor from the tribal districts of Eastern and Southern Gujarat and Maharashtra is common, hence smaller farm labor enumeration at household level.

As would be expected years of schooling increase with family size. There are more males than females in the families. In terms of caste composition general category predominates, followed by OBC and then SC, in fact the general category proportion is much higher in large farms which would imply operational ownership of landed property by the upper castes in most prosperous tracts in Gujarat, though this requires further detailed study to confirm the phenomena.

Table 3.1: Characteristics of Sampled Farmers

Characteristics↓ Categories →	Marginal	Small	Medium	Large	All Farms
Average Age of decision maker (yrs)	62	49.92	48.79	47.58	48.9
Subsidiary Occupation					
Dairy%					86.11
Service%					4.629
Farm labor%					1.85
Others.%					7.41
Education(years of schooling)	6.35	7.8	8.15	9.53	8.61
Family Size (no.)	7.14	5.88	6.53	7.01	6.70
Males	3.92	3.11	3.52	3.63	3.55
Females	3.21	2.77	2.91	3	2.95
Social Grouping					
SC %					9.74
ST %					1.11
OBC %					33.14
General %					55.15
Others %					.8
All %	1.39	7.52	50.97	40.11	100

Operational Holding Characteristics

Our study shows that irrigation provision by Sardar Sarovar Project (SSP) has led to a major trend of what is called reverse tenancy. Smaller farmers have leased out land to larger farmers. More than 90% of the operational holdings are irrigated as parts of the study fall in the command area of the Narmada Project. This area has moderate rainfall and has alternate sources for irrigation, also investment has been made for irrigation sources. Since the districts chosen are in those areas of Gujarat like Vadodara and Kheda which fall under the Narmada command or are otherwise having access to some irrigation sources a very large proportion of the land is irrigated. Broadly only leasing in is seen (very little leasing out) and all this leased in land is irrigated, this seems obvious because only irrigated land would be leased in. Clearly the land that entered into the lease market (leased-in land) has come out from small farmers in irrigated tracts. Table 3.2 is a descriptive statistics of operational land holding pattern for the sample. Large farm households lease in 2.59 hectares of irrigated land per household, as compared to 1.23 hectares

per household for all households. This is also understandable considering fact that the irrigated tracts will have a greater demand in the lease market as compared to un-irrigated tracts. This is an area of what is called 'reverse tenancy'. In other words smaller farmers lease out land to middle and large farms and join the landless labour force. It is to be noted in this context that against popular belief, the larger farms in these highly productive land stretches are observed to lease-in land instead of leasing-out, which in turn indicates towards development of capitalist type of farming on large plots of land. Ever since B. B. Patel's well known study in the Seventies, it is well known that leasing in is a major characteristic of the reorganization of land in Gujarat. This has been accentuated by SSP. This requires further study. The study also shows that medium and large farms which dominate this study also cultivate the largest proportion of operational holding. The study has 5 marginal farmers, 27 small farmers, 183 medium farmers and 144 large farmers. (Note, here that some of the bajra and wheat households are common thus explaining the distribution across sample sizes in the below table aggregating to greater than total sample size.) We also observe the distribution of farmers by size class across crops reflects this larger farmer bias in our sample.

Table 3.2: Average Operational Holding Characteristics (Average Per Household in Hectare)

Overall

Categories	No. of Farmers	Owned Land		Leased in		Leased out		Operational Holding	
		Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated
Marginal	5	0.43	0.27	0	0	0	0	0.43	0.27
Small	27	1.3	0.14	0	0	0	0	1.21	0.09
Medium	183	4.5	0.64	0.38	0.03	0.01	0.08	4.73	0.45
Large	144	15.28	2.2	2.59	0	0.14	0	17.61	2.11
All Farms	359	8.53	1.22	1.23	0.02	0.06	0.04	9.57	1.09

Tur

Categories	No. of Farmers	Owned Land		Leased in		Leased out		Operational Holding	
		Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated
Marginal	3	0.27	0.44	0	0	0	0	0.27	0.44
Small	10	1.07	0.37	0	0	0	0	1.07	0.24
Medium	43	3.24	1.79	0.83	0.13	0	0.33	3.87	1.19
Large	44	14.5	2.52	4.06	0	0.23	0	17.95	2.35
All Farms	100	7.89	1.93	2.14	0.05	0.1	0.14	9.68	1.58

Wheat

Categories	No. of Farmers	Owned Land		Leased in		Leased out		Operational Holding	
		Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated
Marginal	2	0.66	0	0	0	0	0	0.66	0
Small	14	1.44	0	0	0	0	0	1.3	0
Medium	95	4.89	0.28	0.24	0	0.02	0	4.99	0.22
Large	69	15.62	2.06	1.94	0	0.1	0	17.46	2
All farms	259	8.77	0.95	0.88	0	0.05	0	9.53	0.89

Bajra

Categories	No. of Farmers	Owned Land		Leased in		Leased out		Operational Holding	
		Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated
Marginal	2	0.66	0	0	0	0	0	0.66	0
Small	17	1.44	0	0	0	0	0	1.3	0
Medium	107	4.48	0.36	0.31	0	0.03	0	4.62	0.29
Large	53	14.23	1.76	1.51	0	0.19	0	15.55	1.7
All farms	179	7.04	0.74	0.63	0	0.07	0	7.5	0.68

Medium and large farmers have leased in more irrigated land, what we described as reverse tenancy.

Area

In terms of percentage of gross cropped area, cotton (12.63%) is a major crop during kharif and wheat (21.84%) in rabi season. Paddy and vegetables are other important crops grown in kharif season. Area is also being allocated to other crops like tobacco and potato. As far as Rabi season is concerned wheat is grown on 21.84% of the land. This is traditionally an area where paddy and wheat farming was giving way to oilseeds and commercial crops. SSP seems to have made the return to paddy and wheat. SSP water is at the present stage uncontrolled at the delivery level and flood irrigation leads to paddy and wheat farming dominating. Cotton farming as we saw in the earlier sections on Gujarat agriculture has been very successful on account of the new Bt technology and it has spearheaded Gujarat's agricultural growth in the last decade and a half. Marginal farmers only grow paddy, other cereals and pulses, which is expected from the subsistence nature of activity in very small holdings.

Table 3.3: Cropping Pattern: Area (ha)

Crops ↓ Categories →	Marginal	Small	Medium	Large	All Farms
Kharif					
Paddy	0.12	1.64	46.73	43.46	91.95
% to GCA	2.83	7.99	8.47	3.59	5.15
Other Cereals	1.38	4.93	105.98	95.53	207.83
% to GCA	33.37	24.06	19.21	7.89	11.63
Pulses	0.52	3.03	28.39	76.35	108.30
% to GCA	12.59	14.76	5.15	6.31	6.06
Oilseeds		0.58	32.06	83.85	116.49
% to GCA		2.82	5.81	6.93	6.52
Cotton		0.81	39.04	185.85	225.69
% to GCA		3.95	7.08	15.35	12.63
Vegetables		0.00	5.50	14.10	19.61
% to GCA		0.00	1.00	1.16	1.10
Other crops		0.46	80.19	255.65	336.31
% to GCA		2.25	14.54	21.12	18.82
Rabi					
Wheat		1.74	88.24	300.26	390.23
% to GCA		8.47	15.99	24.80	21.84

Oilseeds, cotton, vegetables and fruits are all grown largely on medium and large farms. Commercialization is therefore more in such farms.

Production

Output outcomes follow from area allocations, particularly of irrigated area. Sardar Sarovar canal irrigation has also led to a resurgence of kharif paddy.

Table 3.4: Cropping Pattern: Total Production in Each Size Category (Qtl.)

Crops ↓ Categories →	Marginal	Small	Medium	Large	All Farms
Kharif					
Paddy	1.0	56.0	1884.2	1321.0	3262.2
Other Cereals	18.0	13.6	483.0	396.0	910.6
Pulses	9.2	15.3	215.1	756.6	996.1
Oilseeds		10.4	483.8	1266.2	1760.4
Cotton		7.6	659.0	3165.9	3832.5
Other crops		5.0	866.8	5836.4	6708.2
Rabi – Wheat		53.6	2590.6	6070.0	8714.2
Summer – Bajra	10.4	110.4	2039	3133	5292.8

Major output consequences are in medium and large farms, taking the agricultural year as a whole, wheat emerges in quantity terms as the largest crop. Marginal farms in our sample don't grow wheat. Small farms grow 53.6 qtl, but large farms grow 6070 qtl and medium farms 2590.6 qtl. This is noteworthy, because cereals were falling as a proportion of Gujarat agriculture in earlier decades. SSP has as we have shown led to this reversal. Small farms grow only 7.6 qtl of cotton as compared to 659 qtl by medium farms and 3165.9 qtl from large farms. SSP has as we have shown led to this reversal (Table 3.4). The next story is cotton which is the powerful story of a technology led star performance. Groundnut was an important crop in Gujarat and Castor too in the nineties.

Table 3.5: Production (Values in Quintal Per Hectare)

Crops ↓ Categories →	Marginal	Small	Medium	Large	All Farms
Kharif					
Paddy		34.175	40.320	30.394	35.478
Other Cereals		2.757	4.557	4.145	4.382
Pulses		5.039	7.574	9.909	9.198
Oilseeds		17.975	15.090	15.101	15.112
Cotton		9.392	16.882	17.035	16.981
Other crops		10.840	10.809	22.829	19.947
Rabi - wheat		30.880	29.359	20.216	22.331
Summer - bajra		28.936	28.118	33.794	31.108

Generally across farm size categories, yield tends to not fluctuate too much. It is interesting that the relation between farm size and productivity still shows that in some crops small farms hold out in their performance. This aspect will be studied more in the econometric analysis of this study.

Source of Irrigation

Electric tube wells are the major source of irrigation, in some areas there is irrigation with diesel tube wells and bore wells area also used for irrigation. This shows that there is sufficient supply of electricity for irrigation. Our sample shows that investment in tube wells is high. There is a great thrust for water in Gujarat agriculture and this continues with SSP water. There are many areas of over exploitation and what are called 'grey areas' in our sample areas. Since SSP water supply is not controlled, paddy cultivation is with canal water. If the farmer is a tail ender in the

canal and gets little water, tur is cultivated instead of paddy. In Table 3.6 sources of irrigation are shown.

Table 3.6: Source of Irrigation (Crop Wise and Source Wise Distribution of Irrigated Area in Different Size Classes) % Area under Irrigation

Crops ↓ Categories →	Marginal	Small	Medium	Large	All Farms
Kharif - Paddy					
Canal	0.00	0.00	11.44	2.64	7.40
Electric tube-well	0.00	71.60	88.04	94.07	90.32
Bore well	0.00	0.00	1.56	3.29	2.28
Others	0.00	28.40	4.42	0.00	2.99
Kharif - Other Cereals					
Canal	0.00	2.57	4.59	1.60	3.16
Electric tube-well	15.81	44.24	85.01	95.48	89.13
Bore well	84.19	36.70	5.95	2.65	5.05
Kharif - Pulses					
Canal	0.00	7.93	40.58	17.23	22.64
Electric tube-well	100.00	29.90	40.85	28.99	31.96
Bore well	0.00	50.21	22.53	36.39	33.41
Others	0.00	11.96	10.95	4.87	6.58

Farm Machinery

Use of farm machines is constrained by considerations of profitability, a large amount of expenditure on tractors, tube wells and threshing machines was seen by farmers in these areas, indicating prosperity. High Expense on an average on tractors and tubewells is seen, indicating sufficient purchase and use by medium and large farmers. Table 3.7 shows use of machinery for the sample households.

Table 3.7: Farm Machinery (Average Investment of Different Machinery per Household and Hectare in Rs.)

Categories→ Crops ↓	Average Investment per Farm (Rs.)			Average Investment per Hectare (Rs.)		
Farm Class	Tractors	Threshing Machine	Tube Well	Tractors	Threshing Machine	Tube Well
Marginal	0	0	20000	0	0	28818
Small	0	0	24074	0	0	18487
Medium	62502	7180	81530	12069	1386	15743
Large	183006	10444	160416	9281	529	8135
All Farms	105267	7849	107994	9878	736	10134

Livestock

Maintaining cattle/buffalo is not a viable proposition for the smaller farms, as their use has become extremely confined in the face of competition from tractors under modern cultivation practices. Livestock and fodder costs have also become high.

Across all size classes, livestock other than cattle/buffalo is not kept, as the average number of ruminants is quite low which confirms their prohibitive costs.

Across all sizes Farmer households have large per hectare cattle holding since dairying is a major source of livelihood. Of course medium and large farms have larger herd size. Small farms maintain much larger herd size in relation to their land holding. Livestock per household in large farms is high this is a feature which results naturally in societies where number of cattle owned is seen as a sign of wealth. Table 3.8 shows livestock per household and per hectare among different categories of farmers.

Table 3.8: Farm Size and Livestock

Livestock → Farm Class ↓	Cattle (per hh)	Cattle (per hectare)	Buffalo (per hh)	Buffalo (per hectare)	Others (per hh)	Others (per hectare)
Marginal	0.20	0.29	1.40	2.02	0.00	0.00
Small	0.89	0.68	0.89	0.68	0.33	0.26
Medium	1.43	0.28	1.50	0.29	0.16	0.03
Large	2.09	0.11	2.97	0.15	0.37	0.02
All Farms	1.64	0.15	2.04	0.19	0.25	0.02

Sale Price

Pulses have a sale price of above 3200/qtl except small farms which is lower than 3000/qtl., Oilseeds also have the same range of sale price/qtl. With small farmers selling at 3000/qtl. Cotton across farm size sells at above 3700/qtl. Vegetables sell for about ten times as much though there is variation in the price across and within size classes. Kharif paddy sells for around Rs 1000/qtl. Rabi wheat sells for more than Rs 1000/qtl. Small farmers get lower prices around 10 to 25% lower than large farmers. There are exceptions in data like in vegetables where medium farmers seem to be growing higher value added vegetables and large farmers, low value added. The major features which emerge are the better terms received in the market by medium

and large farmers. The impression that in Gujarat cooperative institutions lead to improved terms for small and marginal farms is not borne out by this study. Table 3.9 briefly explains Average Sale Price for different produces among the sample.

Table 3.9: Average Sale Price (Rs/qtl) Received for Different Crops

Crops ↓ Categories →	Marginal	Small	Medium	Large	All Farms
Kharif					
Paddy		938	998	1212	1051
Pulses*	3000	2783	3379	3226	3262
Oilseeds		3000	3207	3275	3233
Cotton		3863	3743	4002	3899
Vegetables			47156	5818	24420
Other crops		5500	3163	3025	3110
Rabi - Wheat		1019	1099	1167	1124

 *For marginal category Rs.3000/qtl

Production and Availability of Crop by Farm Size

For all crops there is hardly any beginning stock per household at an average, the larger two farm sizes have higher average production in the season, i.e., large farmers produce more. Production clearly rises with farm size. In tur medium farmers grow 9.41 qtl per household and large farmer household grow 16.73 qtl. In wheat these figures are 24.04 qtl and 76.12 qtl respectively. Bajra is grown by marginal farms but only 9.46 qtl per household. The numbers for small households are slightly higher at 11.76 qtls but those of medium farms are 27.78 qtl and of large farm households 81.41 qtl (Table 3.10).

Table 3.10: Availability of Crop by Farm Size

(in qntls/hh)

Crop	Farm Size	Average Beginning Stock	Average Production	Net Average Availability
Tur	Marginal	0.00	3.16	3.16
	Small	0.00	2.07	2.07
	Medium	0.03	9.41	9.44
	Large	0.48	16.73	17.21
	All farms	0.23	11.66	11.88
Wheat	Marginal	0.00	0.00	0.00
	Small	0.00	6.91	6.91
	Medium	0.06	24.04	24.1
	Large	0.40	76.12	76.52
	All farms	0.20	45.03	45.22

Bajra	Marginal	0.00	9.46	9.46
	Small	0.00	11.78	11.78
	Medium	0.10	27.78	27.88
	Large	0.01	81.41	80.56
	All farms	0.06	42.10	41.90

Sale Pattern and Realised Price of Selected Crops:

Purchase Agencies and the Share they buy from Size Class of Farms

Average sale is approximately 7 quintals for tur, 46 quintals for wheat and 40 quintals for bajra. Tur sales are 1 to approximately 2qtl per farm for marginal and small farms. These are 4.09 and 10.85 for medium and large farm households. In wheat the differences are more. Small farms sell 3.6 qtl per household but medium farms 22.85 qtl and large farm households 73.47qtl.

Sales are generally to private trader/money lender and increase monotonically by size. Average price received per quintal by private trader is Rs 2500-3500 in tur, Rs 880-1100 in wheat and Rs 500-800 in bajra. The processor or millers and private companies work on a commission basis in processing dals (Table 3.11).

Table 3.11: Sale Pattern and Realised Price of Selected Crops

Farm Class	Average Sale in qtl. per farm	Percentage of Sales			Avg. price received by farmer		
		Pvt. Trader / Money lender	Processor/ Miller	Pvt. Company	Pvt. Trader / Money lender	Processor/ Miller	Pvt. Company
Tur							
Marginal	2.4	100.00	0.00	0.00	2750.00		
Small	1.02	100.00	0.00	0.00	3550.00		
Medium	4.09	85.67	0.46	13.87	3165.63	2800.00	3450.00
Large	10.85	82.16	2.05	15.79	3140.00	3800.00	2866.67
All farms	6.71	83.54	1.59	14.88	3150.00	3300.00	3012.50

Farm Class	Average Sale in qtl. per farm	Percentage of Sales			Avg. price received by farmer		
		Pvt. Trader / Money lender	Processor/ Miller	Pvt. Company	Pvt. Trader / Money lender	Processor/ Miller	Pvt. Company
Wheat							
Marginal	0.00	0.00	0.00	0.00			
Small	3.60	100.00	0.00	0.00	1100.00		
Medium	22.85	85.60	2.40	0.12	1098.33	1000	1000
Large	73.47	69.88	23.82	0.72	1153.24	1275	1000
All farms	45.40	73.94	18.32	0.56	1124.17	1137.5	1000

Farm Class	Average Sale in qtl. per farm	Percentage of Sales			Avg. price received by farmer		
		Govt Agent	Processor/ Miller	Pvt. Company	Govt.Agents	Pvt. Trader / Money lender	Pvt.Comp any
Bajra							
Marginal	6.00	0.00	0.00	100.00	-	-	1100
Small	8.98	3.34	96.66	0.00	1200.00	850.00	-
Medium	24.43	22.22	69.85	7.94	950.00	917.35	912.5
Large	72.60	52.64	47.36	0.00	934.29	978.57	-
All farms	39.47	41.54	55.70	2.76	947.89	925.95	950

Crop Retention Pattern

Generally retention rises with farm size. In the case of tur retention of marginal, and small farmers is around a third of large farmer households. Medium farmers also have a slightly higher retention than marginal and small farms. Tur dal is an item of consumption and probably has a high income elasticity of demand. Large farm households also purchase tur dal to a much larger extent. Below in Table 3.12 we show crop retention pattern.

Table 3.12: Crop Retention Pattern

Tur					
Farm Size	Self-Consumption			Seeds	Total Retention Qtls/Hh
	Retention	Purchased		in	
	Qtls/Hh	Qtls/Hh	Price	Qtls/Hh	
Marginal	0.43	0.00	0.00	0.21	0.64
Small	0.49	0.06	1700.00	0.03	0.52
Medium	0.74	0.14	1104.65	0.06	0.80
Large	1.86	0.51	534.09	0.29	2.17
All farms	1.20	0.29	848.48	0.17	1.37

Wheat					
Farm Size	Self-Consumption			Seeds	Total Retention Qtls/Hh
	Retention	Purchased		in	
	Qtls/Hh	Qtls/Hh	Price	Qtls/Hh	
Marginal	0.00	0.00	0.00	0.00	0.00
Small	2.22	0.43	264.70	0.11	2.33
Medium	4.23	0.36	146.42	0.32	4.84
Large	9.20	0.31	99.00	1.85	11.53
All farms	5.98	0.34	134.74	0.89	7.22

Bajra					
Farm Size	Self-Consumption			Seeds	Total Retention Qtls/Hh
	Retention	Purchased		in	
	Qtls/Hh	Qtls/Hh	Price/Hh	Qtls/Hh	
Marginal	5.20	3.00	425.00	0.00	5.20
Small	5.23	0.47	108.82	0.06	5.59
Medium	7.51	0.29	100.46	0.09	8.77
Large	14.02	0.36	73.58	0.08	18.89
All farms	9.20	0.36	96.90	0.08	11.42

Crop Losses

Interestingly, small farmers have a significant proportion of losses. It should also be mentioned here that crop loss in harvesting depends much upon factors like the state of maturity of crops, timing of harvesting, unwanted rainfall in the maturity period, distance of plot from farmhouse etc. This study does not take into account of such factors separately and provides the overall estimate of crop loss during harvesting. Table 3.13 summarizes crop loss during production/processing of crop.

Table 3.13: Crop Losses (in kg) in % of Total Physical Losses and as % of Total Production by Mode

Farm Class	Harvesting		Threshing		Winnowing		Loss due to Animals		Overall Loss	
	% Loss in Production	% in Total Loss	% Loss in Production	% in Total Loss	% Loss in Production	% in Total Loss	% Loss in Production	% in Total Loss	% Loss in Production	% in Total Loss
TUR										
Marginal	2.11	74	0	0	0.74	25.9	0	0	2.85	100
Small	7.73	33.4	0.58	2.51	1.88	8.14	12.94	55.95	23.13	100
Medium	4.33	29.02	1.18	9.1	0.52	4.02	7.53	57.87	13.56	100
Large	5.33	30.54	1.08	6.18	0.64	3.67	10.38	59.61	17.44	100
All Farms	5	30.24	1.1	6.91	0.62	3.92	9.34	58.93	16.06	100
WHEAT										
Marginal	0	0	0	0					0	100
Small	1.41	60.47	0.92	39.53					2.33	100
Medium	2.64	84.49	0.49	15.51					3.14	100
Large	2.86	85.4	0.5	14.6					3.36	100
All Farms	2.79	85.03	0.5	14.97					3.29	100
BAJRA										
Marginal	3.96	49.34	4.07	50.66					8.03	100
Small	1.69	48.64	1.79	51.36					3.48	100
Medium	2.31	65.89	1.2	34.11					3.51	100
Large	1.72	65.5	0.9	34.5					2.62	100
All Farms	1.96	65.05	1.05	34.95					3.01	100

Note that in tur apart from marginal farmers, greater than 15% loss in production overall is there, in bajra and wheat it is much less.

Crop Losses during Transport

Transport losses from field to floor and floor to market are basically while transporting through tractor. Crop losses occur during transport of crop output. This happens mainly during transporting harvested crop from field to threshing floor and transporting stored crop from farm to market.

Losses are generally attained while transporting through tractor that being the dominant mode of transportation, some losses are also while transporting on person on head, as well as by animal. Losses in packing are during packing in bags. Table 3.14 shows crop loss during transportation.

Table 3.14: Crop Losses during Transport of All Farm Total Losses in Each Mode as % of Total Losses and % of Production

Loss by Mode of Transport from Field to Floor						
Mode	Head		Tractor		Overall	
	Loss % out of overall total Prodn.	%in Total Loss	Loss % out of overall total Prodn.	%in Total Loss	Loss % out of overall total Prodn.	% in Total Loss
Tur						
Overall	0.03	23.12	0.11	48.19	0.5	100
Loss by Mode of Packing from Field to Floor						
Mode	Bags		Overall			
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	%in Total Loss		
Tur						
Overall	0.15	100	0.5	100		
Loss by Mode of Transport from Floor to Market						
Mode	Head		Tractor		Overall	
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss
Tur						
Overall	0.03	23.12	0.11	48.19	0.5	100
Loss by Mode of Packing from Floor to Market						
Mode	Bags		Overall			
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	%in Total Loss		

Tur						
Overall	0.15	100	0.5	100		

Loss by Mode of Transport from Field to Floor

Mode	Tractor		Overall	
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss
Wheat				
Overall	0.01	100	0.01	100

Loss by Mode of Packing from Field to Floor

Mode	Bags		Overall	
	Loss % out of overall total Prodn.	%in Total Loss	Loss % out of overall total Prodn.	% in Total Loss
Wheat				
Overall	0.01	100	0.01	100

Loss by Mode of Transport from Floor to Market

Mode	Tractor		Overall	
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss
Wheat				
Overall	0.01	100	0.01	100

Loss by Mode of Packing from Floor to Market

Mode	Bags		Overall	
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss
Wheat				
Overall	0.01	100	0.01	100

Loss by Mode of Transport from Field to Floor

Mode	Animal		Tractor		Overall	
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss
Bajra						
Overall	0.01	36.14	0.01	63.86	0.02	100

Loss by Mode of Packing from Field to Floor

Mode	Bags		Overall			
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss		
Bajra						
Overall	0.02	100	0.02	100		

Loss by Mode of Transport from Floor to Market						
Mode	Animal		Tractor		Overall	
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn..	% in Total Loss
Bajra						
Overall	0	5.35	0.02	94.65	0.03	100
Loss by Mode of Packing from Floor to Market						
Mode	Bags		Overall			
	Loss % out of overall total Prodn.	% in Total Loss	Loss % out of overall total Prodn.	%in Total Loss		
Bajra						
Overall	0.03	100	0.03	100		

3.2 Factors Influencing Marketed Surplus

Distance and Type of Market

A greater proportion (60%) of Sale is in local market across farm sizes. However around 40% of households sell in distant markets.

The farmer generally prefers local market. Also the average transport cost per quintal is highest for large farms.

The average distance to market is around 10 kms.

Table 3.15: Distance and Type of Market

Factors↓ Categories →	Marginal	Small	Medium	Large	All farms
Sale in local market (HH%)	0.83	4.41	31.13	22.31	58.68 [1]
Sell in Distant market (HH%)	0.55	3.03	19.01	16.80	39.39 [2]
Average transport cost (Rs/Qtl.)	10.00	13.23	16.76	17.20	16.58
Average distance to market kms	10.40	5.07	10.21	11.70	10.42

---

[1] this is %, since not all household belong to this category, it does not sum to hundred.
[2] this is %, since not all household belong to this category, it does not sum to hundred.

Policy Awareness

Generally less than a quarter are aware about policies like MSP as a policy variable. One sixth feel that sale possibilities can be availed and farmers feel that this is possible by retaining less for feed and around a tenth are aware of the possibilities of futures trading.

Table 3.16: Policy Awareness

Policy ↓ Categories →	Marginal	Small	Medium	Large	All Farms
Aware of MSP (%)	0.00	11.11	20.77	31.25	23.96
Aware of Futures Trading (%)	0.00	25.93	7.65	13.19	11.14
Additional Sale Possibilities availed if available? Yes (%)	40.00	14.81	11.48	20.14	15.60
If Yes, Source					
a. Less Retention for seed	40.00	3.70	1.09	4.86	3.34
b. Less Retention for feed	0.00	11.11	7.10	10.42	8.64

Credit

The institutional sources of credit are more dominant like banks and cooperative societies. Half of the medium farms and three quarters of large farms have access to credit. In our sample cooperative credit is largely taken advantage of by medium and large farms. The average amount of loan is around a lakh and a half rupees. Getting a loan from bank is not difficult. Table 3.17 below, summaries the sources of credit to farmers.

Table 3.17: Sources of Credit by Farm Size

Factors ↓ Categories →	Marginal	Small	Medium	Large	All farms
Access to Credit (%)	20.00	14.81	53.55	77.78	59.89
Credit Sources:					
Private money lender	0.00	0.00	5.60	2.08	1.67
Relatives and Friends	0.00	0.00	1.64	0.69	1.11
Commercial Bank	0.00	11.11	31.15	56.94	39.55
Miller	0.00	0.00	0.00	0.00	0.00
Cooperative Society	20.00	3.70	19.13	18.06	17.55
Purpose					
Average Loan Amount	25000	226250	94989.8	178866.1	140800
Problem in getting loan from bank (%)	0.00	0.00	1.67	2.23	3.90
Have Kisan Credit Card (%.)	0	0	10	19.44	12.81
Average KCC Limit	N.A.	N.A.	131333.3	315785.7	243608.7

Contract farming is rarely used (2% to 5% of farms, generally medium and large farms only.)

Sources of Price Information

The medium and large farmers are more networked, communication helps them more (Table 3.18).

By and large the trader himself helps as a source of information though media is also availed.

Table 3.18: Sources of Price Information (In Percentage)

Categories→ Source of Price Information ↓	Marginal	Small	Medium	Large	All Farms
Trader	40.00	55.56	75.96	72.92	72.70
Print media	0.00	22.22	46.45	62.50	50.42
Electronic media	0.00	7.41	7.10	12.50	9.19
Visit to Market	0.00	25.93	11.48	3.47	9.19
Others	0.00	18.52	4.37	4.86	5.57

3.3 Estimation of Marketed and Marketable Surplus and Comparison with Previous studies

Surplus tends to be highest for wheat followed by bajra then tur, this seems to result from the fact that wheat and bajra has more significant production (Table 3.19). For wheat around 73% of the availability is Marketed (Marketed Surplus Ratio) and our estimate is that around same is Marketable (Marketable Surplus Ratio). For bajra these ratios are 71% and 64% and for tur the number is a little less than 70. A district wise statistics for Marketed to Marketable Surplus is shown in Table 3.20.

Table 3.19: Marketed and Marketable Surplus Ratio Estimates for Major Crops

Crop	Marketed Surplus Ratio	Marketable Surplus Ratio
Tur	69.54	69.40
Bajra	71.41	63.75
Wheat	73.89	73.88

Table 3.20: Marketed and Marketable Surplus Ratio Estimates for Crops District Wise

Tur		
Districts	Marketable Surplus Ratio	Marketed Surplus Ratio
Baroda	70.42	70.26
Panchmahal	68.22	68.09
Overall	69.54	69.40

Wheat		
Districts	Marketable Surplus Ratio	Marketed Surplus Ratio
Junagadh	81.51	81.51
Kheda	66.46	66.46
Banaskantha	37.17	37.14
Overall	73.89	73.88
Bajra		
Districts	Marketable Surplus Ratio	Marketed Surplus Ratio
Kheda	73.95	73.94
Banaskantha	68.64	68.61
Overall	71.41	63.75

The exceptional values are seen in wheat, Junagadh (high proportion marketed) and Banaskantha (low proportion marketed).

Table 3.21: Marketed and Marketable Surplus Ratio Estimates by Size Class

Tur		
Land Size	Marketable Surplus Ratio	Marketed Surplus Ratio
Marginal	76.24	76.24
Small	47.46	47.46
Medium	76.53	76.43
Large	68.32	68.13
Overall	69.54	69.40
Wheat		
Land Size	Marketable Surplus Ratio	Marketed Surplus Ratio
Marginal	0.00	0.00
Small	12.93	12.93
Medium	67.36	67.36
Large	77.11	77.11
Overall	73.89	73.88
Bajra		
Land Size	Marketable Surplus Ratio	Marketed Surplus Ratio
Marginal	0.00	0.00
Small	43.82	43.79
Medium	66.47	66.44
Large	76.40	76.38
Overall	71.41	63.75

It cannot be concluded that surplus increases with size. A clear relationship is not seen. For small farms a low value is seen. (Table 3.21)

Comparison with Previous studies

It would be interesting to see whether or not earlier studies (conducted in the late nineties or even before in the seventies) would have different results i.e., a lower marketed surplus ratio for foodgrains like wheat and bajra. We find below that this is indeed the case, the onset of liberalization may not have led to greater emphasis on agriculture but has definitely led to a greater emphasis on the market as our results show.

The Directorate of Marketing & Inspection (D.M.I., 2005), ever since its inception in the year 1935 has been engaged in conducting surveys on Marketing of Agricultural Commodities. In the recent past, a nation wide survey was conducted for estimation of Marketable Surplus and Post Harvest Losses of foodgrains on Paddy, Wheat, Jowar, Bajra, Maize, Ragi, Barley amongst cereals and Arhar, Green gram, Black gram, Gram and Lentil amongst Pulses for the period of three years i.e., 1996-97, 1997-98 and 1998-99. The study covered for 25 States, 100 selected districts and 15,000 cultivator houses holds in the country with adoption of stratified multi stage random sampling design. The survey generated valuable information on various aspects such as retention for different purpose, Marketed Surplus and Marketable Surplus, Post Harvest Losses at Producer's level. We summarise below the results for wheat and bajra to compare with our study.

WHEAT

1. The survey covered 100 districts, selected from 25 states, in accordance with the methodology approved by the Technical Committee, in consultation with the Indian Agriculture Statistical Research Institute (IASRI), New Delhi. From 100 selected districts, 1500 villages were selected. Out of 1500 selected villages, 1065 selected villages were growing wheat. In other words, 71 percent of the selected villages were wheat-growing villages.

2. The total area under wheat was estimated at 26569.29 thousand hectares. Out of this, an average of 22859.40 thousand hectares or nearly 86.04 percent was grown as irrigated.

3. The coverage of the High Yielding Varieties was of the order of 23198.65 thousand hectares or 87.31 percent.

4. The production of wheat was estimated at 68495.89 thousand tonnes, out of which the contribution of irrigated wheat was 63472.64 thousand tonnes or 92.67 percent. The contribution of High Yielding Varieties in production was estimated at 62778.63 thousand tonnes or 91.65 percent.

5. The total requirement of wheat for farm-family consumption (retention for consumption at farmer level and purchases) was estimated at 20313.12 thousand tonnes, which accounted for 29.66 percent of the estimated production.

6. The total post harvest losses of wheat at producers' level (in transport from field to threshing floor, threshing and winnowing, transportation and farm storage) were estimated at 1.79 percent of the total production.

7. The total marketed surplus was estimated to be 53.81 percent. The share of direct sales by the producers to consumers was 14.56 percent. The co-operatives purchased only 9.42 percent, the share of FCI was merely 20.00 percent.

8. Out of the total sales, 70.73 percent sales were within villages.

9. The earlier survey of marketable surplus & post harvest losses of wheat conducted during the year 1972-73 revealed that estimated farm-family requirement was 7525.83 thousand tonnes or 34.92 percent of estimated production. Incidentally, it may be mentioned that during the year, the country was facing the problem of deficit.

10. The 1972-73 survey showed that the marketable surplus was 14028.57 thousand tonnes or 65.08 percent of the production. The present survey revealed that the marketable surplus now stood at 39288.34 thousand tonnes or 57.36 percent and the total farm-family requirement including the losses at farm level accounted for 29207.55 thousand tonnes or 42.64 percent of the total production.

11. The seventies surveys showed that the average number of family members per household was 6.26, whereas the nineties survey showed that the average number of family members per household was 6.45.

BAJRA

1. The survey covered 100 districts selected from 25 states in accordance with the methodology approved by the Technical Committee in consultation with the Indian Agricultural Statistics Research Institute (IASRI), New Delhi. From 100 selected districts, 1500 villages were selected. Out of 1500 selected villages, 313 villages were growing bajra. In other words, 20.87 of the selected villages were bajra growing villages.

2. The total area under bajra was estimated at 9761.44 thousand hectares. Out of this, an average of 2787.59 thousand hectares or nearly 28.56 percent was grown as irrigated. The state-wise distribution of area under bajra showed that maximum area was in the State of Rajasthan (4700.00 thousand hectares), followed by Maharashtra (1750.01 thousand hectares), Gujarat (1075.00 thousand hectares), Uttar Pradesh (850.00 thousand hectares), Haryana (574.97 thousand hectares), Karnataka (350.00 thousand hectares), Tamil Nadu (189.98 thousand hectares) and Madhya Pradesh (140.00 thousand hectares). These states together accounted for 99.69 percent of area under bajra. Rajasthan had highest percent irrigated area i.e. 51.23 percent.

3. The coverage of the High Yielding Varieties was of the order of 7404.58 thousand hectares or 75.86 percent.

4. The production of bajra was estimated at 7948.85 thousand tonnes, out of which the contribution of irrigated bajra was 2760.47 thousand tonnes or 34.73 percent. The contribution of High Yielding Varieties in production was estimated at 6475.78 thousand Tonnes or 81.47. This further signifies the need for promotion of HYV.

5. The total requirement of bajra for farm-family consumption (retention for consumption at farmer level and purchases) was estimated at 2854.64 thousand tonnes, which accounted for 35.91 percent of the estimated production.

6. The estimates of retention for various purposes and purchases of bajra to meet the total requirement of farm-family were as under:

i)	For farm-family consumption	-	34.80 percent
ii)	For consumption by permanent labour and temporary labour.	-	1.11 percent
iii)	Estimated purchases for Consumption.	-	0.02 percent
iv)	For seed purpose	-	0.49 percent
v)	For animal feed	-	4.90 percent
vi)	For payment in cash and kind	-	1.19 percent

7. The total post harvest losses of bajra at producers' level (in transport from field to threshing floor, threshing and winnowing, transportation and farm storage) were estimated at 1.89 percent of the total production.

8. The total marketed surplus was estimated to be 45.44 percent. In the total sale the share of direct sales by the producers to consumers was 10.80 percent. The co-operatives purchased only 5.92 percent, the share of FCI was merely 0.38 percent.

9. Out of the total sales, 43.45 percent sales were within villages.

10. The earlier survey of marketable surplus & post harvest losses of bajra conducted during the year 1974-75 revealed that estimated farm-family requirement was 1994.45 thousand tonnes or 63.69 percent of estimated production.

11. The 1974-75 survey showed that the marketable surplus was 1137.15 thousand tonnes or 36.31 percent of the production. The present survey revealed that the marketable surplus now stood at 3893.61 thousand tonnes or 48.98 percent and the total farm-family requirement including the losses at farm level accounted for 4055.24 thousand tonnes or 51.02 percent of the total production.

12. The marketed surplus was estimated at 3612.11 thousand tonnes i.e., 45.44 percent of total production.

13. The nineties survey showed that the farm-family requirement was 4055.24 thousand tonnes. During 1974-75 survey, it was observed to be 1994.45 thousand tonnes. Thus, farm-family requirement seemed to have increased by 103 percent.

14. The seventies surveys showed that the average number of family members per household was 6.26, whereas the nineteen nineties survey showed that the average number of family members per household was 6.45.

3.4 Regression Relating Factors Affecting Marketed Surplus

We are interested in estimating the determination of marketed surplus ratio of total crops to related variables as described in the methodology chapter and on the basis of our quantitative results.

MS (Y) = f [farm-size (X1), household size (X2),access to credit (X3), off farm income (X4), distance from market (X5), age (X6),expense on tubewells (X7),no. of tractors (X8),no. of tubewells (X9), number of cattle (X10), awareness of msp (X11), education of the decision maker in years(X12), belonging to general caste(X13),Sale Price(X14)]

Here, the independent variable Y is the Marketed Surplus of individual farms aggregated and the independent variables are as stated. It is important to note that variables like years of education and access to credit do not show relationship with marketed surplus. It should be noted here that as some of the farm households do not actually market their product (the entire product is retained for home consumption), we have intentionally left them out from our exercise. Out of the total of 360 farm households covered under the study, therefore include only farm households who have marketed at least some part of their product. The result of the regression exercise stated above is presented in the following tables (table 3.22, 3.23, 3.24 for tur, wheat and bajra respectively). From the results of our regression exercise it is seen that the regression coefficients are highly significant. The exercise reveals that factors representing developed agriculture have a significant positive effect on marketed surplus ratio, which means that more modern the agriculture more it induces them to sell proportionate higher amounts of crop in the market. These would be farms taking advantage of modern technology in agriculture and have larger surpluses to sell.

Table 3.22: Regression Values of Factors Affecting Marketed Surplus of Tur in Gujarat 2011-12

Factors	Coefficient	Std. Error	t-ratio	p-value	
Constant	564.378	733.385	0.7696	0.44550	
Area in hectare	20.3569	16.418	1.2399	0.22130	
Family size	-88.8842	40.6251	-2.1879	0.03379	**
Access to credit	732.958	317.871	2.3058	0.02568	**
Education in years	127.191	33.7097	3.7731	0.00046	***
Price sold in Rs.	-0.0755889	0.164695	-0.4590	0.64842	
No. of tubewells	100.591	256.256	0.3925	0.69647	
No. of tractors	750.269	264.761	2.8338	0.00681	***
No. of cattle	172.139	54.183	3.1770	0.00266	***
Belonging to general caste	-879.013	369.096	-2.3815	0.02143	**

Statistics based on the weighted data:

Sum squared residual	141.7827	S.E. of regression	1.755629
R-squared	0.920341	Adjusted R-squared	0.903023
F(10, 46)	53.14592	P-value(F)	6.84e-22
Log-likelihood	-106.8500	Akaike criterion	235.6999
Schwarz criterion	258.1735	Hannan-Quinn	244.4339

Statistics based on the original data:

Mean dependent variable	1493.737	S.D. dependent variable	2161.380
Sum squared residual	2.19e+08	S.E. of regression	2182.675

*Note: *, ** and *** denote significant at 0.05, 0.01 and 0.001 levels respectively.*

Regression is Heteroskedasticity-corrected, using observations 1-57

Dependent variable: Marketed Surplus

Tur surpluses are negatively related with family size on account of self-consumption. Educated upper caste farmers have larger surpluses to sell. Investment variables have a positive relationship with marketed surpluses. The F value of 53.15 is significantly higher than the required value of 2.66 for 10.46 degrees of freedom at 1% level leading to highly significant estimated relationship.

Table 3.23: Regression Values of Factors Affecting Marketed Surplus of Wheat in Gujarat 2011-12

Factors	Coefficient	Std. Error	t-ratio	p-value	
Constant	-1415.01	1828.56	-0.7738	0.44246	
Area in hectare	82.218	29.2502	2.8109	0.00691	***
Access to credit	90.1533	578.33	0.1559	0.87672	
Family size	-266.4	91.6891	-2.9055	0.00534	***
Off farm income	0.00707131	0.00580922	1.2173	0.22890	
Price sold in Rs.	2.0129	1.09883	1.8319	0.07259	*
Dummy mkt. distant/local (positive sign because if farmer sells in distant market rather than disposing off product in local market itself means higher marketed amount is there.)	746.882	364.452	2.0493	0.04539	**
Aware of msp.	49.4238	872.628	0.0566	0.95505	

No. of tractors	513.805	415.804	1.2357	0.22202	
No. of tubewells	1372.73	359.548	3.8179	0.00035	***
Age in years	5.39637	16.2133	0.3328	0.74057	
Belonging to general caste	-51.1739	453.248	-0.1129	0.91053	
Cattle	-479.297	206.017	-2.3265	0.02385	**
Education in years	108.687	55.9571	1.9423	0.05742	*

Statistics based on the weighted data:

Sum squared residual	195.5214	S.E. of regression	1.920699
R-squared	0.737221	Adjusted R-squared	0.672765
F(13, 53)	11.43770	P-value(F)	3.67e-11
Log-likelihood	-130.9466	Akaike criterion	289.8932
Schwarz criterion	320.7589	Hannan-Quinn	302.1069

Statistics based on the original data:

Mean dependent variable	2746.672	S.D. dependent variable	3596.751
Sum squared residual	4.84e+08	S.E. of regression	3022.581

*Note: *, ** and *** denote significant at 0.05, 0.01 and 0.001 levels respectively.*
Regression is Heteroskedasticity-corrected, using observations 1-67
Dependent variable: marketed surplus

The relationship is again highly significant. The required F value at 1% level for 13.53 degrees of freedom is 2.45 and the estimated level is 11.44. Family size higher means lower surplus on account of self-consumption. A better price and sale at the distant market lead to higher surpluses. Investment variables like tubewells, farm size and the number of cattle are significant as well as education levels.

Table 3.24: Regression Values of Factors Affecting Marketed Surplus of Bajra in Gujarat 2011-12

Factors	Coefficient	Std. Error	t-ratio	p-value	
Constant	-1078.43	985.052	-1.0948	0.27621	
Area in hectare	330.351	57.1952	5.7759	<0.00001	***
Off farm income	0.00778132	0.0035136	2.2146	0.02903	**
Dummy Market distant/local.	2468.04	751.284	3.2851	0.00140	***
Price sold in Rs.	1.66534	0.445309	3.7397	0.00031	***
Aware of msp	1965.87	956.745	2.0547	0.04249	**
Age in years	-18.4165	15.7928	-1.1661	0.24631	

Number of tubewells	194.597	376.985	0.5162	0.60685	
Number of tractors	1809.24	522.192	3.4647	0.00078	***

Statistics based on the weighted data:

Sum squared residual	241.8645	S.E. of regression	1.547481
R-squared	0.572029	Adjusted R-squared	0.521181
F(12, 101)	11.24979	P-value(F)	5.85e-14
Log-likelihood	-204.6332	Akaike criterion	435.2664
Schwarz criterion	470.8370	Hannan-Quinn	449.7025

Statistics based on the original data:

Mean dependent variable	4034.004	S.D. dependent variable	6084.049
Sum squared residual	2.22e+09	S.E. of regression	4689.296

*Note: *, ** and *** denote significant at 0.05, 0.01 and 0.001 levels respectively.*
Regression is Heteroskedasticity-corrected, using observations 1-114

Dependent variable: Marketed surplus

Bajra in this result is more like a commercial crop. Self consumption in terms of family size is not significant. The price obtained is important as also sale in the distant market. These are large farmers, having non farm income, aware of the MSP for bajra and investing in farm machinery.

Chapter 4: Summary and Conclusion

Need of the Study

Gujarati farmers have increased in Prosperity with Sardar Sarovar, however certain traits remain: they insure a certain amount of grain for self-consumption, around 30% at all times. There are certain basic features of the system and environment which affect this propensity of self-consumption: storage facilities are limited, irrigation till recently was by digging borewells and electric tubewells, canal irrigation through Sardar Sarovar has led to demand for electricity for irrigation declining. Specifically as far as the impact of irrigation on the farmers is concerned we can say that large farmers having some ability to ensure storage of water in Kheda and Vadodara falling in catchment areas of Sardar Sarovar have become more prosperous, small farmers situation has also improved due to excess flood waters and catchment area of Mahi Canal in these two districts, as far as the rest of the study area is concerned in Saurashtra and rocky areas of Panchmahals the impact of Narmada is not yet felt. So we cannot say actual impact of Narmada project has begun to be felt in substantial pockets of the sample area covered. However despite increasing prosperity features of retention remain as before, specifically with regard to foodgrains. However all the above is based on observation and study of agriculture in Gujarat, a definite conclusion could have only emerged through a detailed statistical field study which we attempted as above was the basic path taken in the study and conclusions reached.

Objectives of the Study

The main objectives of the study were to estimate marketable and marketed surplus of selected foodgrains in Gujarat and to examine the role of institutional, infrastructural, and socioeconomic, factors in influencing household marketed surplus decisions.

Wheat, bajra and tur are the largest foodgrain crops in Gujarat. The study covered five districts: Vadodara, Panchmahals, Kheda, Junagadh and Banaskantha. The crops covered were tur in Vadodara and Panchmahals, wheat and bajra in Kheda, wheat in Junagadh and bajra in Banaskantha. The production of these crops specially in these districts were dominant in Gujarat. Totally 359 respondents were interviewed. 50 each in Vadodara and Panchmahals and 101 in Kheda, 80 in Junagadh and 78 in Banaskantha.

Sample size was selected for each district. Village level detailed farming information relevant for estimating marketed surplus was obtained from the field survey at the village level. This included – Sale Price, Productivity, Machinery used, Cropping Pattern, Irrigation Mechanisms and so on. During these visits the Project Head visited the villages along with field staff at the first instance to create suitable rapport with the villagers, this was followed in every village by detailed surveying by the Field Investigators, supervised by the author as Project Incharge.

The Growth Performance for Major Crops in Gujarat

The growth performance for major crops reveals that the post-liberalization phase was marked by improvements in yield levels for all the major food crops, groundnut and cotton. Foodgrains as a category recorded a decline in acreage up to 2000-01. Between 2001 and 2010, the share of foodgrain area in gross cropped area stabilised at around 34%. While *bajra, jowar* and maize recorded a decline in acreage growth, wheat area expanded very rapidly (estimated to be 10.7% annually) that arrested the falling importance of foodgrains in the agricultural economy of the state. Commercialization process and crop diversification towards non-food crops (cotton, spices, horticulture) are positive developments. Castor and sesame besides groundnut are the other commercial crops that are amenable to processing and have expanding domestic and global demand (Mehta, Niti, 2012).

Summary of Performance of top Performing Districts including Selected Districts in Selected Crops

Characteristics of Sampled Population

Average age of the decision makers of the sample household is near 50, so like in census households here too middle aged farmers predominate. Possibly younger members are migrating out. Farm households have larger family size as compared to census results. The fact that farm household size is more than 4-5 persons as in the census implies that family is not nuclear but is larger. The average size is 6.7. The size of households of marginal and large farms is above 7. Large farmers can support a large family size. Marginal farmers have a low land base but the family members are forced to depend on agriculture. The main occupation is crop farming in all farm sizes and dairying dominates as a subsidiary occupation. Dairying is a subsidiary and

important occupation in rural India now and this is particularly true for Gujarat. In terms of caste composition general category predominates, followed by OBC and then SC, infact the general category proportion is much higher in large farms which would imply operational ownership of landed property by the upper castes in most prosperous tracts in Gujarat, though this requires further detailed study to confirm the phenomena as also the hypothesis resulting from that. Generally medium and large farmers tend to dominate in all classifications. This is particularly so since they have leased in irrigated land in what we described as reverse tenancy.

Area

In terms of percentage of gross cropped area, cotton is a major crop, so is wheat. Kharif paddy and finally vegetables are grown in kharif. Area is also being allocated to other crops like tobacco and potato, this proportion is greater than cotton. As far as rabi season is concerned wheat is grown on 25% of the land. This is traditionally an area where paddy and wheat farming was giving way to oilseeds and commercial crops. Sardar Sarovar Project (SSP) seems to have made the return to paddy and wheat. SSP waters are at the present stage uncontrolled at the delivery level and flood irrigation leads to paddy and wheat farming predominating. Cotton farming, as we saw in the earlier sections, has been very successful in fields of Gujarat on account of the new BT technology and it has spearheaded Gujarat's agricultural growth in the last decade and a half. Oilseeds, cotton, vegetables and fruits are all grown largely in medium and large farms. Commercialization is therefore more in such farms.

Production

Output outcomes follow from area allocations, particularly of irrigated area. Sardar Sarovar canal irrigation has also led to a resurgence of kharif paddy. The proportion follows from area with other crops, kharif cotton, paddy, oilseeds and pulses production in that order. As it is obvious the production of rabi wheat is high. Major output consequences are in medium and large farms, taking the agricultural year as a whole, wheat emerges in quantity terms as the largest crop. This is noteworthy, because cereals were falling as a proportion of Gujarat agriculture in earlier decades. SSP has led to this reversal. The next story is cotton which is the powerful story of a technology led star performance. The falling importance of oilseeds comes out. The medium and large farmers are the main actors in Gujarat's agricultural performance. For example, as

compared to 0.81 hectares under cotton for small farms, the figure for medium farms is 39.04 hectares and that for large farms is 185.85 hectares. Again in our sample vegetables are grown in medium and large farms.

Yield

Generally across farm size categories, yield tends to not fluctuate too much. It is interesting that the relation between farm size and productivity still shows that in some crops small farms hold out in their performance. This aspect will be studied more in the econometric analysis of this study.

Source of Irrigation

Electric tubewells are the major source of irrigation, in some areas there is irrigation with diesel tubewells and bore wells as well. This shows that there is sufficient supply of electricity for irrigation. Our sample shows that investment in tubewells is high. There is a great thirst for water in Gujarat agriculture and this continues with SSP water. There are many areas of over exploitation and what are called 'grey areas' in our sample areas. Since SSP water supply is not controlled, paddy cultivation is with canal water. Paddy can grow with flood irrigation.

Farm Machinery

Use of farm machines is constrained by considerations of profitability, a large amount of expenditure on tractors, tubewells and threshing machines was seen by farmers in these areas, indicating prosperity. High expense at an average on tractors and tubewells is seen, indicating sufficient purchase and use by medium and large farmers.

Livestock

Maintaining cattle/buffalo is not a viable proposition for the smaller farms, as their use has become extremely confined in the face of competition from tractors under modern cultivation practices. Livestock and fodder prices are also inflating.

Across all size classes, livestock other than cattle/buffalo is not kept, as the average number of ruminants is quite low which confirms their prohibitive costs.

Across farm sizes apart from small farms, farmer households have large per hectare cattle holding since dairying is a major source of livelihood. Of course medium and large farms have larger herd size. Small farms maintain much larger herd size in relation to their land holding. Livestock per household in large farms is very high this is a feature which results naturally in societies where number of cattle owned is seen as a sign of wealth.

Sale Price

Pulses have a sale price of above 3200/qtl except small farms which is lower than 3000/qtl. Oilseeds also have the same range of sale price/qtl. With small farmers selling at 3000/qtl. Cotton across farm size sells at above 3700/qtl. Vegetables sell for about ten times as much though there is variation in the price across and within size classes. Kharif paddy sells for around Rs. 1000/qtl. Rabi wheat sells for more than Rs. 1000/qtl. Small farmers get lower prices around 10 to 25% lower than large farmers. There are exceptions in data like in vegetables where medium farmers seem to be growing higher value added vegetables and large farmers, low value added. The major features which emerge are the better terms received in the market by medium and large farmers. The impression that in Gujarat cooperative institutions lead to improved terms for small and marginal farms is not borne out by this study.

Production and Availability of Crop by Farm Size

For all crops there is hardly any beginning stock per household at an average, the larger two farm sizes have higher average production in the season, i.e. large farmers produce more. Production clearly rises with farm size. In tur medium farmers grow 9.41 qtl per household and large farmer household grow 16.73 qtl. In wheat these figures are 24.04 qtl and 76.12 qtl respectively. Bajra is grown by marginal farms but only 9.46 qtl per household. The numbers for small households are slightly higher at 11.76 qtl but those of medium farms are 27.78 qtl and of large farm households 81.41 qtl.

Sale Pattern of Selected Crops

Average sale is approximately 7 quintals for tur, 46 quintals for wheat and 40 quintals for bajra. Tur sales are 1 to approximately 2qtl per farm for marginal and small farms. These are 4.09 and

10.85 for medium and large farm households. In wheat the differences are more. Small farms sell 3.6 qtl per household but medium farms 22.85 qtl and large farm households 73.47qtl.

Sales are generally to private trader/money lender and increase monotonically by size. Average price received per quintal by private trader is Rs. 2500-3500 in tur, around Rs.1100 in wheat and Rs. 800-980 in bajra. The processor or millers and private companies work on a commission basis in processing dals.

Crop Retention Pattern

Generally retention rises with farm size. In the case of tur retention of marginal and small farmers is around a third of large farmer households. Medium farmers also have a slightly higher retention than marginal and small farms. Tur dal is an item of consumption and probably has a high income elasticity of demand. Large farm households also purchase tur dal to a much larger extent. For all crops across farm size categories of farmers retention for self consumption goes up with farm size. Small farms tend to purchase more.

Crop Losses

Crop losses are generally attained during harvesting. Interestingly, small farmers have a significant proportion of losses. It should also be mentioned here that crop loss in harvesting depends much upon factors like the state of maturity of crops, timing of harvesting, unwanted rainfall in the maturity period, distance of plot from farmhouse etc. This study does not take into account of such factors separately and provides the overall estimate of crop loss during harvesting.

Crop Losses during Transport

Transport losses from field to floor and floor to market are basically while transporting through tractor. Crop losses occur during transport of crop output. This happens mainly during transporting harvested crop from field to threshing floor and transporting stored crop from farm to market.

Losses are generally attained while transporting through tractor that being the dominant mode of transportation, some losses are also while transporting on person on head, as well as by animal. Losses in packing are during packing in bags.

Factors Influencing Marketed Surplus

Distance and Type of Market

A greater Proportion (60%) of sale is in Local Market across farm Sizes. However around 40% of households sell in Distant Markets. The farmer generally prefers local market. Also the average transport cost per quintal is highest for large farms. The average distance to market is around 10 kms.

Policy Awareness

Generally, less than a quarter are aware about policies like MSP as a policy variable. One sixth feel that sale possibilities can be availed, and farmers feel that this is possible by retaining less for feed and around a tenth are aware of the possibilities of futures trading.

Credit

Generally larger farmers are aware about credit. The institutional sources of credit are more dominant like banks and cooperative societies. Half of the medium farms and three quarters of large farms have access to credit. The average amount of loan is around a lakh and a half rupees. Getting a loan from bank is not difficult.

Contract Farming

Contract farming is rarely used (2% to 5% of farms, generally medium and large farms only).

Sources of Price Information

The medium and large farmers are more networked, communication helps them more. By and large the trader acts as a source of information though media is also available.

Estimation of Marketed and Marketable Surplus

Surplus tends to be highest for wheat followed by bajra then tur, this seems to result from the fact that wheat and bajra has more significant production. For wheat around 73% of the availability is Marketed (Marketed Surplus Ratio) and our estimate is that around same is Marketable (Marketable Surplus Ratio). For bajra these ratios are 71% and 64% and for tur the number is a little less than seventy.

The exceptional values are seen in wheat, Junagadh (high proportion marketed) and Banaskantha (low proportion marketed). It cannot be concluded that surplus increases with size. A clear relationship is not seen. For small farms a low value is seen. Quantitatively wheat and bajra have a larger marketed surplus. Quantitatively since more than a fifth of the area (GCA) is allocated to wheat its predominance in quantities is obvious. Of course given the size and purposive nature of the sample these estimates are of an indicative nature.

Regression Relating Factors Affecting Marketed Surplus with Marketed Surplus Value

Regression exercises reveal that factors representing developed agriculture have a significant positive effect on marketed surplus ratio, which means that more modern the agriculture, more it induces them to sell proportionate higher amounts of crop in the market. Investments in tubewells and farm machinery are significant variables determining surplus. These would be farms taking advantage of modern technology in agriculture and have larger surpluses to sell. Larger farms have more surplus. Self consumption is important in tur and wheat as shown in a relation with family size. Interestingly bajra shows the character of a commercial crop with the surplus related with price, distance to market and non farm income.

4.1 Concluding Observations and Policy Implications

The present study is undertaken with the objective of estimation of marketed and marketable surplus at producer's level for tur, bajra and wheat; the important foodgrain crops of Gujarat. The study is based on primary data from 359 households spread over five districts of Gujarat. The primary data pertain to year 2011-12.

Production

Major output consequences are in medium and large farms, taking the agricultural year as a whole, wheat emerges in quantity terms as the largest crop. This is noteworthy, because cereals were falling as a proportion of Gujarat agriculture in earlier decades. SSP has led to this reversal. The medium and large farmers are the main actors in Gujarat's agricultural performance.

The major features which emerge are the better terms received in the market by medium and large farmers. The impression that in Gujarat cooperative institutions lead to improved terms for small and marginal farms is not borne out by this study. Our sample shows that investment in tube wells is high. There is a great thirst for water in Gujarat agriculture and this continues with SSP water. Use of farm machines is constrained by considerations of profitability, a large amount of expenditure on tractors tube wells and threshing machines was seen by farmers in these areas, indicating prosperity. Maintaining cattle/buffalo is not a viable proposition for the smaller farms, as their use has become extremely confined in the face of competition from tractors under modern cultivation practices. Sales are generally to private trader/money lender and increase monotonically by size. Generally retention rises with farm size. Crop losses are generally attained during harvesting. It should also be mentioned here that crop loss in harvesting depends much upon factors like the state of maturity of crops, timing of harvesting, unwanted rainfall in the maturity period, distance of plot from farmhouse, etc. Majority of the larger farmers are aware about credit. The institutional sources of credit are more dominant like banks and cooperative societies.

Market-Information

The medium and large farmers are more networked, communication helps them more. By and large the trader acts as a source of information though other media is also available.

Regression Relating Factors Affecting Marketed Surplus with Marketed Surplus Value

The exercise reveals that factors representing developed agriculture have a significant positive effect on marketed surplus ratio, which means that more modern the agriculture more it induces them to sell proportionate higher amounts of crop in the market.

Policy Implications

Development of efficient agricultural marketing is crucial for accelerating the growth of agricultural production and marketed surplus. An efficient marketing system must ensure best possible return for sale of produce. The investigation reveals that food grains market is highly dominated by private sector and traders were observed to exploit producers in the absence of an organized dissemination of market information.

The study reveals that majority households were lacking marketing intelligence. Majority of households were receiving information from traders regarding the market.

The study illustrated that total production losses at different stages of handling were high. By minimizing the losses at different stages, marketed surplus and financial benefits to producers can be enhanced. For minimization of losses, technical backup and support with regard to scientific storage, use of mechanical operations at harvesting stages, mode of packing and transportation should be disseminated. Moreover, creation of proper and adequate storage facilities at producers' level will reduce the storage losses and enhanced the bargaining power of producers in the marketing of produce, which will create positive impact on their net profitability.

The study revealed that marketed surplus output ratio was found on the lower side because the farmer always insures minimum amount of (approximately 30%) output for self-consumption.

The study revealed marketed surplus of all four crops are lower than marketable surplus. In Gujarat distress sales is anyway not much seen.

The study gives clear message that if storage, seeds and pest removal is stepped up and the farmer given even greater support by a more enthusiastic government machinery and officers the food security of the farmers can increase. This is the only way the retention proportion of Gujarati farmers can be reduced, but this is a slow process, it will take decades not years.

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Review Report of Study on

ASSESSMENT OF MARKETED ---- FOODGRAINS IN GUJARAT

TITLE OF STUDY: Assessment of Marketed and Marketable Surplus of Major Food grains in Gujarat

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II.INSTITUTIONAL AFFILIATION: Centre for Management in Agriculture, IIM, Ahmadabad

III.DATE OF RECEIPT OF REPORT: January 21, 2014 through Head, AERU, IEG, Delhi

IV.DATE OF DESPATCH OF COMMENTS: February 11, 2014

V.GENERAL COMMENTS: Author argue that following transition of agriculture from subsistence to commercial scale, marketed surplus as obtained from earlier studies has become obsolete. In this backdrop the present study on marketed surplus has been undertaken in the state of Gujarat. The study under review has four chapters. The first chapter entitled as 'Introduction and Review' also discusses methodology and a brief description of study area. The second chapter presents overview of agriculture in Gujarat, while Chapter 3 presents empirical analysis of results of study. The Chapter 4 is in the nature of summary and conclusion of study.

Review of literature is silent on marketed surplus by size group of farmers, cultivating group, development stage and type of crops (commercial and subsistence); though these issues are flagged in context of marketed surplus in the report.

VII.COMMENTS ON METHODOLOGY AND DATA:

The study elucidates concept of marketed and marketable surplus, and also explains basis of selection of districts in each of the agricultural commodities in Gujarat. The report however fails to explain the reason behind selection of blocks, villages and farmers in the study districts. The report is also silent about presumed relationship between marketed surplus (MS) and several

determinants of marketed surplus. For example how marketed surplus is supposed to be affected by variables like number of cattle.

VIII.COMMENTS ON FINDINGS / RECOMMENDATIONS:

Findings of study are not discussed adequately, though findings are presented in Tables in Chapter 3 of the report. Conclusion of study under review should have illustrated as to how current results on marketed surplus and its determinants are different than the earlier studies on the issue of marketed surplus. How far differences in results can be attributed to changed agrarian and market related situations in years?

Editorial problems exist in the draft report, and at times it becomes incomprehensible (example, page 19 paragraphs 1 of report).

IX.OVERALL VIEW ON ACCEPTABILITY OF REPORT:

This is an excellent effort to study marketed surplus in the new context. It is always advisable to review and revise study after some interval; while revising the report may look into the above suggestions/comments. The report may be accepted after incorporation of some of these suggestions.

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Action Taken on Review Report

Sr. No.	Comments	Action Taken
1.	**General Comments:** Author argue that following transition of agriculture from subsistence to commercial scale, marketed surplus as obtained from earlier studies has become obsolete. In this backdrop the present study on marketed surplus has been undertaken in the state of Gujarat. The study under review has four chapters. The first chapter entitled as 'Introduction and Review' also discusses methodology and a brief description of study area. The second chapter presents overview of agriculture in Gujarat, while Chapter 3 presents empirical analysis of results of study. The Chapter 4 is in the nature of summary and conclusion of study. Review of literature is silent on marketed surplus by size group of farmers, cultivating group, development stage and type of crops (commercial and subsistence); though these issues are flagged in context of marketed surplus in the report.	References have been added in the literature review to cover size class, level of development, type of crops and cultivating group.
2.	**Comments on Methodology and Data:** The study elucidates concept of marketed and marketable surplus, and also explains basis of selection of districts in each of the agricultural commodities in Gujarat. The report however fails to explain the reason behind selection of blocks, villages and farmers in the study districts. The report is also silent about presumed relationship between marketed surplus (MS) and several determinants of marketed surplus. For example how marketed surplus is supposed to be affected by variables like number of cattle.	An explanation of selection of blocks, villages and farmers in the study districts has been added, a section on factors determining marketed surplus has also been added.
3.	**Comments on Findings/Recommendations:** Findings of study are not discussed adequately, though findings are presented in Tables in Chapter 3 of the report.	A section covering the specific features of our results in relation to previous

	Conclusion of study under review should have illustrated as to how current results on marketed surplus and its determinants are different than the earlier studies on the issue of marketed surplus. How far differences in results can be attributed to changed agrarian and market related situations in years? Editorial problems exist in the draft report, and at times it becomes incomprehensible (example, page 19 paragraphs 1 of report).	results has been added and the editorial problem as mentioned corrected.
4.	**Overall View on Acceptability of Report:** This is an excellent effort to study marketed surplus in the new context. It is always advisable to review and revise study after some interval; while revising the report may look into the above suggestions/comments. The report may be accepted after incorporation of some of these suggestions.	Comments have been taken into serious consideration and changes hence undertaken.