Exports of Agri-Products from Gujarat – Problems and Prospects

Ravindra H. Dholakia
IIM, Ahmedabad

Abstract

Agri-products are defined to include products of agriculture & allied activities, fishing, forestry, and manufacturing industries, like food & food products, tobacco, textiles, paper, furniture, etc. Gujarat has a revealed comparative advantage in the exporting activity over the other states since, as per GITCO Study (November 2001), more than one-fifth of the exports of the country originate from Gujarat. Gujarat has the revealed comparative advantage in ground-nuts, oilmeals, castor oil, poultry & dairy product, spices, sesame & niger seeds, processed food & vegetables & fruits, cotton yarn & fabric, man-made textiles, handicrafts, and cotton raw including waste. Fresh fruits & vegetables, floriculture, and fish are not the areas of strength for Gujarat so far. Based on the large sample survey conducted by GITCO (November 2001), several features of the exports originating from Gujarat are also examined. Exports of agri-products originating from Gujarat represent excess supply rather than exclusive supply to the foreign markets. The prospects of the domestic demand and production of the agricultural sector in Gujarat are examined. The dismal picture of the declining real income in Gujarat agriculture during the late nineties is not supported by several other evidences. On the contrary, Gujarat has a very vibrant and responsive agricultural sector. It has an achievable potential to grow at 4.5% to 5% p.a. over the next 8 to 10 years. The paper concludes by identifying some areas for further research.

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I. Defining Agri-Products

The term `agri-business' is coined to encompass a wide range of economic activities directly or indirectly associated with agriculture and allied sectors. It would include all industries and activities providing inputs and outputs in these sectors. The argument for such an aggregation is in terms of a broad similarity in the nature and features of the activities leading to a common conceptual framework for analytical treatment on one hand, and an expectation of finding business synergies in market, technology and factor supplies on the other hand. However, since our focus is to examine the export performance of Gujarat State in the sector, a more appropriate concept is `agri-products' rather than `agri-business'. A narrow definition of agri-products would include products of the sector `Agriculture & Allied Activities' of the national accounts and their processing. Thus, it would include agriculture, horticulture, floriculture, animal husbandry, poultry; and industries like food & food product, tobacco, textiles, etc. A broad definition of the agri-products would, however, include products of the primary sector of the national accounts and their processing. This would additionally include the sub-sectors of fishing, forestry and mining besides several manufacturing industries using these products as their raw materials. However, there is a controversy about including mining products and their processing industries in the broad definition of agri-products. This is because, while all these sub-sectors represent the products of natural resources, minerals are different from the rest in the group inasmuch as they are exhaustible and non-

reproducible goods. Thus, whereas the rest of the primary sector represents products of "land", minerals are like "land" itself, the way it is defined in economics. For our purpose here, we define `agri-products' either in the narrow sense or in the semi-broad sense excluding the minerals and mineral products.

With this clarity about the agri-products, in the next section, we review the exports from Gujarat and their main features during the year 2000-01. The revealed comparative advantage (RCA) of Gujarat over the rest of India is also examined in various commodity groups including agri-products. In the third section, we discuss the trends and potential of agriculture in Gujarat. The paper ends with some observations on the researchable issues and policy direction.

II. Features of Exports Originating From Gujarat

At the outset, it is important to distinguish between `exports from Gujarat" and "exports originating from Gujarat". This is because Gujarat has the longest coastline in the country with several sea-ports and even an airport having international links. Therefore, not all exports from Gujarat necessarily originate from Gujarat. Similarly, some portion of the exports from the ports outside Gujarat like Bombay or Delhi may also originate from Gujarat. Traditionally, this type of information has not been collected and segregated at any level by any agency on a regular basis in the country. The regional accounts are, therefore, not complete and comparable fully with the national accounts. In the pre-reform era, the notion of comparative advantage of regions in different products was hardly ever considered relevant and was, therefore, never emphasized. In the reform era, however, there is an urgently

felt need to collect and segregate this type of information by states. There is a scope for research in settling a few issues in estimation of exports at the state level.*[1]

Recognizing the need, the Government of Gujarat commissioned an extensive survey of exporting units to get an estimate of exports originating from Gujarat. On behalf of the Industrial Extension Bureau, GITCO carried out the exercise and submitted its findings in November 2001. The study considered 6 major outlets for the exports from Gujarat. These are : (i) Gujarat Maritime Board (GMB) Ports; (ii) Kandla Sea Port; (iii) Ahmedabad airport; (iv) Bombay Sea Port; (v) JNPT Port (Bombay); and (vi) Bombay Airport. The first 3 are Gujarat based and the remaining 3 are Bombay based. By meticulously sifting the data on trade from the Gujarat based outlets, the Report estimated that out of the total exports worth Rs.17,198 crores from these outlets, exports originating from Gujarat are of the order of Rs.11,167 crores. For the Bombay based outlets, since the similar data were not available, the data from the four Inland Container Depots from Gujarat were analyzed. It was estimated that exports worth Rs.38,329 crores from these Bombay outlets originated from Gujarat. Thus, the total exports originating from Gujarat during 2000-01 was Rs.49,496 crores. Out of the total exports of Rs.238,490 crores during the same year for the country, Gujarat thus accounts for a little more than one-fifth. Compared to any other parameters like population, income, manufacturing, new investments, etc., Gujarat's share in the national exports is remarkably high. Thus as a region, Gujarat has a comparative advantage in the export activity over other states in India.

*[1] For instance, a company may have the headquarter in one state and production or procurement units in different states. The company may not maintain its accounts by such units. How do we allocate or segregate exports of such a company ? Several such issues need to be resolved for meaningful estimation.

Table 1 provides estimates of commodity group-wise exports originating from Gujarat and all India during the year 2000-01. It also reports the coefficient of the revealed comparative advantage (RCA) for Gujarat in different commodities. The coefficient of RCA is calculated as (see, Balassa, 1977) :

$$RCA = \frac{X_{iG} / X_i}{X_G / X}$$

Where X_{iG} and X_I are exports from Gujarat and all India in the commodity i; and X_G and X are the total exports of Gujarat and All India. There are 13 commodity groups reported in the table within the narrowly defined agri-products. The share of Gujarat in the narrowly defined agri-product exports in the country works out to 12.8% whereas with the semi-broad definition of agri-products, it constitutes 11.8% in 2000-2001. The table also brings out that Gujarat has a revealed comparative advantage over other states in groundnuts, oilmeals, castor oil, poultry and dairy products among the agri-products; and processed minerals, other minerals, gems & jewellery, chemicals, and petroleum products among the rest of the products. However, if we exclude those product categories where Gujarat accounts for 70% or more of the national exports (e.g., petroleum products, residual chemicals & allied products, gems & jewellery, and castor oil), in the remaining products Gujarat's share in the national exports is only 8%. Comparing against this modified base, we find 10 additional product categories where Gujarat has revealed comparative advantage over other states in India. Out of these additional 10 products groups, 7 belong to the agri-product category, viz., spices, sesame & niger seeds, processed food & vegetables & fruits, cotton yarn & fabric, manmade textiles, handicrafts, and cotton raw including waste. As of now, floriculture, fresh fruits & vegetables and fish are not the areas of strength for Gujarat.

Table 1 : **Revealed Comparative Advantage (RCA) of Gujarat in Exports by Commodity Sectors**					
No.	Commodity Sectors	Exports (Rs. in crores)		Guj./India (in %)	RCA
		All India	Gujarat		
I.	**Agri. & Allied Products**	**17665**	**2257**	**12.78**	**0.62**
1.	Rice	2926	146	4.99	0.24
2.	Pulses	537	--	--	--
3.	Tobacco	870	--	--	--
4.	Spices	1622	197	12.15	0.59
5.	Sesame & Niger Seeds	598	116	19.40	0.93
6.	Groundnut	316	125	39.56	1.91
7.	Oilmeals	2044	503	24.61	1.19
8.	Castor Oil	953	856	89.82	4.33
9.	Molasses	503	20	3.98	0.19
10.	Fresh Fruits & Vegetables	840	40	4.76	0.23
11.	Processed food, Fruits & Veg.	1328	200	15.06	0.73
12.	Poultry & Dairy Products	213	50	23.47	1.13
13.	Floriculture	133	4	3.01	0.15
II.	**Marine**	**6368**	**390**	**6.12**	**0.29**
III.	**Minerals**	**5290**	**836**	**15.80**	**0.76**
1.	Processed Minerals	1724	400	23.20	1.12
2.	Other Minerals	1706	436	25.56	1.23
IV.	**Gems & Jewellery**	**33757**	**25037**	**74.17**	**3.57**
V.	**Chemicals**	28247	6234	22.07	1.06
1.	Basic Chem., Pharma & Cosm.	16778	3993	23.80	1.15
2.	Plastic & Linoleum	4152	450	10.84	0.52
3.	Rubber, glass & other products	5660	300	5.30	0.26
4.	Residual chem. & allied prod.	1697	1591	93.75	4.52
VI.	**Engineering**	**29385**	**1000**	**3.40**	**0.16**
1.	Machinery	12220	500	4.09	0.20
2.	Other engineering goods	9127	500	5.42	0.26
VII.	**Electronic Goods**	**5112**	**200**	**3.91**	**0.19**
1.	Electronic	4800	200	4.17	0.20
2.	Computer Software (Phy.form)	312	--	--	--
VIII.	**Project Goods**	**123**	**10**	**8.13**	**0.39**
IX.	**Textiles**	**46459**	**5700**	**12.27**	**0.59**
1.	Readymade garments	25469	1500	5.89	0.28
2.	Cotton yarn, fabric, etc.	15986	3200	20.02	0.96
3.	Manmade textiles, etc.	5004	1000	19.98	0.96
X.	**Handicrafts**	**3052**	**300**	**9.83**	**0.47**
XI.	**Cotton Raw, incl. Waste**	**224**	**20**	**8.93**	**0.43**
XII.	**Software**	**36000**	**103**	**0.29**	**0.01**
XIII.	**Petroleum Products**	**8309**	**6409**	**77.13**	**3.72**
XIV.	**Unclassified Exports**	**21775**	**1000**	**4.59**	**0.22**
	Agri-Products (I+II+IX+X+XI)	**73768**	**8667**	**11.75**	**0.57%**
	Total	**238490**	**49496**	**20.75**	
	Total (Excl. XIII,V-4,IV & I.8)	**193774**	**15603**	**8.05**	
Source : Calculated from *GITCO Study* (2001).					

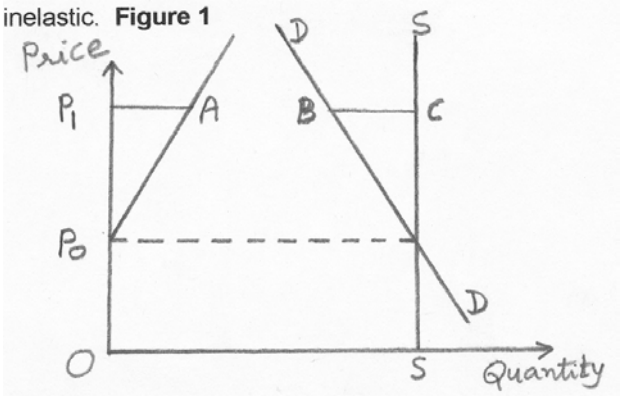
The GITCO study (2001) also conducted a large scale sample survey covering 1224 units out of the estimated total number of 3000 exporting units in the state. Thus, the sample size was about 40% in terms of units and about 43% in terms of value of exports. Excluding the export of gems & jewellery, the sample accounted for almost 83% of the remaining exports of Gujarat. The survey revealed some very interesting features of the export sector in Gujarat. Almost 50% of the exporters are the private proprietors or partnership concerns. More than 80% are producers and exporters. Only a quarter of the units have the export houses or upward status for special benefits. More than 40% of the exporting units have come up only after 1991-92. Similarly only 10% and 23% of the exporting units are in narrowly defined and semi-broadly defined agri-product sector. There are a large number of small and medium scale exporters in Gujarat. 29% of the exporters have less than Rs.50 lakhs of export; 37% of the exporters have exports between Rs.50 lakh and Rs. 5 crores. Thus, about two-thirds of the exporters in Gujarat belong to the small and medium enterprises.

Another very interesting feature revealed by the GITCO study (2001) is regarding the export intensity (or orientation) of the exporting units. Exports as a proportion of the sales in the aggregate 1224 exporting units in Gujarat turns out to be 22%. However, it turns out to be 31% in the agro and food processing units; 19% in paper and 63% in the textile units. Thus, we can argue that those units in textiles sector who export from Gujarat are essentially concentrating on the export business, but the same is not the case for the exporting units in the agro-food processing or paper industry in Gujarat. For them, export is only a side business to be carried out only if there is a surplus or a glut in the domestic market. This is further corroborated

when we consider the growth in the export during the previous year (1999-2000) with the growth during 2000-01 as given in *Table 2*.

Table 2 : **Annual Growth of Exports Originating from Gujarat**				
Sectors	No. of Units Surveyed	Export Growth During		Exports as % of sales (00-01)
		2000-01	1999-2000	
Agro & Food Processing	128	2%	28%	31%
Paper	19	6%	21%	19%
Textiles	137	57%	40%	63%
Merchant Exporter	203	146%	13%	40%
Total	1224	44%	36%	22%
Source : GITCO (2001)				

Thus, the exports of agri-products originating from Gujarat represent basically the excess supply rather than targetted production for the foreign markets. This feature has very interesting implications. Firstly, the exports would be more price elastic than both the domestic demand and supply of the product.*[2] Secondly, the export supply would be invariably price elastic*[3] and not, like several scholars of the past generation used to argue, price inelastic. **Figure 1**



*[2] This can be shown easily by considering the extreme case of perfectly inelastic supply and inelastic demand for good X in the domestic market as in *Figure 1*. The excess supply curve is derived as the curve PoA with P1A = BC. It can be seen that the price elasticity of ES > O and is also numerically greater than the elasticity of DD, because price and absolute value of the slope remaining the same, X on ES is lower than X on DD.

*[3] More precisely, the price elasticity of export supply as an excess supply will be greater than one if in the absence of exports, the equilibrium price in the domestic market is positive.

Exchange rate changes would, therefore, be very important considerations for these exporters. It is not the Marshall-Leaner condition, but the exchange rate pass-through and volatility that would be critical for policy purposes. Similarly, the quality of the agri-products exports would be largely determined by the domestic buyers since there is little concern about the foreign markets on a sustained basis. WTO and the Uruguay Round of GATT have provided a significant incentive by dismantling the quota, tariffication the quota on exports as well as imports, and by providing access to the markets hitherto closed for the imports from the developing world. These measures are expected to result in raising the agricultural prices in those domestic commodity markets where export quota existed. This would certainly boost the exports of the agri-products temporarily. However, in the long run, the exports can be sustained only if the underlying production and demand constraints are removed.

III. Trend and Potential of Agriculture in Gujarat :

The demand for the agricultural products in Gujarat is likely to have risen sharply during the last decade or so. This is because the growth of industrial sector in Gujarat has been phenomenal over the last decade (see, Dholakia, 2000) generating significant additional demand for raw materials. Moreover, as we have noted earlier, a large proportion (43%) of the exporting units at present have come up only after 1991-92. A large number of them are again in the agro and food processing sector or the merchant exporters. They are bringing with them a new source, viz., the foreign demand for the agri-products in Gujarat. Moreover, there are positive evidences to suggest that the domestic consumption demand for the agri-products in Gujarat must have risen significantly during the past 15 years or so. This is seen

from *Table 3*, which reports a sharp decline in the population living below poverty line since 1987-88 both in the relative terms as well as absolute numbers. This is conclusively established by a very recent study putting all controversies on the official estimates of poverty at rest (see, Deaton & Dreze, 2002). Moreover, the study also reports an estimated growth of real agricultural wages based on the information available from *Agricultural Wages in India* during the nineties for major states in India. Gujarat ranks second (after Kerala) with the annual growth rate of well above 6%. Similarly, Deaton & Dreze (2002) also report a very healthy growth of 16.8% in the average per capita consumption expenditure (APCE) over the period 1993-94 to 1999-2000. Gujarat raks 7th in terms of APCE growth out of 20 states. Thus, the demand for agri-products in Gujarat from all sides appears to be very strong and is likely to continue to grow in the near future.

Table 3 **: Number and Percentage of BPL Population in Gujarat**

Year	*Rural Area*		*Urban Area*		*Total Gujarat*	
	No.in lakhs	*% Pop.*	*No.in lakhs*	*% Pop.*	*No.in lakhs*	*% Pop.*
1973-74	94.61	46.35	43.81	52.57	138.42	48.15
1977-78	92.53	41.76	38.35	40.02	130.88	41.23
1983	72.88	29.80	45.04	39.14	117.92	32.79
1987-88	74.13 (101.90)	28.67 (39.40)	48.22 (21.20)	37.26 (16.40)	122.36 (123.10)	31.54 (31.70)
1993-94	62.16 (91.10)	22.18 (32.50)	43.02 (22.70)	27.89 14.70	105.19 (113.80)	24.21 (26.20)
1999-00	39.8 (60.40)	13.17 (20.00)	28.09 (11.50)	15.59 (5.40)	67.89 (71.90)	14.07 (14.90)

Source:(1) Planning Commission, Government of India, New Delhi
(2) Figures in parentheses are the' Adjusted Estimates' prepared by Deaton and Dreze (*EPW*, Sept. 7, 2002)

It is, however, the supply of agricultural products that is causing concern. As per the official estimates, the shares of agriculture and the primary sector in the gross state domestic product (GSDP) are sharply declining over the past two decades. *Table 4* clearly shows that the trend is of secular decline with minor aberrations both

in current prices and at constant prices. The table also reveals that the agricultural prices were rising more rapidly than the average prices in Gujarat from the mid-eighties to the early nineties and during the late nineties. In the rest of the period, the agricultural prices were lagging behind the average price rise in Gujarat. However, it is well-known that while agriculture has a relatively stable demand, the supply keeps fluctuating depending on the weather condition – particularly in a state like Gujarat with low irrigation cover. As a result, the agricultural prices keep fluctuating, too but in the opposite direction of the supply.

Table 5 provides the indices of the real GSDP in agriculture and primary sector in Gujarat since 1980-81. It is shocking to find that the level of agricultural real income in 2000-01 is absolutely lower than the level reached in 1980-81. The table reveals the miserable story of heavy fluctuations in the agricultural incomes in Gujarat throughout the past two decades. According to the official estimates of GSDP, the down turn in the agricultural income has started since 1996-97 and still continues However, notwithstanding this, the linear time trends fitted on the real GSDP in agriculture and primary sector in Gujarat show a marginally significant positive growth of the order of 1.6% to 1.7% per annum. The r^2's are too poor to use the trend for any prediction purpose. Such a dismal picture on the growth front needs to be verified through other evidences.

Land-use statistics are very relevant in this context. However, given the state of the data availability in the state, the latest year for which the official figures are available is 1997-98 (see, Government of Gujarat, 2002). As per these statistics, there has been an increase in the net area sown by 4% during the nineties. Similarly, there is a steady reduction in the fallow land by over 35%. The cultivable waste is more or less constant but stands at about 20% of the net sown area. Two

things can be inferred from the land-use data. First, they do not support significant down turn of agricultural real incomes in Gujarat during the nineties. Secondly, there is a good potential to raise agricultural growth in the Gujarat in future by exploiting cultivable waste land.

Table 4 **: Share of Agriculture and Primary Sector in GSDP in Gujarat**

(In %)

Year	*At Current Prices*		*At Constant Prices*	
	Agri.	*Primary*	*Agri.*	*Primary*
1980-81	34.69	38.65	34.69	38.65
1981-82	35.71	42.08	37.67	41.26
1982-83	31.09	37.13	32.59	36.07
1983-84	33.15	38.25	33.77	36.85
1984-85	32.56	38.28	33.81	37.24
1985-86	24.21	30.35	26.06	29.75
1986-87	24.81	31.33	24.54	28.02
1987-88	18.14	24.73	14.48	18.28
1988-89	26.78	34.34	28.55	31.51
1989-90	26.16	32.44	25.30	28.58
1990-91	25.16	31.63	23.10	26.67
1991-92	23.87	30.27	20.27	24.17
1992-93	25.56	30.73	23.94	27.08
1993-94*	19.90	25.40	19.90	25.40
1994-95	23.80	28.80	24.40	29.40
1995-96	18.80	23.00	20.10	24.80
1996-97	22.50	26.60	24.10	28.30
1997-98	21.20	25.00	21.50	25.70
1998-99	20.50	23.90	20.50	24.30
1999-00	14.70	18.60	14.10	18.00
2000-01	12.40	16.00	11.90	15.90

* Base has changed since 1993-94

Source: Bureau of Economics and Statistics, Government of Gujarat, Gandhinagar.

Table 5 : **Indices of Agriculture and Primary Sector in Gujarat, 1993-94=100**								
Year	*Primary*	*Agri.*	*Year*	*Primary*	*Agri.*	*Year*	*Primary*	*Agri.*
1980-81	90.15	95.24	1987-88	52.29	48.77	1994-95	136.10	144.37
1981-82	105.30	113.18	1988-89	121.90	130.01	1995-96	121.28	125.83
1982-83	91.44	97.25	1989-90	109.74	114.34	1996-97	158.00	172.02
1983-84	110.07	118.73	1990-91	104.48	106.52	1997-98	145.91	156.06
1984-85	111.75	119.44	1991-92	88.54	87.40	1998-99	146.60	158.09
1985-86	87.84	90.55	1992-93	127.31	132.49	1999-00	108.08	108.31
1986-87	87.88	90.56	1993-94	100.00	100.00	2000-01	97.05	93.04
Source : Bureau of Economics & Statistics, Government of Gujarat, Gandhinagar.								

Second indicator for the agricultural performance is in terms of the progress of irrigation. Again, the official data stop at 1997-98 (ibid). Here also there has been a steady and significant increase in the area irrigated to area sown during 1980-81 to 1990-91 to 1997-98. By 1997-98, almost one-third of the area is irrigated. Within the irrigated land, the food crops receive a larger cover (54%) than the non-food crops (46%).

Third indicator is the use of traditional and modern implements in agriculture. Livestock census provides the relevant data. As per these figures, all the traditional implements like ploughs, carts, oil engines and electric pump sets show a clear decline from 1988 to 1992 to 1997. Over the same period, however, there is a marked increase in the use of modern implements like submersible pump sets and tractors used in Gujarat agriculture (Ibid). It can be clearly seen from these two indicators that there is a marked shift in favour of modern inputs leading to the technological progress in the agricultural sector in Gujarat.

Fourth indicator is again from the Livestock Census about the population of cows, buffaloes and poultry. All the three categories have registered substantial (double-digit) growth in their population during 1988 to 1992 to 1997 (ibid). Again,

this evidence does not support the finding of the declining real incomes in agriculture in Gujarat during the nineties.

Fifth indicator about the performance of the agriculture in Gujarat during the nineties is in terms of the growth of real wages of the agricultural labour. As noted earlier, Deaton & Dreze (2002) in their recent study report a very high annual growth of more than 6% in the agricultural real wages in Gujarat during the nineties. This is further corroborated by the high growth in the per capita consumption expenditure during 1993-94 to 1999-2000 (ibid). Both these empirical findings are not consistent with the declining real income in Gujarat agriculture revealed by the GSDP estimates during the nineties.

As a final evidence, we can examine the time series data on area and yield of all the crops in Gujarat. Consistent and comparable time series on area and yield are available for 30 crops in Gujarat from *CMIE* (2001). The data are available for the period 1972-73 to 1999-2000, for most of the crops. The selected 30 crops almost exhaust (99% of) the total cultivated land in Gujarat. Using these data, linear time-trends can be fitted to examine whether there are any significant trends over time in the area and yield per hectare of these 30 crops. The results are reported in *Table 6*. As expected, not all the 60 time-trends are statistically significant.

We summarise the findings in a tabular form as under :

Area -> / Yield	Significant Positive Time-Trend	Insignificant Time-Trend	Significant Negative Time-Trend
Significant Positive Time-Trend	Rice, Maize, Arhar, Other Pulses, Sesamum, Rapeseed & Mustard, Castor, Sugarcane, Chillies, Ginger, Brinjal, Banana	Wheat, soyabeans, Garlic	Jowar, Bajra, Ragi, Cotton
Insignificant Time-Trend	Gram, Tobacco, Potatoes, Onions, Lemons	Groundnut, Guarseed	
Significant Negative Time-Trend	Fruits & Nuts, Chickoo	Papaya	Smaller Millets

Table 6 :Linear Time-Trend Regressions for Area and Yield by Crops in Gujarat								
No.	*Crop*	*Period*	*Area*			*Yield*		
			Intercept	*Slope*	*Adj.R^2*	*Intercept*	*Slope*	*Adj.R^2*
I	Rice	1972-00	397.68	8.71	0.6917	870.71	25.17	0.3786
		n=28	(21.57)	(7.84)		(8.70)	(4.17)	
2	Wheat	1972-00	575.53	0.20	-0.0383*	1628.59	26.52	0.5537
		n=28	(10.01)	(0.05*)		(21.72)	(5.87)	
3	Jowar	1972-00	1211.16	-32.77	0.8136	338.76	16.03	0.3618
		n=28	(24.27)	(-10.90)		(5.13)	(4.03)	
4	Bajra	1972-00	1613.43	-22.17	0.2662	674.12	15.30	0.2071
		n=28	(14.40)	(-3.28)		(7.52)	(2.83)	
5	Maize	1972-00	247.75	5.39	0.8897	813.80	20.52	0.1308
		n=28	(40.95)	(14.79)		(5.37)	(2.25)	
6	Ragi	1972-00	59.73	1.50	0.9137	702.07	9.08	0.1334
		n=28	(40.39)	(-16.93)		(10.57)	(2.27)	
7	S.Millets	1972-00	162.31	-5.41	0.8532	74.58	-14.09	0.2921
		n=28	(22.68)	(-12.56)		(11.04)	(3.48)	
8	Gram	1972-00	54.73	2.56	0.2599	713.82	-1.68	-0.028*
		n=28	(4.16)	(3.23)		(12.85)	(-0.50*)	
9	Arhar	1972-00	80.47	13.54	0.8476	447.93	15.21	0.4600
		n=28	(4.40)	(12.29)		(8.68)	(3.10)	
10	O.Pulses	1972-00	261.63	4.44	0.2379	245.74	7.36	0.1673
		n=28	(10.87)	(3.07)		(5.09)	(2.53)	
11	G'nuts	1972-00	1826.34	3.53	-0.0227*	671.48	8.54	-0.005*
		n=28	(19.67)	(0.63*)		(4.42)	(0.93*)	
12	Sesamum	1972-00	44.95	8.76	0.8033	217.62	6.66	0.1128
		n=28	(3.25)	(10.55)		(4.14)	(2.10)	
13	R'sd&Must	1972-00	19.52	14.10	0.8414	424.92	33.78	0.5364
		n=28	(1.00*)	(12.01)		(4.30)	(5.67)	
14	Castor	1972-00	26.26	12.90	0.8478	778.76	38.50	0.6513
		n=28	(1.50*)	(12.30)		(8.73)	(7.17)	
15	Soyabeans	1980-00	13.83	-0.04	-0.0535*	209.50	22.86	0.3267
		n=20	(2.92)	(0.18*)		(1.51*)	(3.19)	
(cont.)								
Note: Figures in the parentheses are t-values. * Not Statistically Significant At 5% Level.								

Table 6 :Linear Time-Trend Regressions For Area And Yield By Crops In Gujarat *(Concl.)*

No.	*Crop*	*Period*	*Area*			*Yield*	
			Intercept	*Slope*	*Adj.R^2*	*Intercept*	*Slope*
16	Cotton	1972-00	1716.31	-18.97	0.2630	133.25	6.35
		N=28	(17.77)	(-3.26)		(8.53)	(6.75)
17	Sugarcane	1972-00	20.89	5.52	0.9036	53722.92	1035.93
		N=28	(3.63)	(15.94)		(14.53)	(4.65)
18	Tobacco	1972-00	89.97	0.82	0.2155	1619.23	-1.13
		N=28	(18.96)	(2.90)		(16.25)	(-0.18*)
19	Chillies	1972-00	12.90	0.15	0.1794	165.86	22.95
		N=28	(13.02)	(2.62)		(10.36)	(6.97)
20	Ginger	1972-00	0.27	0.16	0.3012	-3006.10	430.94
		N=28	(3.61)	(6.55)		(-1.94*)	(4.63)
21	Garlic	1974-00	9.71	0.29	-0.0597*	4222.68	54.67
		N=26	(3.11)	(1.60*)		(14.26)	(3.18)
22	Potatoes	1972-00	1.00	0.94	0.8662	24852.19	-57.57
		N=28	(0.85*)	(13.26)		(17.44)	(-0.67*)
23	Onions	1978-00	1.87	0.90	0.4068	23147.42	120.51
		N=22	(0.43*)	(3.92)		(11.64)	(1.12*)
24	Brinjal	1993-00	-12.28	1.42	0.4138	-176.00	19.42
		N=7	(0.78*)	(2.28)		(-0.90*)	(2.49)
25	G'seed	1972-00	128.14	-0.10	-0.0381*	337.48	4.26
		N=28	(6.43)	(-0.08*)		(4.57)	(0.96*)
26	Fruits&Nuts	1991-00	-124.46	11.20	0.9002	36091.64	-866.46
		N=9	(-3.93)	(8.55)		(5.46)	(-3.16)
27	Chickoo	1991-00	-25.17	1.51	0.8843	21595.35	-467.36
		N=9	(-5.42)	(7.88)		(7.39)	(-3.86)
28	Lemons	1993-00	-27.64	1.64	0.9376	57018.14	-1840.14
		N=7	(-6.40)	(9.55)		(2.22)	(-1.80*)
29	Bananas	1972-00	11.11	0.58	0.4325	26406.19	721.59
		N=28	(5.28)	(4.64)		(5.10)	(2.31)
30	Papaya	1991-00	2.97	0.03	-0.121*	78190.00	-1382.50
		N=9	(1.35*)	(0.36*)		(7.85)	(-3.35)

Note: Figures In The Parentheses Are T-Values.

* Not Statistically Significant At 5% Level.

Source: Calculated From Data Given In *CMIE* (2001)

It can be readily seen that 12 out of the 30 crops show significant positive time trend in both area and yield over the past 3 decades. As many as 26 out of 30 crops show significant positive trend either in the yield or the area. The cropping pattern in Gujarat has been changing over time as can be inferred from the table. There are 19 crops where the trend in area is positive and significant while there are 5 crops where the trend is negative and significant. These 5 crops are essentially low value traditional crops whereas the 19 crops include some of the high value - high business potential crops. The agriculture in Gujarat thus does not present a dismal and pessimistic picture. On the contrary, all these evidences suggest a vibrant and very responsive agricultural sector in Gujarat.*[4]

The supply of the basic agri-products from Gujarat in future needs to be growing rapidly with reasonable stability and consistency. There seems to be enough potential for the agricultural growth in the state. However, unlike the *Gujarat Agro Vision-2010*, the potential for agricultural growth needs to be realistically estimated rather than over-optimistically stated. *[5] (See, Government of Gujarat, 2002). *Table* 7 provides the highest yield rates by 33 crops observed during 1997-2000 and 1989-1992 triennums in Gujarat, all India average and the maximum in any state in the country. The table also provides the highest yield rate by crops ever achieved in Gujarat over the last 3 decades.

*[4] The *Agro Vision-2010* visualizes the growth of real GSDP in Gujarat agriculture at 6.8% p.a. compared to the national target of 4% p.a. Our performance over the last two decades is considerably below 2% p.a.

*[5] One of the possible reasons why the quick estimates of GSDP in Gujarat's agriculture fail to capture realistic picture of the sector is the use of outdated weights in crop forecasting. As of now, the quick estimates are derived using base of the triennium ending 1969-70 = 100. On the other hand, as we have seen, there are substantial changes in the structure and cropping pattern in the state over the past three decades.

It can be seen that Gujarat is currently at the top of the table in five crops – jowar, rapeseed & mustard, castor, garlic and onions. It was enjoying the top yield rate in the country in lemons and bananas during the early nineties. Moreover, Gujarat has recently achieved higher yield rate than the all India average in as many as 22 crops out of the 33 most relevant crops. Thus, all in all, Gujarat has an above-average performance in the agricultural sector in the country. However, Gujarat's own current performance compared to its past achievements in different crops is not very satisfactory. In as many as 17 crops out of the 33 crops, Gujarat had achieved much higher yield rates in the past compared to the maximum achieved during the last 3 years. Thus, it is not implausible or even moderately ambitious for the state agriculture to achieve something which was already achieved in the past. If we consider the maximum yield rate achieved so far in the state in different crops and also consider the maximum area under each crop during the last 3 years as the reference cropping pattern, the potential increase in the agricultural output would be 7%. This could be our short term target for improving the agricultural productivity.

In the medium term, however, the state should aim at achieving the level of the yield rates already achieved by the best performer state in different crops during 1997-2000 period. This is again a tough but not unachievable or too optimistic a target. With this assumption, the potential increase in the state's agricultural output would be about 50%. It is possible to achieve this target by 2010, i.e., in the next 8 years. It implies a compound growth of 5% p.a. in the total agricultural production. The increase in the real value added or GSDP in the agricultural sector is likely to be marginally less than 5% p.a. assuming an increase in the input proportion over time on account of greater capital intensity in the sector. We can argue that targeting the growth of real GSDP in agriculture in Gujarat higher than 4.5% to 5% p.a. over the

next 8 to 10 years is becoming unrealistic and over-ambitious. Any business planning for agri-business development in Gujarat and exports of agri-products from Gujarat has to be on realistic and plausible growth expectations. Otherwise there could be disastrous implications.

***Table 7* :Yield Rates By Crops-Comparison Over The Last Decade Of Gujarat and All-India**

No.	Crop	Highest During 1997-00			Highest During 1989-92 **			Max In Guj.	
			Yield In Kg/Ha			Yield In Kg/Ha			
		Guj.	India	Max.	Guj.	India	Max.	Yield	Year
1	Rice	1630	1990	Pun 3350	1490	1750	Pun 3510	1630	1998-99
2	Wheat	2427	2750	Pun 4700	2210	2390	Pun 3800	2720	1994-95
3	Jowar	1200	859	Guj 1200	500	870	Mah 1030	1200	1999-00
4	Bajra	1360	791	Up 1440	1000	660	Up 1190	1360	1997-98
5	Maize	1700	1800	Ap 3470	1490	1630	Ap 2240	1800	1975-76
6	Ragi	1110	1480	Tn 2040	850	1210	Tn 1870	1110	1999-00
7	S.Millets	420	460	Up 1080	600	490	Up 980	910	1975-76
8	Gram	870	810	Hp 1500	680	740	Bih 980	960	1983-84
9	Arhar	950	800	Wb 3333	880	760	Bih 1240	950	1998-99
10	O.Pulses	580	466	Up 881	460	480	Up 830	620	1983-84
11	G'nuts	1358	1214	Tn 1800	820	930	Ori 1410	1580	1988-89
12	Sesamum	600	340	Wb 854	679	330	Wb 880	600	1997-98
13	R'sd&Mst	1390	982	Guj 1390	1170	900	Har 1340	1390	1998-99
14	Castor	1994	1292	Guj 1994	1600	880	Guj 1600	1994	1998-99
15	Soyabean	820	1135	Raj 1315	1140	1010	Up 1300	1140	1990-91
16	Coconut *	6883	7145	Mah 15020	Na	6410	Mah15380	6883	1997-98
17	Cotton	400	226	Har 408	250	250	Har 430	400	1998-99
18	S'cane	71730	72560	Tn 110270	89600	66070	Tn 104570	89600	1990-91
19	Tobacco	1660	1449	Up 7122	1810	1370	Up 4780	2060	1978-79
20	Chillies	1150	1112	Ap 2360	1290	880	Ap 1660	1290	1989-90
21	Ginger	17952	3390	Tn 30645	1000	2890	Tn 19200	17952	1999-00
22	Garlic	7028	4632	Guj 7028	4960	3930	Mah 6920	7028	1998-99
23	Potatoe	22560	18643	Wb 23686	28500	15900	Tn 29310	32920	1984-85
24	Onions	29482	11390	Guj 29482	27310	11090	Pun 27650	32960	1984-85
25	Brinjal	13940	16225	Bih 20010	15000	15340	Bih 20300	428	1999-00
26	G'seed	660	420	Pun 884	640	490	Pun 980	660	1997-98
27	Frt&Nut	13488	11983	Tn 25597	19100	11983	Tn 20160	19100	1993-94
28	Chicoo	9400	13250	Kar 17709	12000	14540	Kar 18400	12000	1994-95
29	Lemons	9982	9030	Ap 15010	20000	10110	Guj 20000	20000	1994-95
30	Bananas	35660	34148	Mah 60000	55500	20290	Guj 55500	62700	1988-89
31	Papaya	42160	27540	Kar 87160	Na	22650	Kar 87000	50000	1994-95
32	Guavas	17574	11900	Mp 20000	Na	10790	Mp 20010	17574	1997-98
33	Mango	6464	7390	Bih 12000	Na	8310	Bih 12000	6464	1997-98

* Coconuts : Yield In Nuts/Ha.

** For Crops Nos. 25,27,28,29,31 Previous Year Stands As 1991-1994

Source: *CMIE*, Agriculture, Nov 2001

IV. Concluding Remarks :

With dismantling of quota and opening up of the agricultural trade as a consequence of the WTO and GATT agreements, new opportunities have emerged for agri-business and agri-exports in the country. Gujarat like many other states has not lagged behind in the race for preparing reports and policy papers assessing the potential for agro-processing, identifying constraints in the development and exports of agri-products, and suggesting or announcing several important policy measures removing physical and financial infrastructural bottlenecks and promoting R&D activities in the sector (see, for instance, CII, 2000; Government of Gujarat, 2000; GCCI, 2002; Government of Gujarat,2000(a); etc.). However, there is a need to exercise some caution in this matter. The whole exercise in these documents lacks a touch of realism because it fails to consider the overall growth prospects in the economy and in the sector. Moreover, these documents fail to recognise effectively a very important feature of the exports of the agri-products in the state, viz., that they arise as excess supply and not as exclusive supply for the export markets. Although these documents have examined in details the implications of the WTO and GATT on agri-business and agri-exports of Gujarat, they have not explicitly recognised the most obvious implication that now there is an opportunity for the agri-business in the state to focus on exclusive supply to the export markets. The strategy and policy implications of this shift are very different.

For exclusive supply to export market, the quality standards have to be met according to the requirements of the destination and not the domestic market. This calls forth a large scale of production, assured input supplies and good logistics ad infrastructural facilities. A large scale unit can pay for all these services and also

economically invest in R&D activities and technological upgradation required from time to time. This, therefore, requires creating an appropriate land market by relaxing the laws on the transfer of agricultural land. Alternatively, contract farming needs to be recognised and encouraged. This calls forth research on optimal contracts to avoid the problem of moral hazard leading to inefficiencies in the principal-agent problems. Devising proper incentives or in other words framing appropriate rules of the game holds the key. There is also a need to stop further decline in the average size of holding*[6] by prohibiting sub-division and fragmentation of agricultural land below the size of 2 hectares.

Moreover, with free movement of agricultural commodities allowed across states in India recently, there is a need to look at the concept of diversification of agriculture and cropping pattern more critically. It is true that diversification leads to reduced risk – but there is also efficiency loss associated with certain type of diversification. It is possible to argue that the diversification needs to reduce or the specialisation in the cropping pattern needs to increase at the state level for the optimal resource allocation and utilisation particularly after the agricultural commodities are allowed to be freely mobile within the country. Liberalisation of the international trade in agri-products also has similar impact on the cropping pattern as the liberalisation of internal trade. There is a need to focus on the optimal cropping patterns in different regions not only from the agro-climatic angle but also from socio-economic angle. The factors responsible for the supply and the supply responsiveness of different agri-products are also very relevant topics for the social science research in the field. Estimation of various demand elasticities and excess supply elasticities are also important areas of research. Last but not the least, we

*[6] Average size of holding in Gujarat stood at 2.9 ha. compared to 1.6 ha. for the country in 1990.

need to have a similar focus and detailed studies on imports of agri-products in Gujarat and what are their uses and contribution to value addition in the state. This is because, it can open up several opportunities for business in the agri-products.

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