

Exports of Agri-Products from Gujarat: Problems and Prospects

Ravindra H Dholakia

Executive Summary

This paper follows a narrow definition of agri-products that include products of agriculture, horticulture, floriculture, animal husbandry, and poultry. Like most other states in India, Gujarat has also prepared several reports and policy papers assessing the potential for agro-processing, identifying constraints in the development and exports of agri-products, suggesting or announcing several important policy measures for removing physical and financial infrastructural bottlenecks, and promoting R&D activities in the sector. However, these exercises lack realistic assessment of the potential, important features of agri-exports from the state, and Gujarat's comparative advantage over the rest of the country in specific product categories. This paper addresses these aspects.

A recent survey of exports originating from Gujarat conducted by the Gujarat Industrial Technical Consultancy Organization (GITCO) estimated that, during the year 2000-01, Gujarat contributed Rs 495 billion (or 20.8%) out of the total national exports of Rs 2,385 billion. However, excluding gems and jewellery and petroleum products, Gujarat's share in the national exports is only 9.2 per cent. Compared to this overall proportion, Gujarat's share in national exports in commodities like groundnut, oil-meals, castor oil, poultry, dairy products, spices, sesame and niger seeds, and processed food, fruits, and vegetables is much higher indicating Gujarat's revealed comparative advantage in these product categories.

Some important features of the exports activity in Gujarat are:

- Only 20 per cent are pure traders in the export business.
- Only a quarter of the units have 'export house' or upward status for special benefits.
- More than 40 per cent of the exporting units have come up after 1991-92.
- Two-thirds of the exporters belong to small and medium enterprises.
- Export intensity of Gujarat's agricultural sector is about 12 per cent.
- Agri-exports represent excess supply and hence highly volatile and fluctuating activity over time.
- Agri-exports are price elastic.
- Agri-exports would be highly responsive to exchange rate depreciation.

In recent years, Gujarat's agriculture shows considerable dynamic characteristics in contrast to the gloomy official income estimates in the sector. Nineteen out of 30 crops show significant positive time trend in area while five crops show significant negative trend. The cropping pattern in Gujarat has been shifting away from the low value traditional crops to high value commercial crops with business and export potential. A detailed consideration of yield rates of different crops in the state and other states over the past three decades indicates a realistic potential of 5 per cent per annum growth rate for agriculture in Gujarat over the next eight to ten years.

In order to ensure exclusive and regular supply to the export market, quality standards have to be according to the foreign destination and not the domestic market. This calls for large-scale production, assured input supplies, good logistics, infrastructural facilities, R&D activities, and technological upgradation. This involves giving priority to investments in several infrastructural facilities and agricultural R&D besides perfecting agricultural land market and encouraging contract farming in the state. ♡

KEY WORDS

Agri-business

Exports

Gujarat Economy

Agricultural Growth

Comparative Advantage

With dismantling of quota and opening up of agricultural trade as a consequence of the World Trade Organization (WTO) and General Agreement on Trade and Tariffs (GATT) agreements, new opportunities have emerged for agri-business and agri-exports in the country. Like many other states, Gujarat 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, suggesting or announcing several important policy measures, removing physical and financial infrastructural bottlenecks, and promoting R&D activities in the sector (CII, 2000; Government of Gujarat, 2000; GCCI, 2002; Government of Gujarat, 2000a). Although these documents have examined, in detail, the implications of the WTO and GATT on agri-business and agri-exports of Gujarat, they have failed to consider realistically the overall growth potential in the agricultural sector of the state. Further, they have not explicitly considered some important features of agri-exports from the state as well. Similarly, these documents have not clearly examined whether Gujarat has comparative advantage in the exports of agri-products over the rest of the country by specific product categories. This paper, therefore, makes an attempt to address these issues with the help of readily available evidence. We may clarify at the outset that we follow a narrow definition of agri-products here which would include products of the 'agriculture and allied activities' sector of the national accounts. Thus, it would include agriculture, horticulture, floriculture, animal husbandry, and poultry.

COMPARATIVE ADVANTAGE OF GUJARAT

In this section, we consider the findings of a survey recently conducted by Gujarat Industrial and Technical Consultancy Organization (GITCO) on estimating exports from Gujarat during the year 2000-01. From the findings of the survey, it is possible to examine the comparative advantage of Gujarat over the rest of India in various commodity groups including agri-products. The measure used for the purpose is the coefficient of Revealed Comparative Advantage (RCA) popularized by Balassa (1977).

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 seaports and even an

airport having international links. Therefore, not all exports from Gujarat necessarily originate from Gujarat. Similarly, some portion of exports from ports outside Gujarat may also originate from Gujarat. Traditionally, this type of information gets routinely collected by the Customs Department but are not collated 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 (Committee on Regional Accounts, 1976). 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 collate and segregate this type of information by states (National Statistical Commission, 2001). There are some conceptual and practical issues to be resolved for proper 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 final report in March 2002. The study follows the concept of value of the exported commodities and not value added in exports. Thus, like the national exports, the study estimates the exports from Gujarat also at market prices. The study considered six major outlets for the exports from Gujarat. These are: (i) Gujarat Maritime Board (GMB) ports; (ii) Kandla sea port; (iii) Ahmedabad airport; (iv) Mumbai sea port; (v) JNPT port (Mumbai); and (vi) Mumbai airport. While the first three are Gujarat-based, the remaining three are Mumbai-based. By considering the origin of commodity-wise cargo from Gujarat-based outlets, the report estimated that out of the total exports worth Rs 171.98 billion from these outlets, exports originating from Gujarat are of the order of Rs 111.67 billion. Methodologically, this is ideal. However, since similar data were not available² for Mumbai-based outlets, the data from the four Inland Container Depots from Gujarat and trade reports were analysed. It was estimated that exports worth Rs 383.29 billion from Mumbai-based outlets originated from Gujarat. Although these are not ideal estimates, they may be considered good approximations under the current state of data availability. The total exports originating from Gujarat during 2000-01 were estimated at Rs 494.96 billion. For the same year, thus, Gujarat accounts for a little more than one-fifth of the total exports of Rs

2,384.90 billion from the country. Compared to other parameters like population, income, manufacturing, new investments, etc., Gujarat's share in the national exports is remarkably high. Thus, it is possible to establish from the survey results that Gujarat has a definite comparative advantage in the export activity over other states in India.

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 RCA for Gujarat in different commodities. The coefficient of RCA is calculated as (Balassa, 1977):

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

where X_{iG} and X_i are exports from Gujarat and all-India for the commodity i ; and X_G and X are the total exports of Gujarat and all-India. As per this measure, a region has comparative advantage in a commodity for which the RCA coefficient is greater than one. This is because if Gujarat has a higher share in the national exports of a commodity than its share in the total national exports, the state must have comparative advantage in the exports of that particular commodity. The concept of RCA

captures this simple logic. There are 11 commodity groups accounting for all exports of agri-products from Gujarat. The share of Gujarat in the total agri-product exports in the country works out to 12.8 per cent. However, there are other commodity groups like gems and jewellery and petroleum products where Gujarat's share in the nation's exports is well above 70 per cent. When we consider the exports of all products, Table 1 shows that Gujarat has RCA over other states in groundnuts, oilmeals, castor oil, poultry, and dairy products among the agri-products; and minerals, gems and jewellery, chemicals, and petroleum products among the rest of the products. However, if we exclude gems and jewellery and petroleum product categories, Gujarat's share in the national exports of the remaining products is only 9.2 per cent. If we compare against this modified base, we find that Gujarat has RCA over other states also in spices, sesame and niger seeds, and processed food, fruits, and vegetables.

Table 1 further reveals that Gujarat neither has a comparative advantage in traditional agricultural products like rice and molasses nor has it shown any comparative advantage in the emerging areas of floriculture, fresh fruits and vegetables, and fish over the rest of India in 2000-01. So far, Gujarat has shown good export per-

Table 1: RCA of Gujarat in Exports by Commodity Sectors, 2000-01

No.	Commodity Sectors	Exports (Rs in Billion)		Gujarat/ India (%)	RCA with	
		All-India	Gujarat		Total Exports	Exports Excluding Gems and Petroleum Products
I	Agriculture and allied products	176.65	22.57	12.78	0.62	1.39
	Rice	29.26	1.46	4.99	0.24	0.54
	Spices	16.22	1.97	12.15	0.59	1.32
	Sesame and niger seeds	5.98	1.16	19.40	0.93	2.11
	Groundnut	3.16	1.25	39.56	1.91	4.30
	Oilmeals	20.44	5.03	24.61	1.19	2.68
	Castor oil	9.53	8.56	89.82	4.33	9.77
	Molasses	5.03	0.20	3.98	0.19	0.43
	Fresh fruits and vegetables	8.40	0.40	4.76	0.23	0.52
	Processed food, fruits and vegetables	13.28	2.00	15.06	0.73	1.64
	Poultry and dairy products	2.13	0.50	23.47	1.13	2.55
	Floriculture	1.33	0.04	3.01	0.15	0.33
II	Marine	63.68	3.90	6.12	0.29	0.67
III	Minerals	52.90	8.36	15.80	0.76	1.72
IV	Gems and jewellery	337.57	250.37	74.17	3.57	—
V	Chemicals	282.47	62.34	22.07	1.06	2.40
VI	Textiles	464.59	57.00	12.27	0.59	1.34
VII	Petroleum products	83.09	64.09	77.13	3.72	—
	Other products	956.71	26.33	2.75	0.13	0.30
	Total	2384.90	494.96	20.75	—	—
	Total (Excl. IV & VII)	1964.24	180.50	9.19	—	—

Source: Calculated from GITCO (2001) study.

formance compared to the other states in the country in the traditionally commercial crops and poultry and dairy products. The state can concentrate on the new commercial crops with a clear focus on exports because it has a comparative advantage in agri-products in general.

FEATURES OF EXPORTS ORIGINATING FROM GUJARAT

In this section, we discuss some interesting features of exports from Gujarat as revealed by the GITCO survey (2001) and their implications on policy. For the first time, the GITCO study conducted a large-scale, systematic sample survey covering 1,224 units out of the estimated total number of 3,000 exporting units in the state. Thus, the sample size was about 40 per cent in terms of units and about 43 per cent in terms of value of exports. Excluding the export of gems and jewellery that constitutes about half of the total exports from Gujarat, the sample accounted for almost 83 per cent of the remaining exports of Gujarat. Thus, for the remaining products, the survey is expected to be fairly representative and exhaustive. The survey revealed some very interesting features of the export sector in Gujarat which are as follows:

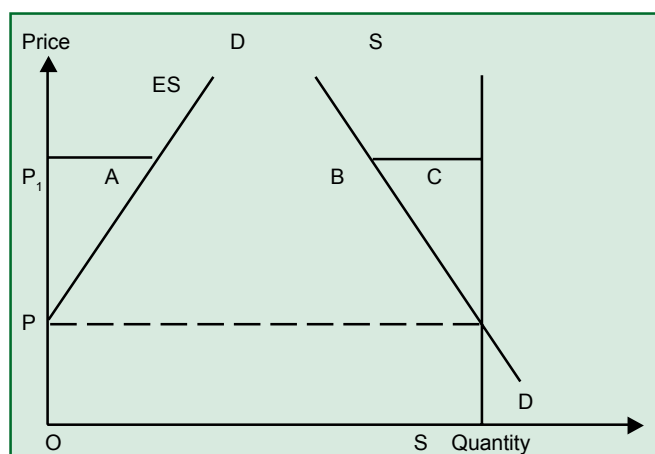
- Almost 50 per cent of the exporters are private proprietors or partnership concerns.
- More than 80 per cent are producers and exporters implying that only 20 per cent are pure traders in the export business in the state.
- Only a quarter of the units have the 'export house' or upward status for special benefits.
- More than 40 per cent of the exporting units have come up only after 1991-92.
- Only 10 per cent of the exporting units are in the agri-product sector.
- There are a large number of small and medium scale exporters in Gujarat with 29 per cent of the exporters having less than Rs 5 million of exports and 37 per cent having exports between Rs 5 million and Rs 50 million. Thus, about two-thirds of the exporters in Gujarat belong to the small and medium enterprises. This proportion is likely to be almost 100 per cent in the agri-products sector in Gujarat.

Since the GITCO study (2001) provides a definite estimate of the exports of agricultural products originating from Gujarat for the first time, it is possible to combine it with the state income accounts to derive an esti-

mate of the export intensity of the sector in the state and in the nation. Export intensity or export orientation can be defined as the proportion of exports in the total value of output produced in the sector. From the value of exports and the value of gross output in the agricultural sector at the national level (EPWRF, 2002) and at the state level (DES, 2002), we find that the export intensity in the agricultural sector is only 3.2 per cent at the national level, but 11.9 per cent in Gujarat. Although Gujarat's export orientation in agriculture is about four times higher than the nation, it is still very low. This is largely on account of the subsistence nature of agriculture as reflected by the average size of holding that stood at 1.6 hectare in the country and 2.9 hectare in Gujarat in 1990. However, such a low proportion of exports in total output is an important feature of the export activity in the sector. It appears that export is carried out only if there is a surplus or a glut in the domestic market. As a result, this does not become a stable activity but a highly volatile and fluctuating activity over time.

It is clear that the exports of agri-products originating from Gujarat as well as the nation represents basically the excess supply rather than targeted production or exclusive supply for the foreign markets. This feature has some interesting implications for price elasticity and the non-price aspects of exports of the agri-products. Figure 1 depicts an extreme case of perfectly inelastic supply (SS) and a relatively inelastic demand (DD) of a good in the domestic market with the equilibrium price at P. The excess supply curve is then derived as ES curve such that the horizontal distance of the curve from the vertical axis is the same as between the DD and the SS curve of the domestic market at different prices. Thus, $P_1A = BC$. It can, then, be easily seen that at any price P_1 , the excess supply curve (ES) is more price elastic than both the demand (DD) and the supply (SS) curves. If the supply curve is upward sloping, this result is even sharper.³ Moreover, it can be seen from Figure 1 that the price elasticity of export supply as an excess supply will invariably be greater than one if, in the absence of exports, the equilibrium price in the domestic market is positive. This is a significant result considering the general pessimism and empirical findings of price inelastic supply and demand for agricultural products in India.⁴ Figure 1, thus, clearly suggests that exchange rate is an important determinant of the export supply of agri-products. It is not the Marshall-Lerner condition but the exchange rate pass-through and volatility that would be

Figure 1: Export as Excess Supply



critical for policy purposes.

In this context, it is interesting to note that import intensity of exports is an important factor for the effectiveness of exchange rate changes on export supply. Dholakia and Kapur (2001) find that import intensity of the Indian private corporate sector is higher than its export intensity. As a result, exchange rate depreciation is not likely to provide incentives for enhanced supply of manufactured exports from the country. This argument, however, is not likely to be valid for the supply of agri-exports from Gujarat since the export intensity of the agri-products sector in Gujarat is estimated at 11.9 per cent against 3.2 per cent at the national level. The import intensity of agri-products may be higher than 3.2 per cent but would significantly be less than 11.9 per cent. Thus, exchange rate depreciation is likely to provide good incentives for the supply of agri-exports from Gujarat.

The non-price implication of the feature of agri-exports being an excess supply is that the domestic buyers would largely determine the quality of the agri-products exports since there is little concern about the foreign markets on a sustained basis. As per the GITCO survey (2001), a large proportion of exporters of agri-products are only traders in the state and do not have a regular 'export house' or an upward status for special benefits. They are not likely to have any clear incentives for investing in the development of regular export market of agri-products nor are they likely to have any incentives in nurturing and developing long-term relationship with the producers of quality products in the state if their prices are not lower. Thus, the non-price factors when the exports are considered as excess supply instead of exclusive supply tend to become less relevant than the price-related factors. In this context, WTO and the Uruguay Round of GATT have

provided a significant incentive by dismantling the quota, tariffing the quota on exports as well as imports, and 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.

POTENTIAL OF AGRICULTURE IN GUJARAT

The demand for 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 (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 merchant exporters bringing with them foreign demand for agri-products in Gujarat. Moreover, there are positive evidences to suggest that the domestic consumption demand for agri-products in Gujarat must have risen significantly during the past 15 years or so. This is seen from Table 2 which reports a sharp decline in the population living below poverty line since 1987-88 both in relative as well as absolute terms. This is conclusively established by a very recent study putting all controversies on the official estimates of poverty at rest (Deaton and 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 per cent. Similarly, Deaton and Dreze (2002) also report a very healthy growth of 16.8 per cent in the average per capita consumption expenditure (APCE) over the period 1993-94 to 1999-2000. In terms of APCE growth, Gujarat ranks seventh 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.

It is, however, the supply of agricultural products in Gujarat that is causing concern. As per the official estimates, the level of agricultural real income in 2000-01 is absolutely lower than the level reached in 1980-81. Table 3 provides the indices of the real Gross State Domestic

Table 2: Number and Percentage of Below Poverty Line Population in Gujarat

Year	Rural Area		Urban Area		Total Gujarat	
	Number in Million	% Population	Number in Million	% Population	Number in Million	% Population
1973-74	9.461	46.35	4.381	52.57	13.842	48.15
1977-78	9.253	41.76	3.835	40.02	13.088	41.23
1983	7.288	29.80	4.504	39.14	11.792	32.79
1987-88	7.413	28.67	4.822	37.26	12.236	31.54
	(10.190)	(39.40)	(2.120)	(16.40)	(12.310)	(31.70)
1993-94	6.216	22.18	4.302	27.89	10.519	24.21
	(9.110)	(32.50)	(2.270)	(14.70)	(11.380)	(26.20)
1999-00	3.98	13.17	2.809	15.59	6.789	14.07
	(6.040)	(20.00)	(1.150)	(5.40)	(7.190)	(14.90)

Source: Planning Commission, Government of India, New Delhi.

Note: Figures in parentheses are the 'adjusted estimates' prepared by Deaton and Dreze (*EPW*, September 7, 2002).

Product (GSDP) in agriculture in Gujarat since 1980-81.⁵ The table reveals heavy fluctuations in the agricultural incomes in Gujarat throughout the past two decades. According to these official estimates, the down-turn in the agricultural income has started since 1996-97 and still continues. However, notwithstanding this, the log-linear time trend shows a positive growth of about 1.7 per cent per annum, statistically significant only at 10 per cent level. The r^2 of 0.14 is too poor to use the trend for the purpose of prediction. 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 data availability in Gujarat, the latest year for which the official figures are available is 1998-99 (Government of Gujarat, 2003). As per these statistics, there has been an increase in the net sown area by 4 per cent during the nineties. Similarly, there is a steady reduction in the fallow land by over 35 per cent. The cultivable waste is more or less constant but stands at about 20 per cent 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. Second, there is a good potential to raise agricultural growth in Gujarat in future by exploiting cultivable wasteland.

The second indicator for agricultural performance is

in terms of the progress of irrigation. Again, the official data are available only up to 1998-99 (Government of Gujarat, 2003). Here also, there has been a steady and significant increase in the area irrigated to area sown during 1980-81 to 1990-91 and 1998-99. By 1998-99, almost one-third of the area was irrigated. Within the irrigated land, the food crops received a larger cover (54%) than the non-food crops (46%).

The third indicator is the use of traditional and modern implements in agriculture. Livestock census provides the relevant data. As per these figures, the use of all traditional implements like ploughs, carts, oil engines, and electric pump-sets shows a clear decline in Gujarat from 1988 to 1992 and further 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 (Government of Gujarat, 2003). It can be clearly seen from these two indicators that there is a marked shift in favour of modern inputs leading to technological progress in the agricultural sector of Gujarat.

The fourth indicator, again from the livestock census, is 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 and further to 1997 (Government of Gujarat, 2003).

Table 3: Indices of Real GSDP in Agriculture in Gujarat, 1993-94=100

Year	Agriculture	Year	Agriculture	Year	Agriculture
1980-81	95.24	1987-88	48.77	1994-95	144.37
1981-82	113.18	1988-89	130.01	1995-96	125.83
1982-83	97.25	1989-90	114.34	1996-97	172.02
1983-84	118.73	1990-91	106.52	1997-98	156.06
1984-85	119.44	1991-92	87.40	1998-99	158.09
1985-86	90.55	1992-93	132.49	1999-00	108.31
1986-87	90.56	1993-94	100.00	2000-01	93.04

Source: Calculated from DES (2002) and DES (1998).

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

The fifth indicator about the performance of agriculture in Gujarat during the nineties is in terms of the growth of real wages of the agricultural labour. As noted earlier, Deaton and Dreze (2002) report a very high annual growth of more than six per cent 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 (Government of Gujarat, 2003). Both these empirical findings are not consistent with the declining real income in Gujarat agriculture revealed by the official 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 for most of the crops are available for the period 1972-73 to 1999-2000. The selected 30 crops almost exhaust (99%) 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 Appendix and summarized in Table 4. As expected, not all the 60 time-trends are statistically significant.

It is evident from Table 4 that 12 out of the 30 crops show significant positive time-trend in both area and yield over the past three 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. There are 19 crops where the trend in area is positive and significant while there are five crops where the trend is negative and significant. These five crops are essentially low value traditional crops whereas the 19 crops include some of the high value, high business potential crops. The agricultural scenario in Gujarat, thus, does not present a dismal and pessimistic picture as sug-

gested by the official GSDP estimates. On the contrary, all these evidences suggest a vibrant and a very responsive agricultural sector in Gujarat.⁶

The supply of basic agri-products from Gujarat in future needs to grow rapidly with reasonable stability and consistency. There seems to be enough potential for 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 stated⁷ (Government of Gujarat, 2000). In order to assess the growth potential of Gujarat's agriculture, we look at Table 5 that provides the highest yield rates by 33 crops observed during 1997-2000 and 1989-1992 trienniums 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 three decades.

It can be seen from Table 5 that Gujarat is currently at the top in five crops — jowar, rapeseed and mustard, castor, garlic, and onions. While it was enjoying the top yield rate in the country in lemons and bananas during the early nineties, it has recently achieved higher yield rate than the all-India average in as many as 22 out of the 33 most relevant crops. Thus, overall, Gujarat has an above-average performance in the agricultural sector in the country. However, the state's current performance compared to its past achievements in different crops is not very satisfactory as it had achieved much higher yield rates in the past in as many as 17 out of the 33 crops, compared to the maximum achieved during the last three years. Thus, it is not implausible for the state agriculture to achieve higher yields as it had done 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 three years as the reference cropping pattern, the potential increase in the agricultural output is estimated to be 7 per cent. This could be the short-term target for improving the agricultural productivity in the state.

Table 4: Summary of Time Trend for Area and Yield by Crops in Gujarat

Yield \ Area ⇒	Significant Positive Time-trend	Insignificant Time-trend	Significant Negative Time-trend
Significant positive time-trend	Rice, maize, arhar, other pulses, sesame, rapeseed and mustard, castor, sugarcane, chilli, ginger, brinjal, banana	Wheat, soyabean, garlic	Jowar, bajra, ragi, cotton
Insignificant time-trend	Gram, tobacco, potato, onion, lemon	Groundnut, guarseed	
Significant negative time-trend	Fruits and nuts, chickoo	Papaya	Smaller millets

Table 5: Yield Rates by Crops—Comparison over the Last Decade of Gujarat and All-India

No.	Crop	Highest During 1997-00 Yield in Kg/Ha			Highest During 1989-92** Yield in Kg/Ha			Maximum in Gujarat	
		Gujarat	India	Maximum	Gujarat	India	Maximum	Yield	Year
01	Rice	1,630	1,990	Pun 3,350	1,490	1,750	Pun 3,510	1,630	1998-99
02	Wheat	2,427	2,750	Pun 4,700	2,210	2,390	Pun 3,800	2,720	1994-95
03	Jowar	1,200	859	Guj 1,200	500	870	Mah 1,030	1,200	1999-00
04	Bajra	1,360	791	UP 1,440	1,000	660	UP 1,190	1,360	1997-98
05	Maize	1,700	1,800	AP 3,470	1,490	1,630	AP 2,240	1,800	1975-76
06	Ragi	1,110	1,480	TN 2,040	850	1,210	TN 1,870	1,110	1999-00
07	Smaller millets	420	460	UP 1,080	600	490	UP 980	910	1975-76
08	Gram	870	810	HP 1,500	680	740	Bih 980	960	1983-84
09	Arhar	950	800	WB 3,333	880	760	Bih 1,240	950	1998-99
10	Other pulses	580	466	UP 881	460	480	UP 830	620	1983-84
11	Groundnut	1,358	1,214	TN 1,800	820	930	Ori 1,410	1,580	1988-89
12	Sesamum	600	340	WB 854	679	330	WB 880	600	1997-98
13	Rapeseed and mustard	1,390	982	Guj 1,390	1,170	900	Har 1,340	1,390	1998-99
14	Castor	1,994	1,292	Guj 1,994	1,600	880	Guj 1,600	1,994	1998-99
15	Soyabean	820	1,135	Raj 1,315	1,140	1,010	UP 1,300	1,140	1990-91
16	Coconut*	6,883	7,145	Mah 15,020	Na	6,410	Mah 15,380	6,883	1997-98
17	Cotton	400	226	Har 408	250	250	Har 430	400	1998-99
18	Sugarcane	71,730	72,560	TN 1,10,270	89,600	66,070	TN 1,04,570	89,600	1990-91
19	Tobacco	1,660	1,449	UP 7,122	1,810	1,370	UP 4,780	2,060	1978-79
20	Chillies	1,150	1,112	AP 2,360	1,290	880	AP 1,660	1,290	1989-90
21	Ginger	17,952	3,390	TN 30,645	1,000	2,890	TN 19,200	17,952	1999-00
22	Garlic	7,028	4,632	Guj 7,028	4,960	3,930	Mah 6,920	7,028	1998-99
23	Potato	22,560	18,643	WB 23,686	28,500	15,900	TN 29,310	32,920	1984-85
24	Onion	29,482	11,390	Guj 29,482	27,310	11,090	Pun 27,650	32,960	1984-85
25	Brinjal	13,940	16,225	Bih 20,010	15,000	15,340	Bih 20,300	428	1999-00
26	Guarseed	660	420	Pun 884	640	490	Pun 980	660	1997-98
27	Fruits and nuts	13,488	11,983	TN 25,597	19,100	11,983	TN 20,160	19,100	1993-94
28	Chickoo	9,400	13,250	Kar 17,709	12,000	14,540	Kar 18,400	12,000	1994-95
29	Lemon	9,982	9,030	AP 15,010	20,000	10,110	Guj 20,000	20,000	1994-95
30	Banana	35,660	34,148	Mah 60,000	55,500	20,290	Guj 55,500	62,700	1988-89
31	Papaya	42,160	27,540	Kar 87,160	Na	22,650	Kar 87,000	50,000	1994-95
32	Guava	17,574	11,900	MP 20,000	Na	10,790	MP 20,010	17,574	1997-98
33	Mango	6,464	7,390	Bih 12,000	Na	8,310	Bih 12,000	6,464	1997-98

* Coconut: Yield in nuts/ha.

** For Crop Nos. 25,27,28,29,31 the years are 1991-1994.

Source: Calculated from CMIE, *Agriculture*, November 2001.

In the medium term, however, the state should aim at achieving the level of yield rates already achieved by the best performer state in different crops during the 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 is estimated to be 50 per cent. It is possible to achieve this target in the next eight years. It implies a compound growth of 5.2 per cent per annum in the total agricultural production in the state. The increase in the real value added or GSDP in the agricultural sector is likely to be marginally less if we assume an increase in the input proportion over time on account of greater capital intensity in the sector. We can, therefore, argue that targeting the growth of real GSDP in agriculture in Gujarat higher than 5 per cent per annum over the next eight to ten years is becoming unre-

alistic 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.

SOME POLICY SUGGESTIONS

A closer examination of the findings of the recently conducted survey on exports originating from Gujarat (GITCO, 2001) and several evidences on the performance and prospects of the agricultural sector in the state reveals that Gujarat has substantial potential in the exports of agri-products. As already discussed, the export intensity of agri-products in Gujarat (11.9%) is substantially higher than the nation (3.2%), which makes the agri-exports from Gujarat positively sensitive to the exchange rate

depreciation unlike the national exports of manufactures or agri-products. Similarly, the exporters of agri-products from Gujarat, on an average, have small (or at best medium) enterprises rarely qualifying for special benefits available to the regular exporters. They are largely traders treating exports of agri-products as an excess supply from the domestic market rather than considering them as an exclusive supply to the foreign markets. For better performance on export front, the policy makers should address this issue urgently.

For an exclusive supply to the export market, the quality standards have to be met according to the requirements of the destination and not the domestic market. This calls for large scale production, assured input supplies, and good logistics and 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 recognized and encouraged. This calls for 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 is the key. There is also a need to stop further decline in the average size of holding by prohibiting subdivision and fragmentation of agricultural land below the size of two hectares. Moreover, the state should accord high priority to the agricultural R&D and infrastructural facilities like storage, seaports, airports, roads, power, and irrigation. The greatest challenge for Gujarat is not to sacrifice these critical investments while restoring the fiscal balance and discipline in the state. ♡

Appendix: Linear Time-trend Regressions for Area and Yield by Crops in Gujarat

No.	Crop	Period	Area			Yield		
			Intercept	Slope	Adjusted R ²	Intercept	Slope	Adjusted R ²
01	Rice	1972-00 n=28	397.68 (21.57)	8.71 (7.84)	0.6917	870.71 (8.70)	25.17 (4.17)	0.3786
02	Wheat	1972-00 n=28	575.53 (10.01)	0.20 (0.05*)	-0.0383*	1628.59 (21.72)	26.52 (5.87)	0.5537
03	Jowar	1972-00 n=28	1211.16 (24.27)	-32.77 (-10.90)	0.8136	338.76 (5.13)	16.03 (4.03)	0.3618
04	Bajra	1972-00 n=28	1613.43 (14.40)	-22.17 (-3.28)	0.2662	674.12 (7.52)	15.30 (2.83)	0.2071
05	Maize	1972-00 n=28	247.75 (40.95)	5.39 (14.79)	0.8897	813.80 (5.37)	20.52 (2.25)	0.1308
06	Ragi	1972-00 n=28	59.73 (40.39)	1.50 (-16.93)	0.9137	702.07 (10.57)	9.08 (2.27)	0.1334
07	Smaller millets	1972-00 n=28	162.31 (22.68)	-5.41 (-12.56)	0.8532	74.58 (11.04)	-14.09 (3.48)	0.2921
08	Gram	1972-00 n=28	54.73 (4.16)	2.56 (3.23)	0.2599	713.82 (12.85)	-1.68 (-0.50*)	-0.028*
09	Arhar	1972-00 n=28	(4.16) 80.47	(3.23) 13.54	0.8476	447.93 (8.68)	15.21 (3.10)	0.4600
10	Other pulses	1972-00 n=28	261.63 (10.87)	4.44 (3.07)	0.2379	245.74 (5.09)	7.36 (2.53)	0.1673
11	Groundnut	1972-00 n=28	1826.34 (19.67)	3.53 (0.63*)	-0.0227*	671.48 (4.42)	8.54 (0.93*)	-0.005*
12	Sesamum	1972-00 n=28	44.95 (3.25)	8.76 (10.55)	0.8033	217.62 (4.14)	6.66 (2.10)	0.1128
13	Rapeseed and mustard	1972-00 n=28	19.52 (1.00*)	14.10 (12.01)	0.8414	424.92 (4.30)	33.78 (5.67)	0.5364
14	Castor	1972-00 n=28	26.26 (1.50*)	12.90 (12.30)	0.8478	778.76 (8.73)	38.50 (7.17)	0.6513
15	Soyabean	1980-00 n=20	13.83 (2.92)	-0.04 (0.18*)	-0.0535*	209.50 (1.51*)	22.86 (3.19)	0.3267
16	Cotton	1972-00 n=28	1716.31 (17.77)	-18.97 (-3.26)	0.2630	133.25 (8.53)	6.35 (6.75)	0.6227
17	Sugarcane	1972-00 n=28	20.89 (3.63)	5.52 (15.94)	0.9036	53722.92 (14.53)	1035.93 (4.65)	0.4330
18	Tobacco	1972-00 n=28	89.97 (18.96)	0.82 (2.90)	0.2155	1619.23 (16.25)	-1.13 (-0.18*)	-0.037*

Contd.

No.	Crop	Period	Area			Yield		
			Intercept	Slope	Adjusted R ²	Intercept	Slope	Adjusted R ²
19	Chilli	1972-00 n=28	12.90 (13.02)	0.15 (2.62)	0.1794	165.86 (10.36)	22.95 (6.97)	0.6380
20	Ginger	1972-00 n=28	0.27 (3.61)	0.16 (6.55)	0.3012	-3006.10 (-1.94*)	430.94 (4.63)	0.4308
21	Garlic	1974-00 n=26	9.71 (3.11)	0.29 (1.60*)	-0.0597*	4222.68 (14.26)	54.67 (3.18)	0.2671
22	Potato	1972-00 n=28	1.00 (0.85*)	0.94 (13.26)	0.8662	24852.19 (17.44)	-57.57 (-0.67*)	-0.021*
23	Onion	1978-00 n=22	1.87 (0.43*)	0.90 (3.92)	0.4068	23147.42 (11.64)	120.51 (1.12*)	0.012*
24	Brinjal	1993-00 n=725	-12.28 (0.78*)	1.42 (2.28)	0.4138	-176.00 (-0.90*)	19.42 (2.49)	0.4643
25	Guarseed	1972-00 n=28	128.14 (6.43)	-0.10 (-0.08*)	-0.0381*	337.48 (4.57)	4.26 (0.96*)	-0.003*
26	Fruits and nuts	1991-00 n=9	-124.46 (-3.93)	11.20 (8.55)	0.9002	36091.64 (5.46)	-866.46 (-3.16)	0.5290
27	Chickoo	1991-00 n=9	-25.17 (-5.42)	1.51 (7.88)	0.8843	21595.35 (7.39)	-467.36 (-3.86)	0.6347
28	Lemon	1993-00 n=7	-27.64 (-6.40)	1.64 (9.55)	0.9376	57018.14 (2.22)	-1840.14 (-1.80*)	0.2718*
29	Banana	1972-00 n=28	11.11 (5.28)	0.58 (4.64)	0.4325	26406.19 (5.10)	721.59 (2.31)	0.1384
30	Papaya	1991-00 n=9	2.97 (1.35*)	0.03 (0.36*)	-0.121*	78190.00 (7.85)	-1382.50 (-3.35)	0.5610

Note: Figures in parentheses are t-values. *Not statistically significant at 5 per cent level.

Source: Calculated from data given in CMIE (2001).

ENDNOTES

1. A company may have its headquarters in one state and production or procurement units in different states. It may not maintain its accounts by such units. How do we allocate or segregate exports of such a company? Similarly, should only the value addition in the export activity be ascribed to a state or the total sales of exports be considered as the contribution of a state? Several such issues need to be resolved for meaningful estimation.
2. It may be noted that the National Statistical Commission (2001) has made some important recommendations to modify invoices and bills to facilitate such data collection in future.
3. For unknown reasons, this simple theory and its application to exports-imports do not find a place in our standard textbooks.
4. For a reasonably comprehensive survey of literature on estimates of elasticities of agri-products, see Gulati and Kelly (1999, Annexure 7.1).
5. The official estimates of real GSDP are available from 1993-94 to 2000-01 with 1993-94 base and for 1980-81 to 1993-94 with 1980-81 base. We have linked the latter set with the former set through the standard method of using the linking factor for the year 1993-94.
6. 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 by using the 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.
7. The Agro Vision-2010 visualizes the growth of real GSDP in Gujarat agriculture at 6.8 per cent per annum compared to the national target of 4 per cent per annum. On the other hand, Gujarat's performance over the last two decades is considerably below 2 per cent per annum. ❖

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Ravindra H Dholakia, Professor in the Economics Area of Indian Institute of Management, Ahmedabad, currently holds the RBI Chair Professorship. A doctorate in Regional Development Economics from MSU, Baroda, his areas of interest include regional development, macroeconomic policy and environment, demand analysis, and international trade. He has published 12 books and several international cases, monographs, and research papers in reputed journals.
e-mail: rdholkia@iimahd.ernet.in

*If all the good people were clever,
And all clever people were good,
The world would be nicer than ever
We thought that it possibly could.
But somehow, 'tis seldom or never
The two hit it off as they should;
The good are so harsh to the clever,
The clever so rude to the good!*

Elizabeth Wordsworth