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Arth Anvesan

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From Editor's Pen

The industrialisation has been perceived as a central dynamic force around the world for the development of any economy due to its deep forward and backward linkages with several segments of the economy. Though the reasonable progress has been attained by Indian economy in building basic infra-structural facilities, research and development capability, project management services, consultancy and design engineering services and innovative capacity to improve and adapt modern technologies connection with the industrial development of the country, yet the overall industrial development is lacking efficiency and productivity. Consequently India's ability to compete globally has been seriously compromised. Every section of the society is facing the burn of average performance of this industrial sector. The average performance of this sector has raised some issues for the Indian economy. The present issue of the journal has tried to give the reflection of various experts' opinions, beliefs and estimations to outline a roadmap of success for the generation of benefits to industrial sector in particular and society in general so that they can be made ready for the future challenges. Containing multitude of themes linked with each other in one or the other way, the journal throws light on the various aspects of growth and structure of Indian industrial sector and has tried to portray its position and various issues associated with it.

The paper by T.S. Papola leads the existing volume which focuses on the India's growth pattern with special reference to industrialisation. The contribution by S.M. Shafi has raised the issues related with Indo-German bilateral trade both from historical perspective and future prospects. Estimating the technical efficiency of readymade garments firms in Bangalore with a case study approach, R.N. Joshi and S.P.Singh has identified the efficient and inefficient firms and also the factors affecting the performance of the inefficient firms. An attempt in providing an understanding of India's exports' nature, pattern and direction over a period of eleven years in case of processed food products is also made by Kuldeep Singh. The India's exports potential in processed food products is also deliberated by Rajesh Kumar in order to chalk out a path for development of industry. A trade performance comparison of India vis-à-vis China to explore the opportunities and threats for both the economies is also made by Falendra Sudan. The issue concludes with the estimation of technical efficiency of agro-based industries in Haryana by Surender Mor, Anupreet and Shivani

Suparn Sharma

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Contents

INDIA: GROWING FAST, BUT ALSO NEEDS TO INDUSTRIALISE![1]

T.S. Papola,
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Abstract

Historically economic development has been taken to be synonymous with industrialization. Therefore, when independent India embarked upon the programme for modern economic development in early 1950s, it was taken for granted that industry would lead the development process and would be the main driver of economic growth. Growth of agriculture was, no doubt, seen necessary for ensuring adequate food supply for the growing population as well as supply of raw materials to the large segments of industry which were agro-based. In the development model of the time which centred around industry, agricultural growth, however, was primarily seen as an instrument to facilitate industrialization. Central emphasis, therefore, was laid on faster growth of industrial sector and building of capacity that could sustain rapid industrialization. Industry and industrialization were placed so high on the agenda of economic development that the government not only adopted a comprehensive policy favouring industrial development, but also found it necessary to directly invest in, direct and manage a large number of industrial enterprises in sectors that were considered essential for building capacity for self-sustained and rapid industrialization.

Long Term Growth of Indian Industry: A Case of Stunted Industrialisation?

Industry-focussed development strategy adopted in early years of planning paid off in so far as the rate of growth of industrial output is concerned. Industrial growth, which was estimated to have been around 1.7 per cent during the first half of the century: 3.1 per cent per annum during the inter-War (1919-1939) period, and 3.3 per cent during 1939-1951, accelerated to an average of 6.8 per cent during 1951-68. The tempo of industrial growth slowed down considerably over the next one and a half decade (1966-1981) when rate of growth of industry averaged to only 4 per cent per annum. It picked up in 1980s, and averaged to 5.7 per cent during 1981-90, and further accelerated to 6.0 per cent during the 1990s. Average rate of growth of industry has been much higher, at around 8.6 per cent since 2000 (Table 1).

Table 1: Industrial Growth in India

Period	Rate of Growth (% of per annum)
1901-1951	1.7
1914-1939	3.2
1939-1951	3.3
1951-1965	6.7
1965-1981	4.0
1981-1993	6.3
1993-2004	6.7
2004-2005	8.4
2005-2006	8.2
2006-2007	11.6
2007-2008	9.0

Source: Papola(1992) and Panagariya (2008).

How does rate of industrial growth compare with that of the economy as whole and other sectors? It is important in so far as the relative growth would determine the changing importance of industry in the economy, which is taken to be a measure of the degree of industrialization. In the early years of planned development in the post-Independence period, rate of growth of industry, even though not very high, was significantly higher than the overall growth rate: 6.7 per cent as compared to 4.1 per cent (Table 2). As a result, the share of industry in GDP rose significantly from 15 per cent in 1950-51 to 23 per cent in 1965-66 (Table 3). In the next phase of low industrial growth, it grew at only marginally higher rate than overall GDP (4 per cent as against 3.5 per cent), and its share in GDP increased from 23 per cent in 1964-65 to 24 per cent in 1980-81. This pattern seem to have continued since 1980-81; industry growing at a marginally higher rate than the economy as a whole, thus leading to only small increase in the share of industry in GDP. As a result, industry in 2007-08, accounts for 27 per cent of GDP, only one percentage point higher than 26 per cent of 1987-88. If an increase in the share of industry in national product is taken as the indicator of the degree of industrialization of an economy, then that process seems to have virtually stopped in 1987-88, till when the contribution of industry showed a steady increase but after which it increased only marginally in 1995-96 declined in 2004-05 and has recovered to the level of 1995-96, 27 per cent, only in 2006-07.

[1] Keynote address in National Seminar on 'Growth of Industrial Sector: A Road-map for Success', Shri Mata Vaishno Devi University, Katra (J&K), 27-28 February, 2009.

Table 2: Growth Rates of Sectoral GDP

	Agriculture	Industry	Mfg.	Services	Total
1951-1965	2.9	6.7	6.7	4.7	4.1
1965-1981	2.1	4.0	4.5	4.3	3.5
1981-1988	2.1	6.3	7.1	6.5	4.8
1988-2006	3.4	6.5	6.8	7.8	6.3

Source: Panagariya, A. (2008).

Table 3: Structure of GDP (% of Share of Sectors)

	Agriculture	Industry	Manufacturing	Services
1950-51	57	15	9	28
1964-65	49	23	12	31
1980-81	40	24	14	36
1987-88	33	26	16	41
1995-96	24	27	16	49
2004-05	21	26	17	53
2006-07	18	27	18	55

Source: Panagariya, A. (2008).

While it is logical to draw such an inference on the basis of macro level structural changes in the economy, it does not, in any way, mean that there has been no industrial growth over this period. As already noted industrial growth has, in fact, been faster since 1981 and has exceeded the average of 9 per cent over the last few years. But the overall economic growth has also been high and, therefore, there has not been a significant rise in the share of industry in GDP. And also, the services sector has grown at still higher rates in recent years, raising its share in GDP much faster than of the industrial sector. Services sector grew at 5.9 per cent during 1980-93, at 9.1 per cent during 1993-2000 and over 10 per cent per annum during 2000-2007; and, increased its share in GDP from 36 per cent in 1980-81 to 55 per cent in 2006-07.

The pattern of economic growth in recent years and the structure of the India economy that has, as a result, emerged have given rise to certain questions among economists and other observers of economic development. Is India pioneering a development model that is service-led in contrast to the conventional and historically experienced industry-led model? As is well known in all developed countries of today, industry grew to become the largest sector in the industry before services took over. Even in the developing countries of Asia such as China, Malaysia, Indonesia, Korea, Thailand and the Philippines had a much faster growth and now have a 40 to 50 per cent share of industry in their GDP.

Is Indian economy entering the third, the 'post-industrial', stage of development, without ever achieving the second, the 'industrialised', stage? Is India's economic growth with current pattern of output with 55 per cent services and 44 percent goods, sustainable with its consumption demand consisting 75 per cent of goods and 25 per cent of services? Will the commodity gap be filled with export of services which had been a main feature of India's success story in the post-reform period? These questions and several others that relate to inclusiveness and equity of the ongoing growth pattern have serious implications for the sustainability of economic development, in general, and the future growth of the industrial and manufacturing sector, in particular. We have examined these larger issues elsewhere (Papola, 2006) and will briefly return to some of them towards the end of this paper. For the present, let us focus on the growth and structure of the industrial sector, particularly its manufacturing part, with a view to assessing its role and prospects in the medium term economic development of India.

Recent Growth in Manufacturing Industry: Consumer Goods Led?

Industrial sector consists of mining, manufacturing, utilities (electricity, water and gas) and construction sub-sectors. All sub sectors have grown, but at different rates in different periods since 1950. Electricity grew the fastest at about 9 per cent per annum during the first 40 years; its growth was about 7 per cent in 1990's and 5.5 per cent in the period after 2000. It is followed by manufacturing, which grew at 6.7 per cent during the first 15 years, but only at 4.5 per cent over the next fifteen years; at about 6 per cent for the next ten years and has maintained an average rate of 7 per cent since early 1990's. Construction which had a slow growth earlier has grown at a relatively fast rate, of over 10 per cent during the recent period (Table 4).

Manufacturing accounts for the largest segment and has seen significant increase in its share in the overall industrial sector. Its share in GDP has doubled from 9 per cent in 1950-51 to 18 per cent in 2006-07. Most of this increase, however, took place only during 1950-51 to 1987-88 when it rose, from 9 to 16 per cent. There has been only a small rise from 16 to 18 per cent for almost two decades since then. This is despite the fact that growth of manufacturing has been quite fast during this period. But that of construction has been still faster, within the overall industry sector and, of course, services sector growth has exceeded growth of all other sectors, averaging to over 9 per cent for about a decade now.

Table 4: Trend Growth Rate (%) of Secondary Sector: by Sub-sectors

	Mining and Quarrying	Manu-facturing	Electricity, Gas and water supply	Industry (2+3+4)	Construction	Secondary (2+3+4+6)
1	2	3	4	5	6	7
1950-51/1965-66	5.74	6.67	11.59	6.74	6.81	6.76
1965-66/1980-81	3.45	4.49	7.60	4.60	2.75	4.06
1980-81/1989-90	7.39	5.95	8.76	6.41	3.73	5.74
1989-90/2000-01	4.44	6.40	7.08	6.23	5.17	5.99
2000-01/2007-08	5.57	8.04	5.38	7.46	12.08	8.59

Source: RBI, *Handbook of Statistics on Indian Economy*, 2008.

While other segments of the industry–mining, utilities and construction — are crucial for providing inputs and facilitating faster growth, it is the manufacturing sector that is generally the focus of any debate on industry for the reasons both of its size and significance for accelerated economic growth, meeting increasing consumption demand and for exports. Let us, therefore, examine in some detail the pattern of growth, changes in product structure and employment and export performance of the Indian manufacturing industry.

Considering major groupings of industrial products (at 2-digit level) textiles (cotton, wool and jute) constituted the largest group, followed by textile products, the two together accounting for 30 per cent of total manufacturing employment in 1983. Together with food products and wood products, both with 10 per cent employment each, these groups made up over one half of the total industrial employment. Beverages, accounting for 10 per cent , non-metallic mineral products another 8 per cent and repair services with 7 per cent of employment, were other important industry groups (Table 5). By 2004-05, while textile products have raised their share from 14 to 19 per cent, that of textiles had declined from 17 to 10 per cent. Non-metallic mineral products experienced a continuous decline in employment share. Food products after increasing its share during the 1990's, experienced significant decline during 2000-2005. Thus in 2004-05, textile products constituted the largest group, contributing over 19 per cent of manufacturing employment, followed by wood products, at 11 per cent, textiles (cotton, wool, jute etc.) and beverages, each at around 10 per cent and repair services at 9 per cent. Thus except for a sharp rise in the share of textile products from 14 to 19 per cent and decline in that of food products from 10.5 to 7.4 per cent, of textiles from 17 to 10 per cent, and that of non-metallic mineral products from 8 to 6 per cent, there appears to have been no major changes in the product structure of the manufacturing industry in India.

Table 5: Industry-wise Distribution of Manufacturing Employment

NIC, 1987 Code	Description	Employment Share (%)				
		1983-84	1987-88	1993-94	1999-00	2004-05
1	2	3	4	5	6	7
20-21	Food Products	10.45	9.33	11.11	11.76	7.43
22	Beverages, etc.	9.53	8.85	10.13	10.10	9.62
23+24+25	Textiles: Cotton, Wool, Jute etc	16.91	15.86	15.48	10.72	9.76
26	Textile Products	13.84	13.95	8.19	10.85	19.28
27	Wood Products	10.21	10.03	9.85	11.05	11.02
28	Paper Products	2.20	2.37	2.19	2.46	2.74
29	Leather Products	1.87	1.87	1.67	2.19	2.55
30	Chemical Products	2.86	3.05	1.81	4.05	3.47
31	Rubber, Plastic and Coal Products	0.97	1.36	4.01	2.27	1.56
32	Non-metallic Mineral Products	8.15	7.47	7.20	7.19	6.01
33	Basic Metal Ind.	2.81	3.20	2.29	2.45	3.13
34	Metal Products	3.53	3.58	3.74	4.65	3.34
35+36	Machine tool & Elect. Machinery	4.07	4.39	4.77	5.00	5.22
37	Transport Equipment	1.48	2.05	1.23	0.93	1.83
38	Other Manufacturing	3.90	3.97	5.23	4.95	3.74
39+97	Repair Services	7.21	8.66	11.10	9.35	9.28
	All Industries	100	100	100	100	100

Source: NSSO: *Survey of Employment and Unemployment*, various rounds.

Output growth followed somewhat different pattern across industries, so that the product structure of output has shown changes dissimilar to the employment structure. Textile products, no doubt, showed the highest output growth of almost 15 per cent per annum during 1981-2000. But the next highest growth of output was registered by chemical products, electrical machinery and rubber and plastic products (10 per cent per annum each). Food products, beverages and wood products were among the slowest growing groups in respect of output, though they showed relatively better growth of employment. Thus excepting the textile products which seem to have gained from their labour intensive character in the liberalized economic regime, other products which have gained are not labour intensive; or, if they

were labour intensive, they did not realize productivity gains from the new policy regime. It is observed that skill-intensive rather than labour-intensive products have grown the fastest in the post-reform period (Kochar, *et al* (2006)).

In terms of use-based classification of industrial products, growth of consumer goods has been consistently higher throughout the period 1980-81/2006-07, at around 9 per cent per annum, than that of basic goods, (7.5%), intermediate goods (8%) and capital goods (7%) (Table 6). Within the consumer goods segment, output of durable consumer goods has grown at a much higher rate of 11 per cent per annum as compared to 8.3 per cent of the non-durable consumer goods. It is, however, interesting to note that the growth of intermediate goods has significantly slowed down since 2000, averaging at around 5 per cent during 2000-2007, as compared to over 10 per cent during 1981-2000. On the other hand, capital goods have registered a much higher growth of output during 2000-07 averaging at 14 per cent as compared to an average of about 6 per cent per annum in earlier two decades. Consumer goods sector has seen a small decline during 2000-07, more in its durable than in non-durable segment.

Table 6: Manufacturing Growth according to Use based Classification

	1981-91	1991-2000	2000-07
Basic Goods	8.0	8.3	7.0
Intermediate Goods	11.2	10.7	5.6
Capital Goods	5.3	6.7	14.1
Consumer Goods	8.9	9.0	8.6
Durable	12.0	12.5	10.0
Non-durable	8.3	8.5	8.0

Source: *Economic Survey*, various years.

Manufactured Exports: How Labour-Intensive?

It is generally agreed that exports have made a significant contribution to India's economic growth in the post-reform period and manufacturing exports have constituted an increasingly larger percentage of India's exports, at least in the initial post-reform years, though services exports have grown at much faster rate in recent years. Exports which constituted only 5.8 per cent of GDP in 1990-91, have grown at about 12 per cent per annum on an average for one and a half decade, and made up 14 per cent of GDP in 2006-07. Commodity composition of exports has changed drastically during this period (Table 7). Primary products which constituted 37 per cent of India's exports in 1980-81 and 24 percent in 1990-91 further declined to 16 per cent in 2000-01 and 15 per cent in 2006-07. Manufactured goods, on the other hand, increased their share from 60 per cent in 1980-81 to 65 per cent in 1990-01, and further to 78.8 per cent in 2000-01, but it has declined to 68.6 per cent in 2006-07.

Table 7: Commodity Composition of Indian Exports (%) – Major Categories/Items

	1980-81	1990-91	2000-01	2006-07
Primary Products (Ag. & mineral ores)	37.0	24.0	16.0	15.1
Manufactured Goods	60.0	65.0	78.8	68.6
of which				
Textile (including RMG)			23.6	12.5
Gems and jewelry			16.6	12.6
Engineering goods			15.7	23.3
Chemicals and Chemical Products			10.4	11.2
Leather and Leather Products			4.4	2.4
Handicrafts			2.8	1.1

Source: *Economic Survey*, various years

Which items within the manufactured goods have shown the highest export growth? Has the pattern been in line with the expectation that the liberalized trade regime would favour labour intensive products? It appears that the growth of Indian exports is not necessarily based on the presumed comparative advantage (Krishna, 2008). True that major items of manufactured exports from India have traditionally been in the labour intensive category. So textiles, textile products, leather and leather products and gems and jewelry have accounted for more than one-half of Indian exports. Trade liberalization seem to have strengthened their export performance, but only for a while. Textile products (including readymade garments) saw their exports grow steadily by 13 per cent per annum during 1980's and 11 per cent during 1990's, but only by 4.3 per cent per annum during 2001-05 and after growing at a high rate of 20 per cent in 2005-06, again slipped to a growth rate of only 5.7 per cent during 2006-07. Gems and jewelry exports grew at 16 per cent per annum during 1980' and 12.5 per cent during 1990's, the growth rate went up to 17 per cent during the first five years of the present century, and after growing at 12.8 per cent in 2005-06, had a steep decline in its growth rate to only 2.9 per cent in 2006-07. Leather and leather products had their exports growth slowed down during 1990's, but it has picked up fast at 17 to 20 per cent per annum during 2001-2007. Textiles have also seen a sustained high growth of exports since 1990-91, but has of late suffered a set back (Table 8).

Table 8: Growth of Manufacturing Exports (Major Items)

(Growth rates, % per annum)

	19881-91	1990-2000	2001-05	2005-06	2006-07
Total	8.3	11.1	17.0	23.4	22.6
Mfg. Goods	11.4	11.8	16.9	18.9	19.8
Leather and Leather Products	14.7	5.4	5.5	11.1	12.1
Chemicals & Chemical Products	20.1	13.0	21.7	17.3	19.1
Engineering Goods	9.8	15.7	25.4	23.4	38.1
Ready Made Garments	12.9	11.1	4.3	20.4	5.7
Textiles	4.6	12.7	*	*	*
Gems & Jewelry	16.0	12.4	16.8	12.8	2.9

Source: *Economic Survey*, various years.
* included in ready made garments

Industries which have shown a consistently high growth of exports and of late seen an acceleration in export growth rate are chemicals and engineering, neither of which can exactly be called labour-intensive. Engineering products had an export growth rate of 10 per cent during 1980's and 14 per cent during 1991-92/2001-02. After growing at an annual average of over 25 per cent during 2001-2005, they maintained a growth rate of 23.4 per cent in 2005-06 and registered a high growth of 38.1 per cent in 2006-07. And chemicals and chemical products had their exports growing at 20 per cent per annum during 1980's and 13 per cent during 1990's. The rate rose to 22 per cent during 2001-2005 and had been 17 and 19 per cent in the 2005-06 and 2006-07.

Thus it appears that the Indian industry has not been able to exploit its comparative advantage of abundant labour for increasing its exports. Exports of labour-intensive industries which accounted for 65 per cent of India's merchandise exports in 1995-96 grew the slowest among different groups and by 2003-04, their share had come down to 49 per cent (Table 9). Medium technology intensive industry had their exports growing at a high rate of 19 per cent per annum and accounted for 20 per cent of exports in 2003-04, as compared to 12 per cent in 1995-95. Knowledge intensive industry which now accounts for 23 per cent of merchandise exports also had a high growth rate in their exports (14%) during this period. (See also Kumar and Sengupta (2008) and Nagraj (2008).

Table 9: Growth and Structure of India's Merchandise Exports (1995-96 to 2003-04)

Category of Exports	Annual Growth (%)	Share of Exports (%)	
		1995-96	2003-04
Labour Intensive	7.2	65.0	49.2
Resource Intensive	11.9	3.7	3.7
Medium Technology Intensive	18.9	12.1	19.8
Knowledge Intensive	14.4	17.9	23.0
Other Commodities	31.9	1.0	4.0

Source: RIS (2006), *Towards an Employment Oriented Growth Strategy*.

There may be several-both external and internal-reasons for India's failure to gain from its labour advantage; there does not seem to be proximate possibility of remedying them. But, a basic question that needs to be asked is whether abundant supply of labour at low wages could really be an advantage irrespective of the productivity levels. What is generally ignored in the comparative labour advantage argument is that low labour productivity can offset this advantage significantly. For example, value added per worker in manufacturing in India at USD (PPP) 4089, in 2005 was only 7% of corresponding US, UK, French and Japanese and 8 per cent of Korean and Taiwanese figure (Table 10). It was somewhat comparable with labour productivity of Brazil (USD 5696) and Indonesia (USD 5943) and less than one third of China (USD 12642). Unit labour cost of production in India is obviously higher than in most of these countries inspite of relatively low wages. And if raising productivity requires technological upgradation of production, as it often does, the labour advantage becomes fictional rather than real.

Table 10: Value Added per Worker in Manufacturing in Different Countries (2005)

Country	GDP per person employed (constant 1997 US$ at PPP)
Australia	55355
Austria	55218
Belgium	74857
Brazil	5696
Canada	63129
China	12642
Czech Republic	23881
Denmark	56533
Finland	84103
France	60835
Germany	57849
Greece	27334
Hungary	23961
India	4089
Indonesia	5943
Ireland	124931
Italy	47179
Japan	59281
Korea, Republic of	53280
Luxembourg	68410
Mexico	12158
Netherlands	61613
Norway	50850
Poland	22372
Portugal	20204
Slovakia	22713
Spain	47636
Sweden	77823
Taiwan, China	48536
United Kingdom	60235
United States	104606

Source: ILO, (2007), KILM, 5th Edition, CD Rom Version.

It is widely known that the growth in exports in recent years is contributed more by export of services than of commodities; in fact, the share of manufactured goods in exports has sharply declined from around 79 per cent in 2000-2001 to 67 per cent in 2006-07. Export of services, grew at an average annual rate of 24.1 per cent during 2001/2004-05, and at 33.3 and 32.1 per cent during 2005-06 and 2006-07 (Table 11). Services constituted 20 per cent of value of exports in 2000-01 which increased to 35 per cent in 2006-07. Software services make the largest group (41%) of services exports, followed by business services at 25 per cent. Exports of the former has grown at an average rate of 33 per cent per year but export of business services has grown much faster at the rate of 84 per cent per year during 2001-05, 80 per cent during 2005-06 and 107 per cent during 2006-07. Financial services, though constituting a small part (4%) of service exports had their export growing at an extraordinarily high rate of 136 per cent during 2005-06 and 141 per cent during 2006-07!

Table 11: Exports of Services: Composition and Growth

Item	Share in total Services Exports (%)			Growth Rate (%) p.a.		
	2000-01	2005-06	2006-07	2001-05	2005-07	2006-07
Travel	21.5	13.6	12.0	19.0	17.8	16.2
Transportation	12.6	11.0	10.6	23.1	35.1	27.3
Insurance	1.7	1.8	1.6	34.6	21.1	13.2
GNIE*	4.0	0.5	0.3	-0.6	-21.7	-20.4
Miscellaneous	60.3	73.3	75.6	27.0	37.5	36.4
of which						
Software services	39.0	40.9	41.1	35.6	33.3	32.6
Non software services	21.3	32.1	34.5	30.3	43.3	41.9
of which						
business services	2.1	16.1	25.3	84.4	80.1	107.0
financial services	2.1	2.1	3.8	25.4	136.1	140.9
commercial services	7.0	2.7	2.8	8.5	13.8	33.3
Total	100.0	100.0	100.0	24.1	33.3	32.1

* Government Services Not Included Elsewhere (Maintenance of Indian Embassies Abroad)
Source: *Economic Survey*, various years.

Services-Led Growth: Implications for Macro-economic Balance, Employment and Equity

Growing importance of services in exports as also in GDP need not,by itself, worry the policy makers. It should, in fact, be a matter to rejoice in so far as it is a result of India's comparative advantage in terms of its manpower base and ability to meet the increasing domestic and world demand for various kinds of services. It is, however, a matter of concern once seen in conjunction with a relatively slower growth and consequent stagnation in the share of industry in GDP and declining share of manufactured goods in exports, as noticed earlier. These features of the on-going growth pattern have implications for macro-economic and trade balances, sustainability of high growth rates, employment and equity that need to be clearly understood and addressed through appropriate policy initiatives.

First, as pointed out earlier, there is a large mismatch between consumption and production of commodities and services. Consumption basket of the Indian population consists 75 per cent of commodities and 25 per cent of services, whereas domestic production, as represented by GDP, consists of 55 per cent services and 45 per cent commodities. The commodity gap is increasing with sharp increase in the share of services in GDP. No doubt, income elasticity of demand for services is higher than that for commodities, but the latter still continues to be relatively high, particularly in respect of manufactured goods: a one per cent increase in income leads to similar increase in demand for manufactured goods, though it leads to 1.65 per cent increase in demand for services. Thus services will, no doubt, constitute an increasing share of consumption basket, but it will take a large increase in income before they make the major part of it. And till then, the commodity gap will continue to be relatively large, if the present pattern of GDP growth in which services have an increasing but commodities a declining and manufactured goods a stagnant share. In the short-run, this imbalance is likely to create inflationary pressure leading to rise in the prices of manufactured goods and in the long run, may pose problems for the sustainability of the growth process itself.

In a globalizing economy, it is certainly not necessary that consumption requirements of the people are met by domestic production: trade can be an effective mechanism to create macro-economic balances between demand and supply. India can export services and import commodities. The rapid rate at which exports of services have been growing and their share in total exports have increased over the past one and a half decade gives reason for optimism in the success of the 'export-services-import goods' model. Considering the magnitudes involved — the volume of manufactured goods that would need to be imported —, however, the feasibility of such a model appears highly doubtful. As pointed out earlier, the commodity gap is a large as around 30 per cent of GDP. Can India export services of such magnitude as would enable it to import such large volume of commodities. No doubt, exports of services have increased rapidly and now contribute about 35 per cent of all export earnings. True, that there is not only a sharp increase in traditional services exports (travel, transportation etc.), but many new items traditionally considered non-tradeables are now getting added to the list and their exports are growing very fast. So exports of software services have grown at an average rate of 33 per cent during 2000-01/2006-07 and now constitute 41 per cent of all services exports. Business services have grown at almost 90 per cent per annum during this period and made over 25 per cent of all services exports in 2006-07. Yet, services exports still constitute about 5 per cent of GDP; and 9 per cent of GDP originating in services. They will have to grow many times faster in order to pay for the required import of goods. Whether India has the capacity to produce tradeable services on an increasingly larger scale and, even if it has, whether it will continue to have the comparative advantage it apparently has now, particularly if other countries build capacity to emerge as its competitors, are questions to which it is difficult to give positive answers. An increasing trade deficit is thus most likely if the domestic production of commodities, especially of the manufactured goods does not grow faster than in recent past.

Another major source of concern arising out of the on-going pattern of growth is its failure to generate employment at a rate commensurate with the GDP growth. Employment growth did not improve inspite of a significant acceleration in the growth rate of GDP in recent years. It was about 2.5 per cent during 1972-73/1983 when GDP grew at the rate of 4.7 per cent per annum. GDP growth improved to about 5 per cent during 1983/1993-94, but employment growth declined to 2.00 per cent per annum. And during 1993-94/2004-05, with further acceleration in GDP growth to 6.5 per cent, employment growth further decelerated to 1.90 per cent per annum. It is observed that slow down in employment growth directly corresponded with that in the growth of industry. With a low and sharply declining employment elasticity, agriculture could not be expected to generate much new employment; and decline in its growth rate during 1990's and early years of the new century, further dipped any hopes of new employment generation in agriculture. Services had the fastest growth of GDP, but much lower growth in employment. As a result, services sector now contributes 55 per cent of GDP, but only 26 per cent of employment. Employment elasticity in services has not only been lower than in industry, but has seen a sharp decline over the years. Thus employment elasticity in this sector was 0.77 during 1972-73/1983, declined to 0.58 during 1983/1993-94, and further to 0.44 during 1993-94/2004-05. Long term elasticity in services has been 0.58 as compared to 0.68 in industry. And employment elasticity in industry has seen an increase from 0.53 to 0.61 during 1993-94/2004-05, and that in manufacturing has increased from 0.41 to 0.49. Because of relatively higher and increasing employment elasticity, industry and manufacturing has experienced a relatively high employment growth of 4.05 and 3.27 during 1993-94/2004-05, despite a slower growth of output (Table 12). A high rate of economic growth without an accelerated growth of industry, particularly manufacturing is not likely to lead to a higher rate of employment growth (Papola 2008a).

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Table 12: Growth of Employment (UPSS) and Employment Elasticity with respect to Gross Domestic Product (at 1993-94 Prices)

	Growth of Employment (%)				Employment Elasticity (%)			
	1972-73/ 1983	1983 1993-94	1993-94/ 2004-05	1972-73/ 2004-05	1972-73/ 1983	1983/ 1993-94	1993-94/ 2004-05	1972-73/ 2004-05
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Primary Sector	**1.67**	**1.38**	**0.84**	**1.28**	**0.46**	**0.50**	**0.33**	**0.45**
Mining & Quarrying	5.92	3.63	-0.32	2.95	0.86	0.59	-0.07	0.51
Manufacturing	4.28	2.00	3.27	3.15	0.78	0.41	0.49	0.57
Utilities	7.86	5.58	-1.78	3.66	1.00	0.64	-0.31	0.52
Construction	4.27	5.67	7.32	5.74	1.38	1.16	0.98	1.14
Secondary Sector	**4.40**	**2.84**	**4.05**	**3.74**	**0.86**	**0.53**	**0.61**	**0.68**
Trade, Hotelling etc.	4.57	3.81	5.33	4.55	0.80	0.68	0.61	0.70
Transport & Communication etc.	5.73	3.54	5.25	4.80	0.88	0.59	0.50	0.64
Services*	3.54	3.87	1.34	2.86	0.70	0.54	0.19	0.46
Tertiary Sector	**4.19**	**3.81**	**3.49**	**3.80**	**0.77**	**0.58**	**0.44**	**0.58**
Non-Agricultural	4.46	3.20	3.74	3.77	0.84	0.52	0.50	0.61
Total	**2.47**	**2.00**	**1.98**	**2.13**	**0.53**	**0.40**	**0.32**	**0.41**

* includes finance, insurance & real estate, community, social and personal services etc.

Note: Employment elasticity is the ratio of growth of employment to growth of GDP.

Source: Author's estimates based on data from the NSS on employment and unemployment (various rounds) and National Accounts Statistics (various years).

A higher industrial growth also seems necessary to mitigate growing inequalities of various kinds: interpersonal, intergroup, intersectoral and interregional. A large and growing asymmetry between shares of GDP and employment in agriculture and non-agriculture (especially services) has led to widening inter-sectoral disparities. With 18 per cent GDP and 56 per cent workers, the ratio of per worker productivity in agriculture to that in non-agricultural activities stands at 1:6 in 2006-07; the ratio was about 1:3 in 1960. Difference is much larger between agriculture and services with later accounting for 55 per cent of GDP and 26 per cent of employment. Segments of services that have grown fast and provided employment with relatively high level of earnings have high human capital requirements and, therefore, have benefited mainly the skilled workers. At the same time, employment structure in the service sector is sharply polarized between a few high end jobs in large corporations and the mass of low paid jobs in small and informal units. Industrial sector, on the other hand, throws up demand for a wider spectrum of skills and thus benefits workers with different skill levels and from all sections of society. The dynamic segments of the services sector are also locationally concentrated in a few states and cities, and to the extent the new growth is derived from them, inter-regional differences in growth rates and development levels have increased (Papola, 2008b). Industry, on the other hand, is today technologically and organizationally so characterized as to permit wider dispersal of location of different processes and parts of products and a faster growth of industry is, therefore, likely to contribute towards mitigating inter-regional differences in economic growth and development.

There is no doubt that services sector has made the major contribution to high growth of the Indian economy and export of services has been a major highlight of this growth experience. It, however, appears necessary now that the industrial sector which has undergone a relative slack in growth for over a decade is brought back on the policy agenda for growth. It is important for sustaining a high rate of economic growth, reducing trade deficit, creating employment and preventing increase in various kinds of inequity in development. An industrial sector growth of about 12 per cent with overall GDP growth of around 8 per cent will be able to meet these objectives progressively over the years. To ensure such growth rates, it is also necessary to lay greater emphasis on domestic demand for industrial products, particularly in the wake of shrinking external demand in the period of the global meltdown.

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INDO-GERMAN BI-LATERAL TRADE: RETROSPECTS AND PROSPECTS

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Abstract

The western European region is by far the most economically evolved centre. Countries like Germany, UK, France, Belgium, Netherlands, Italy and Spain have been excellent market places for developing countries including India. However, of late, Germany, particularly after the unification with east German territories, has become an unparalleled economic power house in the whole of Europe.India's trade relations with Germany have always been based upon mutual trust and understanding. However, India's share in Germany's foreign trade has throughout been minuscule while as Germany continues to be India's largest trading partner in the EU. And if German markets are properly tapped, Germany could become a platform for India for furthering its trade domain to other countries of central Europe and can even extend to countries of eastern Europe as well the markets of which are largely unpenetrated hitherto. The present paper attempts to analyse Indo-German trade and puts forth suggestions towards policy implications at different levels of administrative hierarchies across foreign trade machinery in the country to fillip trade relations with Germany.

Most of India's foreign trade is with USA, UK, Japan and Germany. However, of late, Germany has occupied a very important place in India's foreign trade surpassing India's trade volumes with its erstwhile biggest trading partner (in the EU) i.e. UK. The share of Germany in India's exports to European Union has been increasing with every passing year both in exports and imports. However, imports from Germany have risen quite sharply as compared to rise in exports to that country.

Germany has the largest economy in Europe and the third largest economy in the world behind US and Japan (World Bank, 2007). According to WTO, Germany is the world's top exporter with $ 1.133 trillion exported in the year 2006. Most of Germany's exports are in engineering (especially in automobiles), machinery, metals and chemical goods (The CIA Fact Book, 2006). Though Germany has been a very good trade destination for Indian merchandise and an equally important source of imports, yet Indian's share in Germany's foreign trade has been abysmally low ranging between 0.4 to 0.5 percent. At the same time the Newly Industrialized Countries (the NICs) of South East Asia like Taiwan, Singapore, Malaysia and South Korea have deeply penetrated into German market with their exports particularly those of raw materials which have been used towards the reconstruction of industrially backward East German territories. Nevertheless, Indo-German trade has evolved over the years and India's trade relation with Germany is based on mutual trust and understanding and patronized by an encompassing regulatory framework of the EU. No doubt India's trade with Germany is one of the largest from India's point of view but conversely India occupies a minuscule share in Germany's trade. Secondly, with the fall of USSR, Germany is coming up at an unparalleled economic power house in the world and as such India's economic and trade relations with Germany cannot be afforded to be of low profile or of low significance.

Indo-German trade can potentially cover a wider spectrum of areas over and above the traditional items of import and export. There is a great potential of trade in service sector between the two countries. The present study is aimed to analyze the performance of Indo-German trade in different commodity groups with the broader objective to assess the potential areas of trade which can elevate Indo-German trade to new horizons.

Objectives of the study

The study is aimed:

- to study India's Trade with Germany ,
- to examine the growth prospects of India's foreign trade with Germany; and
- to suggest on the basis of findings of the study, various measures which would fillip and elevate trade relations with Germany

Research Methodology

The present study is purely based on secondary data source. Most of the data have been retrieved from the official website of Directorate General of Foreign Trade of India (DGFT). The data used for the study has been retrieved at 2-digit code of grouped commodities. The other source of data information has been Economic Survey of India and Centre for Monitoring Indian Economy (CMIE), Government of India.

The instruments of analysis (the statistical tools) used for the study have been objectively selected to arrive at dependable results. The statistical methods of percentage comparisons, summary statistics such as averages, YoY growth and compound growth rates have been computed. To unravel growth rates of trade between Indian and Germany and also to examine commodity-wise growth rates in exports and imports, the exponential trend equation of $Y = abx$ has been fitted into the time series data from 1997-98 to 2004-05. The following formula has been used:

1. Exponential Trend Equation $y = abx$
2. Logarithmic form of the equation $\log y = \log a + x \log b$

3. Corresponding normal equations

$$\Sigma \log y = N.\log a + \log b.\Sigma x$$

$$\Sigma x.\log y = \log a . \Sigma x + \log b. \Sigma x2$$

4. Compound Growth Rate [Gr = 100(b – 1)]

The data pertaining to commodity Exports and Imports from Germany retrieved from the Export and Import Data Bank of DGFT do actually belong to 99 major commodity groups codified as per ITC (HS) code but due to the constraint of time and space, only major commodity groups were taken for research analysis. The selection of the major commodity groups was done objectively on the basis of their import and export value. Highly valued commodity groups were taken for research analysis. The selection, in this regard, was done separately for imported commodities and exported commodities. 24 commodity groups from the export basket and 17 commodity groups from import segment were finally chosen for analysis. The minimum export and import value for a commodity group to qualify for separate analysis was fixed at Rs. 100 crores. The remaining 75 commodity groups in exports and 82 commodity groups in imports were treated in aggregate and separate analysis was conducted under the heading "Miscellaneous Group".

The data for the purpose was taken from 1997-98 to 2004-05. The year 1997-98 (initial year for analysis) was purposely chosen as it was deemed that by then the liberalization policies in all areas particularly those concerning with foreign trade policies had started blooming. Thus the data selected was processed with the use of regression analysis, Compound Annual Growth Rates (CAGR) of selected commodities (based on high value) in the import as well as in the export segment were computed. Besides, a comparative analysis was performed with regard to India's export growth with Germany in contrast to India's export growth with world.

Trade with Germany

Germany is India's fourth largest trading partner (after US, UK and Japan) accounting for 5.3 percent of global trade with two way trade of US $ 16.7 billion in 2006-07 (RBI, 2007). India accounts for just about 1.1 per cent of total German exports (WTO, 2007)

Figure-1: Export Growth with Germany & With World

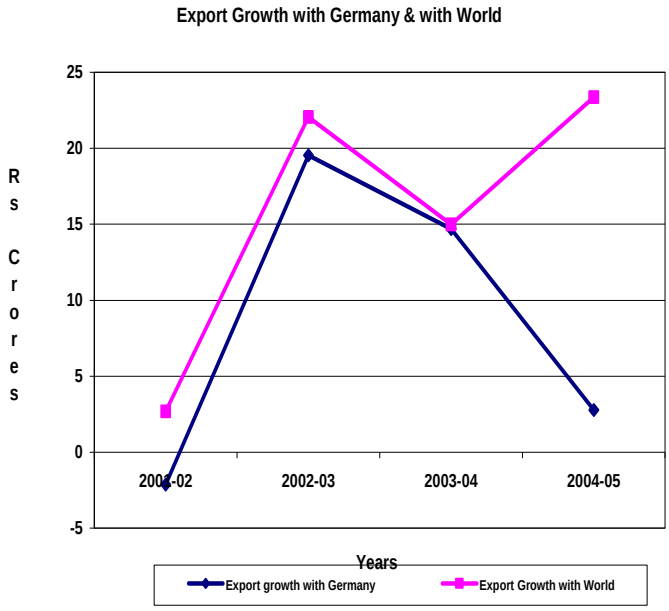

Figure-2: Imports from Exports to Germany

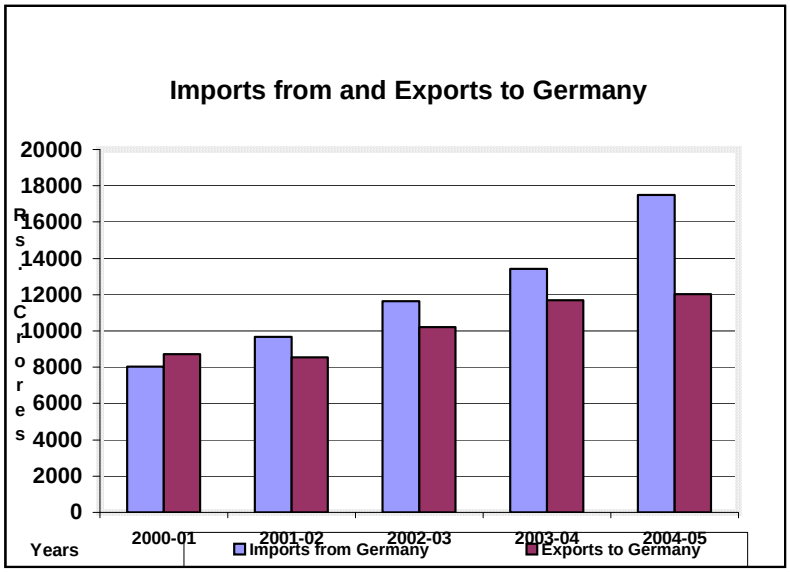

Table 1: India's Exports to EU: Percentage share of member countries

Country	2000-01	2001-02	2002-03	2003-04	2004-05
Austria	0.75	0.75	0.68	0.73	0.64
Belgium	13.78	13.71	14.02	12.50	14.5
Chezh Rep.	0.35	0.40	0.48	0.19	0.15
Cyprus	0.29	0.28	0.19	0.19	0.15
Denmark	1.63	1.49	1.55	1.67	1.66
Estonia	0.03	0,03	0.03	0.04	0.05
Finland	0.54	0.68	0.60	0.77	0.78
France	9.55	9.32	9.06	8.86	9.28
Germany	**17.87**	**17.64**	**17.78**	**17.61**	**15.43**
Greece	1.06	1.05	1.25	1.38	1..69
Hungary	0.39	0.46	0.40	0.63	0.60
Ireland	0.96	1.00	1.14	1.04	1.17
Italy	12.26	11.90	11.45	11.97	12.58
Latvia	0.22	0.06	0.07	0.11	0.09
Lithuania	0.08	0.06	0.08	0.12	0.17
Luxembourg	0.05	0.04	0.07	0.09	0.06
Malta	0.09	0.11	0.27	0.81	0.18
Netherlands	8.24	8.52	8.84	8.92	8.85
Poland	0.80	1.06	0.89	0.92	0.96
Portugal	1.37	1.45	1.36	1.17	1.21
Slovak Rep.	0.09	0.08	0.09	0.11	0.13
Slovenia	0.15	0.28	0.20	0.25	0.35
Spain	6.24	6.68	6.84	6.94	7.65
Sweden	1.65	1.52	1.48	1.52	1.13
UK	21.56	21.31	21.07	20.93	20.27
Total	100.00	100.00	100.00	100.00	100.00

Source: Computed from the data from ' India's Exports by countries –Commodities; DGFT, Government of India, Ministry of Commerce, Various Issues from 2001 to 2005

Table 2: India's Imports from EU: Percentage share of member countries

Country	2000-01	2001-02	2002-03	2003-04	2004-05
Austria	0.65	0.73	1.28	1.34	1.37
Belgium	26.97	26.10	29.04	26.52	23.97
Cyprus	0.01	0.05	0.02	0.01	0.02
Czech Republic	0.34	0.36	0.66	0.74	0.89
Denmark	1.33	1.33	1.12	1.50	1.39
Estonia	0.00	0.05	0.00	0.02	0.70
Finland	1.94	1.53	1.55	1.80	2.01
France	6.62	7.97	8.56	7.27	9.92
Germany	**16.53**	**19.16**	**18.81**	**19.46**	**20.79**
Greece	0.20	0.27	0.17	0.31	0.12
Hungary	0.14	0.22	0.16	0.00	0.00
Ireland	0.67	0.80	0.76	0.87	0.96
Italy	6.80	6.65	6.35	7.40	7.08
Latvia	0.04	0.00	0.02	0.00	0.00
Lithuania	0.01	0.00	0.04	0.07	0.09
Luxembourg	0.04	0.06	0.15	0.29	0.05
Malta	0.00	0.00	0.00	0.00	0.19
Netherlands	4.11	4.40	3.01	3.57	4.09
Poland	0.40	0.29	0.30	0.32	0.47
Portugal	0.11	0.13	0.11	0.09	0.09
Slavok Republic	0.06	0.11	0.08	0.07	0.11
Slovenia	0.20	0.24	0.55	0.40	0.11
Spain	1.33	1.59	1.38	1.72	1.99
Sweden	2.23	3.80	4.04	4.66	4.90
UK	29.77	24.21	21.72	21.57	18.69
Total	100.00	100.00	100.00	100.00	100.00

Source: Computed from the data 'India's Imports by Countries – commodities; Directorate General of Foreign Trade, Govt. of India, Ministry of Commerce, Various Issues.

Exports to Germany

The major commodity exports to Germany are Readymade Garments, Articles of Leather & Raw Hides, Carpet & Other Floor Coverings, Footwear & other such Articles. The Exports to Germany had grown at 19.54% in 2002-03 and at 11.2 per cent in 2006-07 year while as, correspondingly total exports of India grew by 22.50% during the same period. Thus, we can say that India's export growth with world is not in tandem with India's export growth rate with Germany. Germany's share in India's total exports has diminished from 4.28 per cent in 2000-01 to 3.32 per cent in 2004-05. This can be seen in Table 3 that exports to Germany are on the increase in absolute terms but its percentage share had decreased. Exports to Germany had further dropped to 3.2 per cent in 2006-07.

Table 3: Import -Export Trade with Germany Annual Growth Rates, % Share, Comparison with India's Total Foreign Trade, Trade Balance with Germany, India's Total Trade Balance/ Deficit

Country: *Values in Rs. Lacs*

Year →	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005
EXPORT	871,460.13	852,900.56	1,019,534.44	1,169,261.50	1,201,783.50
%Growth		-2.13	19.54	14.69	2.78
India's Total Export	20,357,102.00	20,901,798.00	25,513,728.00	29,336,674.00	36,187,916.00
%Growth		2.68	22.06	14.98	23.35
%Share	4.28	4.08	4.00	3.99	3.32
IMPORT	803,857.31	967,238.31	1,163,677.25	1,341,124.13	1,748,589.75
%Growth		20.32	20.31	15.25	30.38
India's Total Import	23,087,276.00	24,519,972.00	29,720,586.00	35,910,764.00	49,053,168.00
%Growth		6.21	21.21	20.83	36.60
%Share	3.48	3.94	3.92	3.73	3.56
TOTAL TRADE	1,675,317.44	1,820,138.88	2,183,211.69	2,510,385.63	2,950,373.25
%Growth		8.64	19.95	14.99	17.53
India's Total Trade	43,444,378.00	45,421,770.00	55,234,314.00	65,247,438.00	85,241,084.00
%Growth		4.55	21.60	18.13	30.64
%Share	3.86	4.01	3.95	3.85	3.46
TRADE BALANCE	67,602.81	-115337.75	-144142.79	-171862.63	-546806.25
India's Trade Balance	-2,730,174.00	-3,618,174.00	-4,206,858.00	-6,574,090.00	-12,865,252.00

Source: Compiled from the data India's Total Trade with All countries, Directorate General of Foreign Trade, Ministry of Commerce, Government of India

The value of major commodity groups exported to Germany in 1996-97 are Readymade Garments Rs. 1086.13 crores (16%)• Articles of Leather & Raw Hides Rs 895.49 crores (13%), Carpet & Other Floor Coverings Rs. 627.25 crores (9.33%), Footwear & other such Articles Rs. 404.77 (6%) in 1996-97. In 2004-05, the quantum of exports of Readymade Garments was Rs. 2500.39 crores (19.81%), Articles of Leather & Raw Hides Rs. 850.20 crores (6.73%), Organic Chemicals Rs. 831.89 crores (6.59%), Engineering goods including electrical machinery Rs. 724.68 crores (5.73%), Footwear & other such Articles Rs. 699.40 crores (5.54%) (Table 6)

Imports from Germany

The major imports from Germany have been Nuclear Reactors, Capital Goods, Articles of Iron and Steel, Engineering goods, Organic Chemicals etc.

The imports from Germany have risen at 20.32% in 2001-02 over the previous year, by only 15.25% in 2003-04 and by 30.38% in 2004-05. During the corresponding period India's total imports from rest of the world had increased by 6.21% (2001-02), by 21.21% (2002-03), by 20.83 (2003-04), and by 31.60 % (2004-05). In absolute terms the total imports from Germany were of the value of Rs.10047.58 crores in 1996-97, out of which the share of Nuclear Reactors was Rs.3325.82 crores which was (33%) of the total imports from Germany , the share of capital goods was Rs.2245.96 crores (22%), the value of Iron and Steel imported was Rs.932.06 crores (9%), Engineering goods was Rs.532.11 crores (5.25%). Over the years imports from Germany grew more rapidly as compared with exports particularly with regard to some product categories like Organic Chemicals, Nuclear Reactors, Engineering goods, Iron and Steel, Pharmaceutical Products, Aircraft, Spacecraft & Parts thereof. However, the import of capital goods has seen a declining trend over the period. The capital goods import stood at Rs. 2245.96 crores in 1996-97 was Rs. 1576.10 crores in 1997-98, Rs. 1425.37 crores in 1998-99, Rs. 1327.58 crores in 2000-01, Rs. 479.56 crores in 2001-02 and Rs. 595.10 crores in 2004-05. An important inference that can be drawn from this phenomenal decrease in capital goods import is that India had made itself technological self-reliant in many industries where we previously used to be dependent on foreign machinery. The share of Nuclear Reactors in total imports from Germany stood at Rs. 5464.83 (31.25%), Engineering goods Rs. 2885.58 crores (16.50%), Organic Chemicals Rs. 947.15 crores (5.41%).

Foreign Trade Growth Rate with Germany in tandem with rest of the World

To Germany, we find that by and large there has been proportionate increase in imports alongside increases in India's world imports 20.31% increase in 2002-03 for Germany and 21.21% increase for India's total exports during the same year. Again, we see 30.38% increase in imports to Germany, correspondingly 36.60% increases in India's exports to world in the year 2004-05.

India's total trade (taken exports and imports together) has increased at the rate of 4.55 percent in 2001-02, 21.60% in 2002-03, 18.31% in 2003-04, and 30.64% in 2004-05. Correspondingly, during the same period India's foreign trade with Germany has increased at 8.64% in 2001-02, 19.98% in 2002-03, 14.99% in 2003-04 and 17.53% in 2004-05. By and large, we find conformity with the level of increases in India's total trade with that of the increases in total trade with Germany. India has a trade deficit with Germany and with each passing year the quantum of deficit increases, as is the case with India's total trade foreign trade.

• The figures in parentheses denote the percentage share of commodity group in relation to the total exports to Germany

Growth Rate of Exports and Imports

India's exports to Germany have a compound Annual Growth Rate (CAGR) of 6.68% (R^2 = 84.2%)(Table 4). Similarly, imports from Germany have been increasing greater than exports to Germany. The CAGR of Imports from Germany are pegged at 8.00 percent (R^2 = 68.4%) (Table 5).

Table 4: Statistical Analysis (Export Growth Rates with EU Member countries)

Country	Log y = log a + log bx	β co-efficient Anti log Beta	CAGR (growth Rate) (b-1) x100	SE (Standard Error)	R^2
Austria	Log y=2.5801+0.0248x	1.0587	5.87	0.03127	86.3
Belgium	Log y=3.8345+0.0494x	1.0949	9.49	0.02984	95.9
Cyprus	Log y=2.1038+0.0007x	1.0018	0.18	0.06013	0.2
Czech Republic	Log y=2.2970+0.0697x	1.1721	17.21	0.07032	90.8
Denmark	Log y=2.9368+0.2922x	1.0695	6.95	0.0694	64.1
Estonia	Log y=1.3318+0.0414x	1.1001	10.00	0.1452	44.9
Finland	Log y=2.5280+0.0462x	1.1124	11.24	0.07713	78.3
France	Log y=3.6598+0.0444x	1.1078	10.78	0.043100	91.4
Germany	**Log y=3.9561+0.0281x**	**1.0668**	**6.68**	**0.04276**	**84.2**
Greece	Log y=2.7810+0.0577x	1.1422	14.22	0.09934	77.2
Hungary	Log y=2.3421+0.067x	1.1692	16.92	0.07578	88.9
Ireland	Log y=2.6850+0.0630x	1.15611	15.61	0.05711	92.4
Italy	Log y=3.7743+0.0416x	1.10075	10.71	0.03942	91.8
Latvia	Log y=1.6745+0.02610x	1.0867	8.67	0.15760	34.4
Lithuania	Log y=1.4249+0.876x	1.2236	22.36	0.12550	83.0
Luxem-bourg	Log y=1.4403+0.0794x	1.2006	20.06	0.11070	83.7
Malta	Log y=1.9626+0.1013x	1.2628	26.28	0.31230	51.3
Netherlands	Log y=3.6375+0.0417x	1.1009	10.09	0.03340	94.0
Poland	Log y=2.6734+0.0398x	1.09616	9.61	0.03416	93.2
Portugal	Log y=2.804+0.0415x	1.10044	10.64	0.03393	93.8
Slavok Republic	Log y=1.6054+0.0883x	1.22560	22.56	0.10030	88.6
Slovenia	Log y=1.9511+0.1009x	1.26181	26.18	0.13160	85.5
Spain	Log y=3.4922+0.06624x	1.16476	16.47	0.03647	96.7
Sweden	Log y=2.8805+0.0284x	1.06760	6.76	0.03389	87.6
UK	Log y=4.0232+0.0374x	1.0900	9.00	0.02923	94.3

Source: Computed the Regression Analysis on the basis of the export data of the all EU countries obtained from the Official Website of DGFT, ministry of Commerce, Government of India.

Table 5: Statistical Analysis (Imports from EU Member countries)

Country	Log y=log a +log bx	β co-efficient Anti log Beta	CAGR (growth Rate) (b-1) x100	SE (Standard Error)	R2
Austria	Log y=2.6674+0.0831x	1.21087	21.08	0.11070	84.9
Belgium	Log y=4.1647+0.0312x	1.074553	7.45	0.05642	75.4
Cyprus	Log y=0.9962+0.08051x	1.203093	20.36	0.26620	48.3
Czech Republic	Log y=2.4235+0.0809x	1.204924	20.49	0.13520	78.2
Denmark	Log y=2.80216+0.0571x	1.140748	14.07	0.07309	86.0
Estonia	Log y=0.4591+0.0322x	1.077010	7.70	0.49740	4.0
Finland	Log y=2.95371+0.0434x	1.106462	10.64	0.08306	73.2
France	Log y=3.6064+0.0515zx	1.125900	12.59	0.07271	83.4
Germany	**Log y=4.0109+0.0334x**	**1.080027**	**8.00**	**0.07187**	**68.4**
Greece	Log y=2.02614+0.0382x	1.091975	9.19	0.17230	33.0
Hungary	Log y=1.88963+0.079x	1.204813	20.48	0.0589	93.7
Ireland	Log y=2.52766+0.1047x	1.222690	27.26	0.04507	97.6
Italy	Log y=3.59893+0.0163x	1.051080	5.10	0.08395	39.9
Latvia	Log y=1.00245-0.1292x	0.742215	-25.44	0.40510	50.5
Lithuania	Log y=1.0200+0.1975x	1.574400	57.4	0.50930	60.0
Luxem-bourg	Log y=1.4751+0.1224x	1.325800	32.58	0.32630	64.5
Malta	Log y=0.6810+0.0404x	2.535300	153.53	0.99510	1.6
Netherlands	Log y=3.3332+0.0257x	1.061000	6.10	0.06550	60.7
Poland	Log y=2.26856+0.0440x	1.106630	10.66	0.09790	66.9
Portugal	Log y=1.75791+0.0309x	1.073790	7.37	0.08377	57.7
Slavok Republic	Log y=1.77056+00017x	1.003945	0.39	0.20020	0.1
Slovenia	Log y=1.9149+0.1326x	1.357080	35.70	0.28390	68.6
Spain	Log y=2.93326+0.0424x	1.102770	10.27	0.10020	64.3
Sweden	Log y=3.2225+0.0863x	1.220100	22.01	0.07464	93.0
UK	Log y=4.10168+0.0231x	1.054710	5.47	0.04360	73.0

Source: Computed the Regression Analysis on the basis of the export data of the all EU countries obtained from the Official Website of DGFT, ministry of Commerce, Government of India

German Investments in India

Germany has also come up as India's top sources of foreign technology and foreign direct investment. In 1989, Germany topped the list of foreign investors for the first time with over 120 crores (DM 120 million) of sanctioned investment. In fact, German investment proposals amounted for 38 percent of all foreign investments sanctioned by the Government in that year. In the early 1990s, i.e. 1991-92, Germany has maximum number of foreign collaborations approved and had second position in the country-wise foreign investments in India. Germany accounted for 35 percent of the total foreign investments approval in India from 1991 to 1994.

Conclusions:

Although, there is increase in volume and value in the bilateral trade, from the Indian point of view, yet, the share of Indo-German trade in Germany's aggregate trade has been very small, being merely about 0.5 percent of the total Germany trade volume during the later years of 1980s. German imports from India constitute only a minuscule of its total imports (around 0.3 percent) and German supplies, in terms of its world wide exports, also form a very negligible portion (about 0.5 percent). Germany's main trading partners have remained unchanged, namely, France, Netherlands, UK, Italy, Belgium, Luxembourg inside Europe and USA outside Europe. This trade profile has largely been the fallout of the global and regional framework within which Germany evolved itself in the post-war years (Mathur, 1999).

Table 6: India's Exports to Germany (Rs. Crores)

C O M M O D I T I E S	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
Gems and Jewellery	215.61	212.08	304.88	364.60	355.61	294.41	259.23	301.17	396.73
Readymade garments & other clothing accessories	1086.13	1738.28	1990.75	1742.14	2070.58	2099.20	2715.61	2831.68	2500.39
Fish & other Aquatic Invertebrates	37.37	19.09	25.29	53.98	53.42	54.05	70.27	68.82	77.04
Cotton	254.97	269.77	252.08	207.87	207.39	200.49	259.34	249.64	185.76
Organic chemicals	324.48	452.11	222.19	399.26	515.72	549.71	853.31	1146.86	1046.10
Man-Made staple fibres, & filaments	40.23	42.02	48.24	56.24	78.56	57.10	62.73	84.29	84.66
Tabacco & manufactured tobacco substitutes	73.06	74.47	27.72	77.41	95.12	67.24	74.07	117.60	68.40
Iron & steel and its articles thereof	136.52	178.04	184.33	155.86	271.44	232.85	272.72	414.98	669.65
Salt,sulphar, earths, and stones	17.04	16.09	19.72	19.54	29.34	23.71	30.81	42.31	35.54
Engineering Goods including Electrical Machinery	104.09	119.95	164.97	191.02	262.14	303.71	585.97	639.16	723.68
Coffee, Tea, Mate, & spices cereals	262.71	402.09	394.27	354.33	271.03	222.66	232.68	248.11	226.90
plastics and articles thereof	46.24	44.31	32.95	35.57	64.44	66.54	95.68	120.60	133.93
Nuclear Reactors,Boilers, etc	181.56	261.70	308.79	306.01	437.19	458.97	508.67	743.90	831.89
Articles of leather & Raw hides	895.49	1007.50	1106.63	868.93	988.43	926.70	835.11	887.31	850.20
Articles of stone, plaster, cement, Asbestos	61.39	66.06	71.96	65.10	66.38	72.44	74.15	83.08	96.09
Edible vegetables & edible fruits, nuts	62.16	62.55	71.96	65.10	66.38	72.44	74.15	83.08	96.09
Tanning & Dyeing extracts	74.66	142.43	121.02	145.84	199.56	191.42	219.41	225.01	209.50
pharmaceutical products	173.27	189.55	148.42	137.13	167.43	175.46	217.39	166.80	184.07
Footwear & other such Articles	404.77	356.61	466.52	432.82	452.96	550.07	511.30	671.93	699.40
Carpet & other floor coverings	627.25	517.41	521.73	692.35	551.01	431.41	411.20	486.89	528.60
Cereals	12.69	13.99	9.99	13.06	24.57	19.45	22.16	26.38	36.45
Inorganic chemicals	23.78	23.20	24.89	23.14	26.07	23.59	34.09	40.78	32.48
Rubber and Articles of Rubber	19.07	23.76	40.05	47.32	72.02	87.31	117.44	134.00	171.46
Other Miscellaneous Goods	1585.82	906.65	1231.89	1078.30	1387.81	1348.07	1657.85	1878.23	2732.82
Total Trade	**6720.36**	**7139.71**	**7791.24**	**7532.92**	**8714.60**	**8529.00**	**10195.34**	**11692.61**	**12617.83**

Source: Computed from the data' India's Imports by Countries – commodities' obtained from the Official Website of directorate General of Foreign Trade, Govt. of India, Ministry of Commerce, Various Issues.

Table 7: Imports from Germany (Rs. Crores)

COMMODITIES	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
1. Inorganic chemicals	94.78	91.62	107.73	104.51	94.23	117.82	159.67	165.26	188.25
2. Organic chemicals	532.11	91.62	503.38	630.03	535.32	597.67	667.97	819.25	947.15
3. Pharmaceutical products	34.08	50.23	59.59	78.44	102.10	127.73	156.54	104.39	139.32
4. Photographic & cinematographic goods	12.23	9.34	9.90	17.97	16.27	21.40	22.88	46.55	34.09
5. Miscellaneous chemical products	125.44	129.81	136.41	167.51	187.56	264.41	286.80	336.61	344.53
6. Plastic and articles thereof	230.71	243.42	269.50	311.97	316.11	437.72	435.73	610.42	695.69
7. Rubber and articles thereof	79.01	84.49	98.26	117.59	91.96	103.94	110.87	144.50	207.30
8. Paper and paper board	163.27	175.89	153.89	232.43	185.48	179.07	194.23	319.26	298.47
9. Gems and Jewellery	80.94	54.45	53.58	108.56	44.02	56.52	80.77	91.37	141.65
10. Iron and Steel	932.06	877.97	639.87	490.13	480.31	494.91	567.41	1154.62	1153.26
11. Nuclear Reactors	3325.82	2954.07	2626.21	2201.62	2440.26	2896.97	3228.22	4064.18	5464.83
12. Engineering goods	682.11	806.73	789.14	1008.97	1012.62	1465.47	1967.93	2040.55	2885.58
13. Aircraft, spacecraft and parts thereof	6.57	35.28	16.04	10.12	17.13	31.98	190.90	262.95	293.49
14. Optical, Surgical instruments	309.85	451.68	566.42	599.41	654.07	876.37	1095.05	1143.50	1399.40
15. Capital goods	2245.96	1576.10	1558.62	316.63	415.33	479.56	557.27	559.12	595.16
16. Other miscellaneous goods	1192.64	1327.51	1417.44	1581.63	1445.80	1520.84	1914.53	1548.71	2697.72
Total	**10047.58**	**9396.38**	**9005.98**	**7977.52**	**8038.57**	**9672.38**	**11636.77**	**13411.24**	**17485.89**

Source: Computed from the data' India's Imports by Countries – commodities' obtained from the Official Website of Directorate General of Foreign Trade, Govt. of India, Ministry of Commerce, Various Issues.

Moreover, Germany had witnessed eco-politico resurgence as the country stepped into the 1990s. The unification of the Germany and the integration of the European Market in 1992 are having profound effects on its economy. Moreover, German unification has brought tremendous opportunities for India (Lall, et al, 1993). Unification has led to steep rise in German imports as the German industry alone cannot possibly supply all the goods needed for the reconstruction of the economy particularly, the former East German territories. India should, as such, avail of these opportunities in the present as well as in the future. India, should also take caution of South East Asia, a region, which has been maintaining its exports at a commendable rate despite various restrictions. The four NICs – S. Korean, Taiwan, Hong Kong and Singapore – account for nearly 40 percent of German exports to the south, south East Asia and Far East Asia excluding Japan (Lall, et al, 1993). The share of these four economies in the German market is about 53 percent of the total imports from this region. India's position among the South East Asian countries, in the early 1990s, was fifth or sixth with regard to trade with Germany. China, Taiwan, S. Korea and Hong Kong were ahead of India in exporting to Germany in aggregate in commodities of India's interest such as garments, leather products and engineering goods. Being a developing country, India has relatively less sophisticated technology, small volumes of production and low labour productivity in the modern sector industries afflicted by high input costs of basic industrial material (steel, plastics, copper, furnace oil etc.) as compared to International prices, the structure of its exports is dominated by traditional products of low value, although, a modest degree of commodity diversification is noticed in its trade composition in recent years (early 1990s).

Within EU Framework

The prospects of Indian exports, however, cannot be viewed independently of the EU framework. It is argued that there have been two sets of factors affecting the performance of Indian textiles in EU markets. The first is domestic, like lack of modernization of textile machinery, pull of domestic market, high cost of production due to use of outdated machinery and other factors like escalations of cotton prices, heavy internal taxation and low productivity of labour etc. Among the external factors severe competition from Hong Kong, Pakistan, S. Korea and China (mainly on account of low prices) hit India's exports adversely. Exchange rate variations, quota spread or concentration were the other major setbacks. However, with the abolition of quota system from January

2005, there are good prospects of Indian Textile Industry to flourish in the coming years. But, there is another drawback that is Indian industrialists are reluctant to invest in technological up-gradation which stagnates quality of products (Singh,2001). They are not adaptable to demand, design and fashion and more importantly, have a short term outlook leading to problems like non-adherence to quality and delivery schedules. Consequent to hike in wages among the traditional suppliers and structural adjustments in the industrial patterns, a number of new competitors such as Thailand, Philippines and Brazil have emerged. The East Europeans and the Chinese are also putting up stiff competition for woven fabrics in the German market.

Indo-German bilateral trade has to be viewed in a broader perspective. The new targets of the trade relationship cannot be achieved merely in terms of quantitative parameters. A new qualitative element will have to be introduced with a time frame as a reference point (Lall, et ell, 1993). Since, the Indian economy, like many other developing economies which pursued the import substitution strategy, could not build strong scaffolding for a national economy to realign its global relations through external factors by greater participation in the global division of labour attracting foreign capital and technology. Indo-German trade relations, in this context, would develop provided;

- Indian industrialists, by seizing initiatives, become competitive enough in terms of quality production, concentrate on the export of sophisticated finished products, time and delivery schedules. Indian Industrialists should endeavor for joint production with German counter parts through proper identification of sectors.

- Exporters, who are keen to make a dent in the foreign markets, adopt professional and aggressive marketing strategies keeping the suitability of the channels of distribution and proper marketing analysis in mind; study market structure, identify consumer needs, tastes, preferences and develop new products/innovations/designs in conformity with the consumption trends, analyse distribution sector and adopt joint marketing with the local German importer distribution.

- India strengthens its economic relations and make Germany its major economic partner if it has to reap fruits of international business with Germany.

Indo-German trade relations are ever strengthening. The visit of Indian trade and political delegation in April, 2006, headed by the Indian prime Minister, Dr. Manmohan Singh bears testimony to the fact that Indo- German trade relations have christened into a new era with a lot of promise and prosperity for the people of both the nations.

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A CASE STUDY ON TECHNICAL EFFICIENCY OF READYMADE GARMENT FIRMS IN BANGALORE

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Abstract

This case study examines the technical efficiency of readymade garment firms (bottoms' producers only) in Bangalore for the year 2008. The study is based on the field visit to individual garment firms and, data sheets and questionnaires filled after discussion with Production Manager. Data Envelopment Analysis (DEA) is applied under output orientation assumption as the manufacturing firms have to maximize output with available resources. Number of stitching machines and number of operators are selected as input variables and total pieces of garment produced during the year as output variable. The main objectives are to examine technical efficiency of the garment firms, to identify the efficient and inefficient firms and also the factors affecting the performance of the inefficient firms. The study also suggests output-targets for the inefficient firms to improve their relative efficiency. The paper finds that the overall technical efficiency of garment firms is 76 percent. The results of factors associated with the production efficiency indicates that the maximum number of female operators, moderate wages and salaries, operators with 2 to 3 year experience can be a potential for improving the efficiency the firms.

Introduction

The garment industry is a low investment and highly labor-intensive sector of the textile industry. This industry is fragmented and most of the garment firms are small in size. The reason for this could be the SSI reservation policy that existed till 2001. It has been reported that Indian garment firms are less competitive mainly due to low productivity, obsolete technology, and poor infrastructure and low R&D (Hashim 2005, Joshi et. al. 2005). In this scenario, it is essential to assess the performance of the individual garment firms to know the extent of deviation of a firm's actual output from its targeted output. The most popular approach to measure the technical efficiency is Data Envelopment Analysis (DEA).

In India, very few studies have been carried out on productivity and efficiency of the garment industry. Bheda et. al (2002) attempt to study the productivity level in garment manufacturing using number of garment per operator and number of garment per machine as productivity measures. Theses ratios can not reflect the overall performance of the garment firm and also difficult to compare the efficient firm with the inefficient one. Such study is of little significance when the objective is to identify and analyze maximally efficient firms in comparison to the less efficient ones.

DEA and stochastic frontier production function (SFPF) methods have been used by researchers to assess the performance of individual firms and to compare inter-firm performance. Solankar and Singh (2000) measure the relative efficiency of 40 Indian textile spinning firms for the period 1997-1998 using DEA-BCC model. Ram Mohan and Ray (2003) compare the performance of public sector firms of India with those of private sector firms in respect of technical efficiency. The comparison is made in eight different sectors, including textile, over the period 1991-92 to 1998-99 using CMIE database. They measure technical efficiency using BCC model with output orientation. They did not find any evidence of superior performance on the part of the private sector over the public one. Bhandari and Ray (2007) measure the levels of technical efficiency in the Indian textiles industry at the firm level using DEA. The data used for the study relate to the production of cotton, wool, silk, synthetic and other natural fibers products. Bhandari and Maiti (2007) used Translog SFPF to estimate the technical efficiency of Indian textile firms for five years. They found that average TE varies between 68 to 84 percent across these years. Joshi and Singh (2008) examine the total factor productivity (TFP) growth and efficiency trends in Indian textile industry by using MPI.

The review of literature on the subject clearly indicates that there has not been any study conducted so far on Indian garment industry that has used DEA to measure the technical efficiency of individual firms. Keeping this in view, the present study has been carried out to measure the technical efficiency of 8 readymade garment firms of Bangalore. These firms produce single homogenous product, i.e. bottoms and face the similar production and market conditions. The study highlights the best practices followed by the efficient firms to provide the potential information for inefficient manufacturer for improving their performance.

The paper is structured as follows:
Section I deals with the data and variables; and section II describes the models, followed by results of the study and factors associated with the technical efficiency. Section III concludes the paper.

Section I: Data Collection

The study is limited to garment manufacturers that produce homogenous products (i.e, bottoms). The DEA requires that set of firms being analyzed should be comparable in the sense that each firm utilizes the same type of inputs to produce the same type of outputs (Odeck 2008). As our selected firms are in the same business and produces the same product, the DEA is most suitable technique to be applied for assessing the relative efficiency of individual firms and setting benchmarking for the inefficient firms to improve their performance. Further, the sample is restricted only to the domestic manufacturers as they are under similar market, environmental and infrastructural conditions.

As the study covers only bottom manufacturer, the results may not be directly applicable to manufacturers of other garment products. The data and information shared by the manufacturers have been taken for DEA analysis. The sample size in this study was suffered due to reluctance of manufacturers to share the information. Earlier studies on Indian garment industry have also suffered due to manufacturers' perception of confidentially regarding the information (Bheda et. al. 2002, Kalhan 2008).

Initially, we approached to Apparel Export Promotion Council for getting information on garment manufacturers. The data provided by the council contained the addresses and contacts of the manufacturing units. It was difficult to identify the product-wise details of firms from that information. We sent the e-mails with questionnaire and data sheet to almost 3000 manufacturer. We

did not receive any positive response from them. We also tried to contact the garment firms through telephone in Delhi, Mumbai and Bangalore but failed to get a response. PROWESS and Capitaline databases contain data on a large number of manufacturing firms, including readymade garments, but these sources have balance sheet based financial data of individual companies and do not have information about number of workers and number of machines of garment firms. In India, only Annual Survey of Industry (ASI) does provide the data on number of employees at aggregate level i.e. three digit data. It provides the data at firm level without disclosing the identity. ASI is also not having data on physical output and number of machine of selected industry. Therefore, in order to estimate the technical efficiency, using physical data on workers, machines and output, we attempted to conduct primary survey of individual firms in Bangalore and got the information only from 8 bottoms manufacturing units.

In DEA analysis, results are influenced by the size of the sample. In this case study, the number of garment firms is 8 which are consistent with rule of thumb provided by Banker et al. (1984) that the DMU should be at least twice the sum of input and output (Chu et. al. 2008). The sample size in this study is similar that used some of studies in literature (see, Majumdar 1994).

Selection of Variables

Selection of appropriate input and output variables for the efficiency estimation is an important stage in DEA analysis. A model with a large number of variables is one that may fail to have any discriminatory power between firms because most firms will tend to be rated efficient (Majumdar 1994); hence input-output variables in DEA analysis should be minimal. We identify the potential input-output variables by reviewing the DEA literature. Agarwal et.al. (2005) evaluated the relative performance of public transport sector of Uttar Pradesh using number of employees, fuel consumption and fleet size as inputs and passenger-kilometers used as an output variable. Singh and Agarwal (2006) examines the TFP growth and its components in the sugar industry of Uttar Pradesh using installed capacity, employee, raw material and fuel as inputs and sugar and molasses production as output. Chien et. al (2007) also use total energy generated as the output factor and total installed capacity (MW), total number of employees, and total production cost as input factors to evaluate the productivity changes in the Taiwan thermal power plants. Estache et. al. (2007) have attempted to analyze economic efficiency levels in African Electricity Distribution using installed capacity and number of worker as inputs and annual sales, number of customers and power generation as output variables.

In the above reviewed studies of different sectors, number of employees and installed capacity were used as inputs variables and gross output as output variable. In this study, number of stitching machines and number of operators are selected as input variables for installed capacity and employee; and total pieces of garment produced in the year as an output variable. The production of the garment industry is fully depend on the total number of stitching operators and total number of stitching machines. We did not find any difference in the raw material consumption across firms, as most of the firms are using automatic cutters for cutting the fabric. So there is a minimum wastage of fabric. We also did not find any difference in energy consumption as almost all firms are having the power driven machines. We found that the electricity consumption per stitching machine is almost equal in the surveyed firms. Hence, we did not consider the raw material consumption and energy consumption as input variables for the study. The input-output data have shown in Table-1.

Table-1: Correlation Coefficients and Descriptive Statistics of Selected Variables

Variables	GARY	OPT	MC
Correlation Coefficients			
GARY	1		
EMP	0.99083	1	
MC	0.99519	0.9976	1
Descriptive Statistics			
Mean	417500	358	143
Max	1400000	1500	500
Min	200000	150	75
Std. Dev.	401452	462	144
OPT- No. of operators per firm, MC- Nos. of sewing machine per firm, GARY- Nos. of garment produced/year, Adjusted R^2 = 0.9876			

Correlation and regression analyses are conducted to know the extent of variation in garment produced per year caused by the variation in the selected input variables. The results of correlation coefficient, descriptive statistics and R^2 are given in Table-1; indicate that output is significantly related with these inputs. About 98 percent of variations in the output variable are explained by these explanatory input variables.

Section II: Models Used

This paper applies non-parametric deterministic frontier methodology to measure the technical efficiency of the garment firms in Bangalore. In the DEA literature production efficiency, technical efficiency, relative efficiency and comparative efficiency are synonymously used. Using only observed output and input data of the firm, this technique evaluates how efficiently the inputs are converted into outputs. According to literature, there are two broad methodologies for measuring technical efficiency. The firm efficiency may be obtained econometrically specifying a stochastic frontier production function (SFPF) and other one linear programming methodology. The DEA methodology that we use in this paper has some advantages in comparison with the SFPF. First, it is not necessary to assume some functional form for the production function. Second, it makes no a priori distinction between the relative importance of outputs and inputs. Third, DEA is relatively insensitive to model specification, the efficiency measurement is similar if it is oriented to inputs or oriented to outputs. However, DEA also has some limitations. Compared with the stochastic frontier method, the main disadvantage of the DEA approach is that it does not provide statistical tests for the estimated production function (Zheng et. al. 2003).

DEA technique was first formulated by Charnes, Cooper and Rhodes (CCR) in 1978. In this model, the ratio of the weighted output to weighted inputs for each firm being evaluated is maximized (Charnes et. al. 1978). It is known as CCR model based on constant returns to scale. This model can not support to returns to scale. To overcome this limitation, Banker et al. (1984) described BCC model that estimates the efficiency at the given scale of operation and identifies returns to scale (Banker et. al. 1984). In this paper, we use BCC model, since the garment industry is considered as seasonal industry. The production of garment is always depending upon the market conditions. The objective of garment industry is normally to increase outputs rather than to decrease inputs. This industry is an employment generation industry with small investment giving maximum value addition to the textile sector. Hence, minimization of number of operators would not be justified. In Indian context, it needs more production of garments due to huge consumption in the domestic market. We, therefore, use the BCC output oriented DEA model. CCR efficiency is considered as Overall Technical Efficiency (OTE) and BCC efficiency as Pure Technical Efficiency (PTE). Scale efficiency is measured as a ratio of CCR efficiency to BCC efficiency.

We use the DEA approach for estimating these measurements of efficiency, where each firm is represented by vectors of products (y_i) and inputs (x_i). Here we use the notations used by Collei et. al. (1998).The efficiency of garment firm is then defined as the ratio of weight sum of outputs to weighted sum of inputs $(\mu' y_i / v' x_i)$, where μ' and ν' are weights obtained by solving the following linear programming problem:

$$\max_{\mu,v} (\mu' y_i / v' x_i),$$

$$s.t. \quad \mu' y_j / v' x_j \le 1, \qquad j = 1,2,....., N$$

$$\mu, v \ge 0$$

Solving this LPP allows finding values for μ' and ν', such that the efficiency of firm "*i*" is maximized, subject to the restriction that efficiency for the rest of the firms is smaller than or equal to 1. One problem with this particular ratio formulation is that it has infinite solutions. To avoid this, the next restriction is imposed $v' x_i = 1,$ which provides:

$$\max_{\mu,v} (\mu' y_i),$$

$$s.t. \quad v' x_i = 1,$$

$$\mu' y_j - v' x_j \le 0, \quad j = 1,2,....., N$$

$$\mu, v \ge 0$$

This equation is known as multiplier form of DEA. Using the duality in the linear programming, the equivalent maximization problem is:

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

$$s.t. \quad -y_i + Y\lambda \ge 0,$$

$$\theta \chi_i - X\lambda \ge 0,$$

$$\lambda \ge 0$$

Where θ is an efficiency parameter and λ is a vector of constants. This equation involves fewer constraints than the multiplier form and generally used. This input oriented CRS DEA model can be easily modified as a VRS DEA model by adding the convexity constraint N1'λ=1 to above problem. The above equations are used to identify the production efficiency of garment unit as a proportional reduction in inputs by keeping output constant.

In the case of garment industry, the firms are given fixed quantity of inputs and asked to produce the maximum possible outputs. Hence, the output oriented VRS model is suitable for this case study. The output oriented VRS model is given as:

$$\max_{\varphi,\lambda} \phi,$$

$$s.t. \quad -\phi y_i + Y\lambda \ge 0,$$

$$x_i - X\lambda \ge 0,$$

$$N1'\lambda = 1,$$

$$\lambda \ge 0,$$

Where $1 \le \phi < \infty,$ and $\phi - 1$ is the proportional increase in outputs that could be achieved by the i[th] firm, with input quantities held constant. Here the 1/ ϕ is the production efficiency of garment units which varies between zero and one.

Results of DEA Analysis

Table-2 demonstrates that the scores of OTE, PTE, SE, peers and returns to scale (RTS) of the individual garment firms for the year 2008. OTE scores suggest that a firm is efficient if it scores equal to one under CRS technology. It can be revealed from table that out of 8 units, only GF1 turn out technically efficient as it has efficiency score equal to one. The remaining firms are inefficient. For

inefficient firms, this model identifies a set of reference efficient firms that can be used as benchmarking for them. We find that the average OTE score of the 8 firm is 0.76 which indicates that on an average, these firms have to increase output by 24 percent using existing level of inputs if these firms want to be on the efficiency frontier.

The BCC model presumes the variable returns to scale (VRS) and measured efficiency is called as PTE or managerial efficiency. PTE deals with how efficiently the inputs are converted into outputs, irrespective of the size of firm. The BCC model obtains the pure resource conversion of efficiencies achieved by firms, irrespective of whether these firms obtain increasing returns to scale (IRS), decreasing returns to scale (DRS) or constant returns to scale (CRS). Table-2 also illustrates the scores of PTE and RTS measured under VRS assumption. The result reveals that out of 8 garment firms, 3 are efficient under VRS technology as their PTE score is equal to one. Average PTE score of these firms is 0.84, implying that an individual firm can be comparatively efficient by enhancing its output by about 16 percent. The GF3 is the most incompetent firm scoring PTE only 0.64. It should increase its output by 36 percent from the existing level of inputs to obtain 100 percent PTE. It may follow the best practices of firms GF1, GF2 and GF8 for improving its efficiency.

It is also observed from Table-2 that GF2 and GF8 obtain low OTE, but are having 100 percent PTE. For example, GF8 which scores only 0.70 OTE, achieves 100 percent PTE. This clearly indicates that this firm is capable to convert its inputs into outputs with 100 percent efficiency, but its OTE is low due to low scale efficiency. This demonstrates that if the effect of scale-size is neutralized, this garment firm can become efficient. Out of 8 firms, GF1 positions best practice firm by comprising highest peers count of 5 in the whole sample. It achieves most productive scale size as it scores both OTE and PTE as one. Thus, it can be a role model for most of the incompetent firms. Best practices of this firm can be followed as norms or benchmarking by the inefficient firms to monitor their performance.

Table-2: TE, SE, RTS of Readymade Garment Firms

Firm Code	OTE	PTE	SE	Peers	Peer Count	RTS
GF1	1	1	1	1	5	-
GF2	0.87	1	0.87	2	4	DRS
GF3	0.63	0.64	0.97	8,2,1	0	DRS
GF4	0.75	0.83	0.91	8,2,1	0	DRS
GF5	0.69	0.75	0.93	8,2,1	0	DRS
GF6	0.71	0.74	0.96	2,1	0	DRS
GF7	0.69	0.74	0.94	8,1	0	DRS
GF8	0.7	1	0.7	8	4	DRS
Average	0.76	0.84	0.91			

Note- TE- technical efficiency, SE- scale efficiency, RTS- Return to scale, OTE-overall technical efficiency, PTE- pure technical efficiency, DRS- decreasing return to scale

Table-2 shows the SE scores of individual firms. It shows that out of the 8 firms, one firm is scale-efficient while the remaining firms are scale-inefficient. This firm operates at the most productive scale size (MPSS). The average SE of the 8 garment firms is 0.91 which suggests that these firms may have to correct their scale size by 9 percent to achieve the same level of output. The GF8 is having lowest SE score (0.70) and operating under DRS. This suggests that it may decrease scale size in order to become efficient under CRS.

Target Setting for Inefficient Firms

DEA identifies input and output targets for an inefficient firm to render it relatively efficient. Each of the firm can become efficient by achieving these targets, determined by the efficient reference set for that firm. The inefficient firm can become technically efficient by maximizing the outputs as shown in Table-3**.**

Table 3: Actual and Target Inputs & Output of the Ready Made Garment Firms

Firm Code	Actual			Target		
	GARY	OPT	MC	GARY	OPT	MC
GF1	300000	150	75	300000	150	75
GF2	400000	230	120	400000	230	120
GF3	200000	160	80	311402	160	80
GF4	300000	225	100	363551	225	100
GF5	250000	180	90	334206	180	90
GF6	240000	170	90	325000	170	86
GF7	250000	250	90	338824	198	90
GF8	1400000	1500	500	1400000	1500	500

GARY- Nos. of garment produced/year, OPT- No. of operators per firm, MC- Nos. of sewing machine per firm, GF- Garment firm

The actual and target inputs and output are given in Table-3. It is observed that except GF1, GF2 and GF8 all remaining firms have to maximize the outputs to operate at the level of the efficient one. GF7 may have to also reduce the number of employee from 250 to 198 and also needs to increase number of garments produced per year from 250000 pieces to 338824 pieces.

Factors Associated with Technical Efficiency

The analyses for identifying the factors associated with technical efficiency are shown in Table-4. The selected factors are related with operator and machine as these are the input variables for DEA. It can be revealed from the table that more number of female operators, younger operators and less number of operators per machine may contribute positively to improve the technical efficiency of the garment firm as GF1 stood most efficient firm among the sample. The GF7 would have benefited with new machines but it has higher number of operators per machine (2.8 operators/ machine) and less paid operators. The GF7 and GF8 needs to raise their average wage per operators to draw efficient performance from operators to improve the efficiency of the firm. GF3 can improve the efficiency by employing more number of female operators. We could not find any influence of education of operators on the performance of the garment firm.

The data suggest that the firms having the operator's average below 25 are more efficient than the firms having the operator's average age above 25 years. The GF2, GF5 and GF8 are having the old machine of 10 year average age. These firms can improve their technical efficiency by replacing old machines with modern machines. The analysis of factors associated with efficiency suggest that more female operator (87%), latest machine, less number of operator per machine (2.0), younger operator with moderate wages and medium experience (2.6 year) of worker can be a potential for improving the performance of the garment firms.

Table-4: Factors Associated with Performance of Readymade Garment Firms

Factors/ Firm	GF1	GF2	GF3	GF4	GF5	GF6	GF7	GF8	Average
OPTM	2	1.9	2	2.3	2	1.9	2.8	2.4	2.2
AGEM	5	10.2	5	3.7	9.2	7	1	10	6.4
OPTF	87	87	78	80	83	82	80	83	83
WAGEO	3433	4339	3688	4533	4333	4412	2760	3100	3775
EDUO	10	12	10	11	10	11	10	11	11
EXPO	2.1	2.7	2.3	3.2	3.7	3.5	1.8	1.5	2.6
AGEO	25	26	27	26	28	28	25	28	26
TE	1	0.87	0.63	0.75	0.69	0.71	0.69	0.7	0.76

GF: Garment Firm, OPTM- Operator per machine, AGEM- Average age of machine, OPTF- Female operator's%, WAGEO- Average wage/operator, EDUO- Average. education of operator, EXPO- Average experience of operator, AGEO- Average age of operator, TE- Technical efficiency

VI. Conclusions

This paper investigates the technical and scale efficiency of garment firms in Bangalore using non parametric DEA approach. We find that on an average the selected firm can raise output by 24 percent by improving their overall technical efficiency. All the firms, except GF1, exhibit decreasing return to scale. This implies that the inefficient firms have not utilized inputs properly.

The study also identifies the factors affecting the technical efficiency. The results indicates that higher ratio of female to male operators, moderate wages and salaries, operators with 2 to 3 year experience have positive effect on the technical and scale efficiency of the firm. It is also found that firms having operators with an average age of 25 years are more efficient than those having the average age of operators above 25 years. This study suggests output-targets for the inefficient firms to improve their relative efficiency. However, the findings of the study need to be used cautiously as sample size of the readymade garment firms is small.

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AN ANALYSIS OF INDIA'S EXPORTS OF PROCESSED FOOD PRODUCTS

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Abstract

Food processing industry plays a tremendous role in terms of its contribution to employment generation and foreign exchange earnings in the Indian economy. However, its potential has not been exploited on account of underdevelopment features beset in the industry. The present study focusing on focusing on India's exports' nature, pattern and direction over a period of eleven years (1997-98 to 2007-08) has pointed that the Central Government has been quite instrumental to increase the growth of food processing industry. It has been actively encouraging investment in agro processing industries to reduce wastage and encourage value addition.

INTRODUCTION

The emergence of the WTO in 1995 and its clause the Agreement on Agriculture (AOA) raised the hope that the trade of the developing countries in agricultural commodities, may it be primary or processed would expand with increased market access leading to a greater international trade. However, as some promises were far from being fulfilled, therefore, it was resolved at Doha to take a serious note and comprehensive view and discussed these issues at length.

An in-depth analysis of the evolution of the Food Processing Industry in India requires a comprehensive and comparable time series data with the commodity basket composition. Such an in-depth analysis may focus on the dynamism of the food-processing segment in the overall exports of food products and provide comparative picture with experiences of the rest of the world. However, it is imperative to be recognized at the outset that the food processing industry *per se* is a part and parcel of the manufacturing sector. *Ceteris paribus*, it is dependent on the output of the agricultural sector as well as on the dietary practices along with tastes and preferences of the consumers. The domestic scene on both these fronts did not encourage rapid growth of the food processing industry in India. Therefore, the international scenario needs to be carefully taken care of and properly examined. However, the multi-faceted dimensions of food security management in India *ipso facto* laid much emphasis on enhancing food production rather than on food processing.

At the threshold of the beginning of the planning era in 1950-51, the contribution of agriculture in India's GDP was nearly 70 per cent. The agriculture sector accounted for 85 per cent of the total employment at that time. The share of agriculture in the country's GDP has been gradually declining since then. At present, the contribution of agriculture in India's GDP is nearly 17.1 per cent. However, it still engaged about 58.2 per cent of the population in both, i.e., directly and indirectly agricultural activities. It has been estimated that if the country has to maintain a GDP growth rate of over 8 per cent, as it is in vogue these days, then it is imperative that the agricultural sector has to grow at the rate of at least 4 per cent.

In fact, the growth of the food processing industry in India lies in the consistently increasing agricultural production. The year 2008 has witnessed as a record year for India's food grain sector with acreage under cultivation, record procurements and increased production. India is the largest producer of milk in the world and is likely to become the second largest dairy products producer in the coming years. It is the second largest producer of fruits and vegetables and the third largest producer of food grains in the world. Summarizing, India is the world's second largest producer of food baskets only next to China. She has the potential of being even the largest with a huge food and agricultural sector. Despite India having a huge agricultural production base, its share in exports of processed food in global trade has remained merely 1.5 per cent. The size of the global processed-food market has been estimated at US$ 3.2 trillion. Therefore, it seems a tremendous potential for export-led growth and investment in this buoyant industry.

REVIEW OF LITERATURE

A number of researchers have investigated the area of food processing and explored it from different dimensions. The striking feature of world merchandise trade over the past two decades or so has been the expansion of high-value food products at much faster rate than traditional agricultural commodities. The development of export-oriented food processing industry offers enormous potential for rural development and economic growth in developing countries (Athukorala and Sen, 1998). The fruits and vegetables processing industry occupy a unique position among the different sectors of the food processing industry (Subrahmanyam, 2000). Processed food exports must become an instrument to sustain and enhance social welfare in developing countries through poverty alleviation. However, the push for use of highly capital-intensive technologies to gain compliance with SPS regulations leads them to face non-tariff barriers for the exports of the developing countries. (Mehta and George 2003). India can be a largest food production industry in the world. Its food production is equal to that of USA and second to China (Gupta and Garg, 2005). Sustained growth of the industry is possible in a competitive market environment only when the firms operate at a high level of technical efficiency and adopt best technologies (Kalirajan and Bhide, 2007). The issue of food safety standards and export competitiveness in the food and processed food industry in Asia-Pacific countries has also been addressed. The empirical evidence showed the adverse effect of food safety standards on export performance in food and food manufacturing (Babool and Reed, 2007).

NEED OF THE STUDY

Food processing industry plays a tremendous role in terms of its contribution to employment generation and foreign exchange earnings in the Indian economy. However, its potential has not been exploited on account of underdevelopment features beset in the industry.

One of the most important challenges facing the country is to ensure remunerative prices to the farmers for their produce. The issue could be addressed to a great extent if the surplus production of cereals, fruits, vegetables, milk, fish, meat and poultry etc. is processed and marketed both inside and outside the country. A vibrant and dynamic food-processing sector plays a vital role in diversification and commercialization of agriculture. It enhances shelf-life, income of farmers, ensures value addition to the agricultural produce, generates employment and markets for export of agro processed foods products. In this manner, the impact of

increased economic growth in agribusiness through food processing can play a hallmark role in reducing rural poverty and increasing rural income and employment.

OBJECTIVES OF THE STUDY

The objective of the study is aimed at comprehending the position of India's trade of processed food products (PFPs) in the global market. The specific objectives are the following:

1. To analyze India's position in the global trade of processed food products.
2. To examine the specific problems faced by the exporters and producers of processed food products in the country.
3. To highlight the role on the part of the Government of India particularly for promoting these exports.
4. To assess the overall scenario of the sector of processed food products exports from India.

METHODOLOGY

The exports of processed food products (PFPs) are contributing significantly in the domain of Indian exports and play a vital role for the overall growth and sustainable development of the Indian economy. In view of the above significance, the present study has made an attempt to pursue the India's exports from its macro to micro level expressed in terms of processed food products exports. To meet the above aspects of the penetrating study, it has been divided into two sections. Section-I is concerned with the analysis of the nature, pattern and direction of the Indian exports over the study period (1996-97 to 2007-08). Further, it has also evaluated the Indian exports comprehensively in terms of their growth rates, trend values, regression analysis and percentage share of agricultural exports, processed food products exports and the three constituents of processed food products, e.g. processed fruits and vegetables, animal products and other processed food products. The section also examines some regression models relating to the exports of PFPs with some explanatory variables and has estimated these models using the method of least squares. In addition, the exports of three groups of PFPs have been analyzed with various permutations and combinations of the fifteen major importing countries at global level. Such kind of classification facilitates the inter-comparison of the exports for these groups. Further, Section-II of the present study is devoted to highlight the policy initiatives taken by the Central government to promote the export of such products.

Thus, the uses of simple statistical and mathematical tools have been made for the successful completion of the study. A variety of tables comprising the empirical results under different situations have also been prepared. Obviously, such studies are quite significant for the formulation of appropriate policies to promote exports of these products in the present era of globalization.

SOURCES OF DATA

The study is mainly based on the secondary data available from various authenticated sources. Most of the data were collected from Foreign Trade Statistics of India, Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce, Government of India, New Delhi. The data were also collected from the Export Statistics for Agro and Food Products, Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry. Annual reports of the Ministry of Food Processing Industry, Government of India, New Delhi and various other publications of food processing industry were also consulted.

RESULTS AND DISCUSSIONS

SECTION – I

The Section-I dwells on the interpretation of empirical results derived from various models of the study and embedded in the respective tables.

Table-I provides a comprehensive picture of the hierarchy of India's exports comprising of different dimensions. Col. 2 of the table reveals that total India's exports have been continuously increasing with 18.27 per cent compound annual growth rate (CAGR) and Rs. 5163.71 crore as its annual trend value. The t-values reveal that both the CAGR and annual trend values are statistically significant at $\alpha = 0.01$. Likewise, Col. 3 represents total agricultural exports with the figures in parentheses as the percentages of total exports. The agricultural exports in absolute terms have also been increasing but with a diminishing rate. Its CAGR and trend values are 11.76 per cent and Rs. 4703.88 crores respectively. However, their percentage share in total exports has declined from 19.20 per cent to 11.85 per cent over the study period. However, it is not a matter of concern for the agricultural sector of the Indian economy.

Table – I: Hierarchy of India's Processed Food Products Exports

(Value in Rs. Crores)

Year	Total exports	Total agricultural exports	Total exports of processed food products	Total exports of processed fruits & vegetables product group	Total exports of animal products group	Total exports of other processed foods product group
1	**2**	**3**	**4**	**5**	**6**	**7**
1997-98	129277.70	24832.45 (19.20)	7270.71 (29.27)	761.50 (10.47)	908.36 (12.49)	1494.88 (20.56)
1998-99	139753.16	25510.64 (18.25)	9681.65 (37.95)	705.68 (7.28)	851.73 (8.79)	1134.58 (11.71)
1999-00	159561.77	25313.66 (15.86)	7365.36 (29.09)	993.64 (13.49)	905.08 (12.28)	1494.49 (20.29)
2000-01	203571.01	28657.37 (14.07)	9212.88 (32.14)	1345.54 (14.60)	1637.16 (17.77)	1798.03 (19.51)
2001-02	209017.97	29728.61 (14.22)	10169.43 (34.20)	1100.57 (10.82)	1500.93 (14.75)	1780.07 (17.50)
2002-03	255137.28	34653.94 (13.58)	13827.95 (39.90)	1206.93 (8.72)	1800.53 (13.02)	1720.11 (12.43)
2003-04	293366.73	37266.52 (12.70)	14184.16 (38.06)	1125.81 (7.93)	2024.81 (14.27)	2316.44 (16.33)
2004-05	375339.53	41602.65 (11.08)	16982.40 (40.82)	1551.29 (9.13)	2592.58 (15.26)	2165.12 (12.74)
2005-06	456417.86	49216.96 (10.78)	18146.83 (36.87)	2454.60 (13.52)	3714.03 (20.46)	2694.62 (14.84)
2006-07	571779.26	62411.42 (10.91)	21150.42 (33.88)	2502.27 (11.83)	4063.03 (19.21)	3731.66 (17.65)
2007-08	655863.52	77769.71 (11.85)	31870.60 (40.98)	2451.44 (7.69)	5129.28 (16.09)	6523.13 (20.46)
CAGR	18.27 (26.09*)	11.76 (10.36*)	14.36 (10.08*)	13.50 (7.54*)	20.30 (14.37*)	14.10 (6.10*)
Trend Values	5163.71 (9.44*)	4703.88 (6.57*)	2007.02 (6.44*)	186.09 (6.33*)	407.37 (8.40*)	367.27 (3.96*)

Source: Export Import Data Bank, Director General of Commercial Intelligence & Statistics, Ministry of Commerce, Government of India, Kolkata and Agricultural and processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Government of India, New Delhi.

Note: * The coefficients are significant at α =0.01. Figures in parenthesis are percentage. Figures in parentheses in the last two rows are t-values.

Next, Col. 4 describes the transient behaviour of the total exports of processed food products (PFPs) with figures in parentheses as percentages of total agricultural exports, which have been fluctuating over the years and finally have increased from 29.27 per cent to 40.98 per cent over the study period. In addition, the exports in absolute terms have almost continuously been increasing with a CAGR and trend values as 14.36 per cent and Rs. 2007.02 crores respectively. Both these values are statistically significant at α = 0.01 level of significance. Finally, the last three columns of the table depict the total exports of the three constituents of the PFPs. The CAGR and trend values for these constituents have also been statistically significant at α = 0.01. In this way, the table describes the dynamic as well as hierarchical pattern of the India's exports. Such kind of information is quite significant in taking appropriate decisions for improving India's exports in general and in correcting the mismatching of the exports at micro levels in the hierarchy of exports (if any) in particular for the overall and balanced development of the economy.

Table – II: Estimated Results of The Models For The Exports Of Processed Food Products (1997-98 To 2007-08)

(Value in Rs. Crores)

Sr. No.	Model Structure	Estimated Coefficients		t-Value		Remarks
1.	Simple and Linear	0.0052		3.6*		Significant
2.	Simple and Linear	0.000252		1.92**		Significant
3.	Simple and Log-Linear	1.45		5.94*		Significant
4.	Simple and Log-Linear	0.098		2.11**		Significant
5.	Multiple and Linear	Estimated Coeff. for x_1 0.63	Estimated Coeff. for x_2 0.21	t-value for x_1 2.69*	t-value for x_2 0.86	First is Significant
6.	Multiple and Log-Linear	0.98	–0.12	4.39*	–0.55	First is Significant

Source: Calculated on the basis of the data collected from Annual Reports of Ministry of Food Processing Industry, Government of India, New Delhi and Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Government of India, New Delhi.

Note: (i) Depended Variable Y = Total Export of Processed Food Products.

(ii) Independent Variables are x_1 = Total Financial Assistance, x_2 = Exchange Rate.

* The coefficients are significant at α = 0.05

**The coefficients are significant at α = 0.10

Table-II displays the estimated results of the regression parameters for various regression models with total exports of processed food products (PFPs) as dependent variable (Y). In model at serial number 1, the variable, total financial assistance (X_1) is affecting the dependent variable (Y) significantly and may be used as an instrument to improve the total exports of processed food products. However, the linear regression model at serial number 2 between Y and X_2 (the exchange rate) is not significant and hence it may not be effective in controlling the behaviour of *Y*. The models depicted at serial numbers 3 and 4 are of log-linear forms and their t-values reveal that both X_1 and X_2 are significantly affecting the behaviour of Y. The regression coefficients in log-linear models represent the elasticity's of Y with respect to X_1 and X_2. Here, the coefficient of X_1 is 1.45 which means that for one per cent increase in X_1 there is 1.45 per cent increase in Y and similar kind of interpretation holds for the coefficient of log X_2. The models at serial numbers 5 and 6 are multiple linear and log-linear regression models. In both these models, one may note that only the variable X_1 is affecting the variable Y significantly and the variable X_2 is insignificant and it may be dropped from the list of policy variables used to control the behaviour of Y. Such kind of empirical exercises in economic theory are very necessary for controlling the behaviour of target variables through the efficient use of policy variables by various governments/decision makers.

Table – III: Inter Comparison of the Exports of the Processed Food Products (PFPs) Groups (1996-97 to 2007-08)

(Value in Rs. Lacs)

Product Group -I				Product Group - II				Product Group –III			
Country Groups	**Sr. No.**	**Country**	**CAGR**	**Country Groups**	**Sr. No**	***Country***	**CAGR**	**Country Groups**	**Sr. No**	***Country***	**CAGR**
Group -A	1	U.S.A	16.89 (8.71*)	Group- A	1	U.S.A	34.92 (4.06*)	Group- A	1	U.S.A	10.12 (5.20*)
	2	Bangladesh	37.91 (2.79**)		2	Bangladesh	23.33 (5.25*)		2	Bangladesh	9.39 (0.82)
	3	U.A.E	8.51 (3.47*)		3	U.A.E	6.26 (3.96*)		3	U.A.E	17.43 (2.27**)
	4	Germany	7.69 (4.20*)		4	Germany	19.92 (3.89*)		4	Germany	6.14 (1.79)
Group-B	5	Egypt	-17.11 (-1.01)	Group-B	5	Egypt	65.12 (2.21**)	Group -D	5	Malaysia	23.42 (3.90*)
	6	Saudi Arabia	18.41 (9.35*)		6	Saudi Arabia	26.12 (3.25*)		6	Philippines	16.06 (2.25**)
	7	Kuwait	9.29 (5.46*)		7	Kuwait	34.46 (8.48*)		7	Yemen Arab Republic	60.36 (5.07*)
Group-C	8	U.K.	9.82 (6.01*)	Group -D	8	Malaysia	7.89 (5.08*)	Group- C	8	U.K.	5.53 (2.39**)
	9	Sri Lanka	-27.88 (-2.18**)		9	Philippines	10.58 (7.24*)		9	Sri Lanka	11.66 (0.76)
	10	Nether Land	-10.15 (-0.82)		10	Yemen Arab Republic	16.73 (5.75*)		10	Nether Land	-14.68 (-1.16)
Group-E	11	Russia	45.71 (8.47*)	Group-F	11	Angola	82.43 (8.02*)	Group-G	11	Indonesia	13.94 (2.89**)
	12	France	19.17 (9.26*)		12	Jordan	29.92 (8.70*)		12	Ukraine	10.48 (0.79)
	13	Canada	15.10 (6.78*)		13	Oman	19.09 (8.08*)		13	China	-1.19 (-0.42)
	14	Spain	17.05 (7.74*)		14	Iran	8.64 (2.28**)		14	Pakistan	-16-61 (-0.97)
	15	Belgium	18.41 (9.74*)		15	Vietnam	21.82 (6.53*)		15	Nepal	22.09 (8.84*)

Source: Calculated on the basis of data collected from Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Government of India, New Delhi.

Note: Figures in parentheses are t-values.

* The coefficients are significant at $\alpha = 0.01$

Table-III provides a comparative picture of the exports of three product groups as defined in the footnote of the table. The exports of three product groups of PFPs to various countries have also been classified into seven country groups (from Group A to Group G) and are shown in the given table.

The inter comparison analysis of the three product groups of PFPs is also made on the basis of their CAGR of exports to the respective countries. The figures in parentheses of CAGR columns are t-values, which reveal their significance at various levels. One may note from the table that there are some negative values of CAGR for these exports to some countries, which may be due to some random disturbances in the importing countries. Such kind of empirical information is quite valuable for taking appropriate decisions in the field of foreign trade policy.

Table – IV: Two Way Classification of CAGR For India's PFPs Exports

(Value in Rs. Lacs)

Product Group –I			**Product Group-II**			Product Group-III		
Countries Groups	**Highest Growth Rate**	**Lowest Growth Rate**	**Countries Groups**	**Highest Growth Rate**	**Lowest Growth Rate**	**Countries Groups**	**Highest Growth Rate**	**Lowest Growth Rate**
Group-A	37.91 (Bangladesh)	7.69 (Germany)	Group -A	34.92 (U.S.A)	6.26 (U.A.E)	Group-A	17.43 (U.A.E.)	6.14 (Germany)
Group-B	18.41 (Saudi Arabia)	-17.11 (Egypt)	Group-B	65.12 (Egypt)	26.12 (Saudi Arabia)	Group-D	60.36 (Y.A.R.)	16.06 (Philippines)
Group-C	9.82 (U.K.)	-27.88 (Sri Lanka)	Group-D	16.73 (Y.A.R.)	7.89 (Malaysia)	Group-C	11.66 (Sri Lanka)	-14.68 (Nether Land)
Group-E	45.71 (Russia)	15.41 (Canada)	Group-F	82.43 (Angola)	8.64 (Iran)	Group-G	22.09 (Nepal)	-1.19 (China)

Source: *Ibid.,* Table No- III
Note: Product Group –I = Processed Fruits & Vegetables
Product Group –II = Animal Products
Product Group-III = Other Processed Foods

Table-IV has been derived from table-III and it provides two-way classification of the exports for the processed food products (PFPs). The table highlights the highest and lowest growth rates for the three product groups for each category of the importing countries. For example, the highest growth rates in three products groups are 37.91, 34.92 and 17.43 respectively in the importing countries of Group A and similarly the lowest growth rates for same combination are 7.69, 6.26 and 6.14 respectively. In parentheses below the growth rates are given the names of countries. The same kind of interpretations for such remaining combinations may be produced on similar lines.

SECTION – II
POLICY INITIATIVES BY THE GOVERNMENT TO PROMOTE EXPORTS

The Central Government has been quite instrumental to increase the growth of food processing industry. It has been actively encouraging investment in agro processing industries to reduce wastage and encourage value addition. Several policy initiatives have been taken from time to time to promote growth of the processed food industry in the country which are highlighted below:

(i) Food processing industry is one of the thrust areas identified for exports. Free trade zones (FTZ) and export processing zones (EPZ) have been set up with all necessary infrastructures. Similarly the setting up of 100 per cent Export Oriented Units (EOU) is encouraged in other areas. They may import all types of goods including capital goods free of duty.

(ii) Units in EPZ/FTZ and 100 per cent Export Oriented Units can retain 50 per cent of the receipts of foreign exchange earnings in foreign currency accounts.

(iii) Automatic approval for foreign equity up to 100 per cent is available for most of the processed food items except alcohol and beer and those reserved for small-scale sector subject to certain conditions.

(iv) Excise duty on processed fruits and vegetables has been brought down from 16 per cent to zero level in the Union Budget of 2001-02.

(v) All profits from exports are completely free from corporate taxes. Profits from such exports are also exempt from Minimum Alternate Tax (MAT).

(vi) Most of the PFPs have been exempted from the purview of licensing under the Industries (Development & Regulation) Act, 1951, except items reserved for small-scale sector and alcoholic beverages.

(vii) To ensure easy availability of credit, the Union Government has included food-processing industry in the list of priority sector for bank lending in 1999. NABARD has created a refinancing window with a corpus of Rupees one thousand crore for agro processing infrastructure and market development.

(viii) In the Union Budget 2007-08, excise duty has been waived on all kinds of food mixes including instant mixes, Soya Bari, (Food supplement) and ready to eat packaged foods and on Biscuits.

The statement of Mr. Subodh Kant Sahai, the then Union Minister of State for MFPI, indicates a remarkable feature that the food processing industry in India had shown growth even despite the global meltdown. The industry has been growing at 14 per cent currently against 6-7 per cent growth in 2003-04. Likewise foreign direct investment (FDI) totaling US$ 143.80 million was attracted into the food processing industry in 2007-08 against US$ 5.70 million in the preceding year.

CONCLUSIONS

The present study has investigated India's exports focusing on their nature, pattern and direction over a period of eleven years (1997-98 to 2007-08). The main findings of the study have been summarized as under:

(i) An attempt has been made to highlight the pattern of disaggregating total exports at different descending micro levels. The detailed empirical information on their dynamic behaviour is embedded in Table-I.

(ii) The growth rates and the trend values for all such categories of exports are highly significant.

(iii) It has been revealed that the exports of the three product groups of the processed food products have increased many folds (Table-I).

(iv) A variety of regression models with the exports of PFPs as dependent variable, have been examined and found that only 'Total Financial Assistance' (X_1) has been significant in controlling the behaviour of the exports of PFPs. On the other hand, the variable 'Exchange Rate' (X_2) has only been affecting these exports moderately (Table-II).

(v) To achieve the direction of the exports of the three product groups of PFPs, i.e., Product Group I to III, a country-wise classification has been made in seven groups of countries (Group-A to Group-G) and placed in Table-III. Such kind of classification identifies the countries, which are in demand of our specific type of processed food products (PFPs) and this further leads to increase the volume of the national exports (Table-III).

(vi) Finally, a two-way classification of the exports of the three product groups has been made. In this way, the Table-IV has been derived from the Table-III and highlights the highest and lowest growth rates for each product group and corresponding to each country group. This may be valuable information for the exporters engaged in the production and export of these products as well as for the decision makers of India's foreign trade policy.

In addition to such conclusions, the role of the government towards boosting the exports of these products has also been highlighted in the present study. The Union Government promoted rationalization of tariffs and duties relating to the exports of food processing industry in the era of globalization over a period of time.

POLICY IMPLICATIONS AND SUGGESTIONS

Based on the findings of secondary data on various aspects of processed food products industry in India, some strategic suggestions/policy implications have been presented here. These policy implications will be instrumental in creating a conducive environment for the development of processed food products industry and will also increase the share of PFPs industry in the country's total exports.

I. The food processing industry has been growing at 14 per cent per annum currently against 6-7 per cent growth in 2003-04. However, the present study logically emphasizes the need of providing additional stimulus for the exports of processed food products and to address some policy issues like reforming labour law, SSI, de-reservation, high transaction costs, high taxation, high packaging costs and infrastructure bottlenecks.

II. It has been observed that the quality of Indian processed food products is not up to the mark as per tastes and preferences of consumers in the global market. Therefore, it has been suggested that the Union and State Governments should organize regular seminars to update the technology. Thus, there is an immediate need for upgrading the skills, product diversification, SPS standards, market-oriented products, and participation in exhibitions in India as well as abroad.

III. An eco-friendly sound and subsidized public transport system is the need of the hour. Therefore, the transport facilities should be improved, and proportion of the transportation costs may be borne by the government to motivate the exporters. Keeping in mind the perishable nature of processed fruits and vegetables and dairy products, a chain of cold-storage facilities must be developed from the place of production to airports and ports.

IV. The functioning of the agencies likes ITPO, IIFT, APEDA, etc. facilitating the exports promotion must be improved in order to sustain and develop long-term potential of PFPs units. Over a span of time, these agencies have become bureaucratic in their *modus operandi*. Keeping in view certain corrupt practices prevailing underneath the Indian economy, these agencies have also not been devoted honestly to the noble cause of their objectives.

V. The enterprises engaged in the production of PFPs, how so ever small in size, must endeavor to obtain ISO 9000 quality certification in addition to various countries-specific product certifications to improve their quality image in the eyes of overseas buyers in the market of the developed countries.

In essence, if the above-mentioned suggestions are met, it is certain and there is no way that PFPs would not be in a commanding position to take on every challenges of globalization and emerge as a promising industry in the field of Indian exports. Vision 2015 undertaken by the Ministry of Food Processing Industries foresees the following:

- Three – fold growth in the size of the processed food sector.
- Increasing level of processing of perishables from 6 per cent to 20 per cent.
- Value addition to be raised from 20 per cent to 35 per cent.
- Share in global food trade to go up from 1.5 per cent to 3 per cent.

In such a manner, the industry has an ample potential to chalk out the development path of the Indian economy in the 21st century.

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INDIA'S EXPORTS POTENTIAL IN PROCESSED FOOD PRODUCTS

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Abstract

The present study is an attempt to examine the status and growth in processed food products production, processing capacity and growth along with instability in exports. The study is based on secondary data from the several published sources and website. The state-wise percentage change in the distribution of food processing units has gone down from 47.22 per cent to 10.73 per cent during these years (1993, 2004 and 2007). However, the state-wise variation of units has almost remained stable over these years. In addition, the country-wise growth rates and trend values have enabled us to identify the export potential countries into the high, middle and low potential categories respectively for the Indian economy. Besides the item-wise growth rates and trend values of these exports have been analyzed in quantity and value terms and reveal significant variations in the categories of consider items. In spite of impressive growth in exports India's share in the world exports is very low which needs to be increased by taking appropriate research and development policies and relaxing the constraints faced by the processing industry.

Introduction

Agriculture may be termed as the culture of two-third of India's population. In India 650 million people are dependent on agriculture for their livelihood. Agriculture plays a strategic role in the process of economic development of India. Therefore, agricultural development is quite crucial to India's overall economic development. It will depend upon intensifying the agricultural and allied activities along with the diversification and commercialization of agriculture. Food processing industry may be considered as an engine for enhancing better employment opportunities, improving economic conditions of the people, development of rural areas and overall economic development.

Food processing industry is of paramount significance for India's economic development on account of the vital linkages and synergies that the industry promotes between the two pillars of the Indian economy i.e., agriculture and industry. The growth in the food processing sector and progressive improvement in the value-addition chain are also of great importance for achieving favorable terms of trade for Indian agriculture both in the domestic as well as global markets. Besides the efficient food processing industry also contributes in the nation's food security as well.

The simple fact that the post -harvest losses are about 25 to 30 per cent in the country should serve as an eye opener for all of us. Even marginal reductions in these losses are bound to give the country great relief on the food security front as well as improve the income levels of the farming community.

In the current discussions about Indian agriculture, the suggestion is commonly made that agriculture should quickly move towards processing and value- addition, with a consequent increase in exports of processed food products (Gulati, 1992). Likewise, increased urbanization, improved standards of living and the convenience needs of double income families point to major market potentialities in the food processing and marketing sectors (Sidhu, 2008). The food processing industry in India has a share of 1.5 per cent in the total GDP of the country, and as part of total manufacturing accounts for 9 per cent. India's share in world trade in respect of processed food is about 1.6 per cent (Annual Report of the Ministry of Food processing Industry, Govt. of India, 2007-08).

A number of researchers have investigated the area of food processing and explored it from different dimensions. The striking feature of world merchandise trade over the past two decades or so has been the expansion of high-value food products at much faster rate than traditional agricultural commodities. The development of food processing export industries offers enormous potential for rural development and economic growth in developing countries (Athukorala and Sen, 1998). Processed food exports must become available instrument to sustain and enhance social welfare in developing countries through poverty alleviation. Besides, the push for use of highly capital-intensive technologies to gain compliance with Sanitary and Phyto-sanitary (SPS) regulations leads them to becoming, in practice, non-tariff barriers for the developing countries exports (Mehta and George, 2003). India can be a largest food production industry in the world. Its food production is equal to that of USA and second to China (Gupta and Garg, 2005). Sustained growth of the sector is possible in a competitive market environment only when the firms operate at a high level of technical efficiency and adopt best technologies (Kalirajan and Bhide, 2007).

NEED OF THE STUDY

Food processing industry plays an important role in the Indian economy by its contribution to employment generation and foreign exchange earnings. The agriculture sector in India contributes 17.1 per cent of the country's GDP and provides employment (directly/indirectly) to approximately two-third of the population. However, its potential has not been tapped due to the underdevelopment of the processing sector in India. The fruits and vegetables processing industry occupy a unique position among the different sub-sectors of the food processing industry (Subrahmanyam, 2000).

One of the most important challenges facing the country is to ensure remunerative prices to the farmers for their produce. The issue could be addressed to an extent, if the surplus production of cereals, fruits, vegetables, milk, fish, meat and poultry etc. are processed and marketed both inside and outside the country. A strong and dynamic food processing sector plays a vital role in diversification and commercialization of agriculture, enhances shelf life, ensures value addition to the agricultural produce, generates employment, enhances income of farmers and creates markets for export of agro processed foods. The impact of increased economic growth in agribusiness through food processing can play a significant role in reducing rural poverty and increasing rural income. Obviously, such studies are quite significant for the balanced growth and development of the Indian economy and for the formulation of appropriate policies to promote exports of such products in the present era of globalization.

OBJECTIVES OF THE STUDY

The study is aimed at comprehending the position of India's trade of processed food products in the global market. The specific objectives are the following:

1. To study India's state-wise strength of the processed food products units.
2. To examine India's performance in International trade of processed food products.
3. To evaluate the role of the Government of India for promoting exports of processed food products.
4. To make an overall analysis of the exports of processed food products from India.

METHODOLOGY

The exports of processed food products find a crucial place in the domain of Indian exports and play a vital role for the growth and development of the Indian economy. In view of the above significance, the present study needs a comprehensive analysis and for this purpose, it has been divided into two sections. Section – I, is concerned with the dynamic behaviour of the exports of processed food products through their trend values, coefficient of variation, annual compound growth rates and a percentage change in the number of units installed over the Indian states. The equations for CAGR and trend values for the exports of processed food products are respectively as under:

(i) $Y = ab^t$

where $b = 1 + r$ and

r = CAGR

(ii) $Y = a + bt$

where b represents trend value. The values given in the parentheses of the Tables II and III are t-values.

In addition, a comparative analysis of the exports of these products for the top 15 countries of the world has been made. The most appropriate statistical tools used for this purpose are ranks and coefficient of variation, which highlight the year-wise picture of the exports, and country-wise variation in these exports over the period of study (1995-96 to 2006-07).

Further, Section-II of the present study is devoted to highlight the policy initiatives taken by the Central government to promote the export of such products.

Finally, to highlight the effectiveness of the present study the empirical results obtained in Section-I on the basis of the relevant data have been placed below in the analytic part of the present study. Of course, for the successful completion of the study, the use of simple statistical and mathematical tools has been made and a variety of tables and coefficient of variations under different situations have also been prepared

SOURCES OF DATA

The study is mainly based on the secondary data available from the various authenticated sources. Most of the data are collected from Foreign Trade Statistics of India, Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce, Government of India, New Delhi and Export Statistics for Agro and Food Products, Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry and Ministry of Food Processing Industry, Government of India, New Delhi and various publications of food processing industry.

RESULTS AND DISCUSSIONS

The present section consists of four tables and each examines empirically the different aspects of India's exports of processed food products. In the process, Table-I depicts the state-wise distribution of food processing licensed units under Fruit Products Order (FPO) in India at three points of time. One may see from table that the concentration of such units has been in all the southern states, Gujarat and Maharashtra in western region, Uttar Pradesh & Delhi in northern area and only West Bengal from eastern region. It is also noticed that the number of units has been consistently increasing but not at the same rate over the three years shown in the table.

SECTION – 1

It is obvious that the concentration for such units in the above states may be due to the availability of the raw materials/inputs in the respective regions. The last two columns of the above table give the percentage changes in 2004 over 1993 and in 2007 over 2004. For the overall total of these units, there is 47.22 per cent increase in 2004 over 1993 and 10.73 per cent increase in 2007 over 2004, which signifies a significant decline in percent terms over these years. In the end, the last row of the table gives the coefficient of variation of the licensed units for the three years, which reveal that their distribution has almost been uniform (113.83, 103.54 and 108.94).

Table – I: State-Wise Distribution of Licensed Units Under Fruit Products Order (FPO) In India

State/UT	1993	2004	2007	%age change in 2004 over 1993	%age change in 2007 over 2004
Andhra Pradesh	252	279	321	10.71	15.05
Assam	23	28	48	21.79	71.43
Bihar	53	45	52	(-) 15.09	15.56
Chandigarh	29	23	20	(-) 20.69	(-) 13.04
Chhattisgarh	-	30	25	-	(-) 16.67
Delhi	245	395	394	61.22	(-)0.25
Goa	140	177	108	26.43	(-)18.98
Gujarat	224	389	461	73.66	18.51
Haryana	143	373	372	160.84	(-) 0.27
Himachal Pradesh	81	124	154	53.09	24.19
Jammu & Kashmir	80	105	128	31.25	21.90
Jharkhand	-	20	30	-	50.00
Karnataka	230	381	409	65.65	7.35
Kerala	327	418	483	27.83	15.55
Maharashtra	817	1060	1240	29.74	16.98
Madhya Pradesh	93	117	127	25.81	8.55
Orissa	22	37	38	68.18	2.70
Punjab	175	315	336	80.00	6.67
Rajasthan	90	265	244	194.44	(-) 7.92
Tamilnadu	385	542	577	40.78	6.46
Uttar Pradesh	415	494	638	19.04	29.15
Uttarakhand	-	74	120	-	62.16
West Bengal	260	340	325	30.77	(-) 4.41
Others*	48	52	86	8.33	65.38
Total	4132	6083	6736	47.22	10.73
C.V.	113.835	103.546	108.942		

Note* Others states/UTs included Manipur, Meghalaya, Mizoram, Nagaland, Pondicherry, Tripura, etc.

Source: Annual Reports of the Ministry of Food Processing, Govt. of India.

Table-II demonstrates the country-wise growth rates and trend values of the India's exports of processed food products from the period 1995-96 to 2006-07. It can be seen from the table II that most of the growth rates and trends are statistically significant at one per cent level of significance. Further, the importing countries have been classified into the following three categories, namely, category – I when growth rates are greater than 50 per cent, category – II when the growth rates lie between 10 per cent and 50 per cent and category – III when growth rates are below 10 per cent. This kind of classification may be vital in identifying the high, middle and low potential countries for the purpose of exports of the processed food products. On the basis of the ranks obtained for the growth rates (last column), one may conclude that the first three countries fall in the high potential category, next six countries fall in the middle potential category and the last six countries are of the low potential category.

Table – II: Country-Wise Growth Rates and Trend Values for India's Exports of processed Food Products (1995-96 to 2006-07)

(Value in Rs. Lacs)

Countries	CAGR	Trend Values	Rank
U.S.A.	96.47 (6.12*)	6716.29 (6.15*)	1
Saudi Arabia	91.44 (4.79*)	12448.67 (5.06*)	2
U.A.E.	86.42 (5.22*)	8296.18 (4.90*)	3
Nigeria	47.91 (3.73*)	5504.61 (4.48*)	4
Bangladesh	13.76 (2.74*)	14093.01 (2.46**)	5
Malaysia	13.77 (7.03*)	7808.56 (7.04*)	6
Kuwait	13.24 (6.77*)	4328.53 (5.23*)	7
Sri Lanka	12.71 (7.43*)	3397.34 (5.51*)	8
Philippines	12.20 (2.67**)	3930.10 (1.42**)	9
Germany	9.90 (7.87*)	2061.29 (7.70*)	10
Nether Land	9.64 (3.92*)	2062.58 (3.62*)	11
U.K.	7.64 (7.50*)	3509.80 (7.16*)	12
Indonesia	6.41 (1.01)	1034.69 (0.39)	13
South Africa	5.68 (1.12)	2075.60 (1.29)	14
Russia	-3.62 (-3.62)	-729.61 (-0.76)	15

Source: Calculated on the basis of the data collected from Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Government of India, New Delhi.

Note: *Denote the level of significant at $\alpha = 0.01$

** Denote the level of significance at $\alpha = 0.10$

Figures in parentheses are t-values.

Table – III: Growth Rates and Trend values of the Exports of Processed Food Products (Item-wise) (1990-91 to 2006-07)
(Quantity in MTS) (Value in Rs. Crore)

Period (1990-91 to 2006-07)		Growth Rates and Trends of the Exports in Quantity Terms		Growth Rates and Trends of the Exports in Value Terms	
Sr. No.	Items	CAGR	Trend Values	CAGR	Trend Values
1	Fruits and Vegetables	9.1 (6.84*)	75750.73 (5.93*)	14.02 (1.13)	823622.81 (2.73*)
2	Processed fruits and vegetables	64.1 (18.46*)	45939.95 (9.08*)	19.67 (1.63)	1065164.23 (3.10*)
3	Animal products	19.9 (10.72*)	83115.74 (5.14*)	20.22 (1.61)	1699326.96 (3.13*)
4	Other processed foods	16.9 (4.73*)	75678.44 (3.63*)	25.31 (1.96**)	1422991.76 (3.13*)
5	Cereals	15.6 (5.59*)	423791.55 (4.77*)	17.21 (1.49)	3695458.11 (2.93*)

Source: Calculated on the basis of data collected from Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Government of India, New Delhi.

Note: * Denote the level of significance at α=0.01
** Denote the level of significance at α=0.10
Figures in parentheses are t-values
MTS denote metric tons

Table-III depicts the growth rates and trend values of the exports of processed food products both in quantity and value terms. Column three of the table highlights the growth rates of the exports for the various products. It is evident, that the growth rates are varying between 9.1 and 64.1 per cent, signifying that it is lowest for the products at Sr. No.-1 and highest for the products at Sr.No-2. Here, the t-values reveal that all the growth rates are highly significant. On the similar lines it may be seen that range of trend values for the products is between 45940 and 423792, Metric Tonnes (MTS) with smallest value for the products at Sr. No -2 and largest value for the products at Sr. No 5 (col. IV). Again, all the trend values are significant at α=0.01. Similar kind of interpretations can be had for the growth rates and trend values of the exports for the products in value terms respectively (cols. V and VI).

Table – IV: Year-Wise Ranks and Coefficient of Variation Of The Exports Of Processed Food Prodcts

Sr. No.	**Countries**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**
1	Saudi Arbia	4	1	1	2	1	1	1	3	2	2	1	1
2	Bangladesh	1	7	4	1	3	2	2	1	1	1	2	3
3	U.A.E.	3	2	2	3	2	3	3	7	3	3	3	2
4	U.S.A.	6	3	3	5	4	4	5	5	5	5	4	4
5	Malaysia	7	5	6	7	6	5	4	4	4	4	5	5
6	U.K.	8	6	5	6	5	6	7	9	7	7	6	7
7	Indonesia	2	9	13	15	8	10	8	6	6	11	13	9
8	Phillipines	10	10	9	9	14	8	6	2	9	3	9	11
9	South Africa	5	8	7	4	12	13	12	8	11	9	10	10
10	Kuwait	11	12	8	10	9	7	9	12	10	10	7	6
11	Sri Lanka	12	13	14	13	7	9	10	11	8	8	11	12
12	Nigeria	15	15	15	8	15	15	11	14	14	6	8	8
13	Netherland	14	11	11	14	13	11	13	10	13	14	14	13
14	Germany	13	14	12	11	10	12	14	13	12	12	12	14
15	Russia	9	4	10	12	11	14	15	15	15	15	15	15
16	C.V.	92.37	78.01	76.79	125.62	88.60	91.12	75.42	68.74	97.09	90.53	83.23	64.08

Source: *Ibid*., Table – II

Finally, Table-IV provides year-wise ranks and coefficient of variations of the exports of processed food products for the selected countries over the period of study (1995-96 to 2006-07). The ranking pattern of the countries over the years divides/ classifies the India's exports into the following three categories: Category-I, the countries where the exports have increased, Category-II, the countries where these exports have remained stable and Category-III, the countries where the exports have gone down. The countries at Sr. Nos. 1, 4, 5, 10 and 12 fall in the first category and the countries at serial nos. 2, 3, 6, 8, 11, 13 and 14 belong to the second category, finally the countries at Sr. Nos 7, 9 and 15 are in 3rd category. This kind of ranking pattern for the India's exports to these countries certainly highlights their dynamic beahviour. Further, the last row of the table gives the coefficient of variations of the exports over these twelve years. These reveal that the dispersion of the exports has been of fluctuating nature but has reduced to a great extent (92.37 to 64.08), which signifies that the India's exports are leading towards uniform distribution among the countries, which is a good sign for the Indian economy.

SECTION-II

POLICY INITIATIVES BY THE GOVERNMENT TO PROMOTE EXPORTS

The Central Government is committed to enhance the growth of food processing sector and put it on a robust footing. The Central Government is actively encouraging investment in agro processing industries to reduce wastage and encourage value addition. Several policy initiatives have been taken from time to time to promote growth of the processed food sector in the country. Some of these are:

(i) Food processing industry is one of the thrust areas identified for exports. Free trade zones (FTZ) and export processing zones (EPZ) have been set up with all necessary infrastructures. Also, setting up of 100 per cent Export Oriented Units (EOU) is encouraged in other areas. They may import free of duty all types of goods, including capital goods.

(ii) Units in EPZ/FTZ and 100 per cent Export Oriented Units can retain 50 per cent of foreign exchange receipts in foreign currency accounts.

(iii) Automatic approval for foreign equity up to 100 per cent is available for most of the processed food items excepting alcohol and beer which are reserved for small-scale sector subject to certain conditions.

(iv) Excise duty on processed fruit and vegetables has been brought down from 16 per cent to zero level in the Budget, 2001-02.

(v) All profits from export sales are completely free from corporate taxes. Profits from such exports are also exempt from Minimum Alternate Tax (MAT).

(vi) Most of the processed food items have been exempted from the purview of licensing under the Industries (Development & Regulation) Act, 1951, except items reserved for small-scale sector and alcoholic beverages.

CONCLUSION

The present study has examined comprehensively the dynamic behaviour of India's exports of processed food products and reached the following conclusions:

i) The state-wise percentage change in the distribution of food processing units has gone down from 47.22 per cent to 10.73 per cent over the three years (1993, 2004 and 2007). However, the state-wise variation of units has almost remained stable over these years.

ii) The country-wise growth rates and trend values have enabled us to identify the export potential of India into the high, middle and low potential categories respectively (Table-II).

iii) The item-wise growth rates and trend values of these exports have been analyzed in quantity and value terms and reveal significant variations in the categories of considered items (Table-III).

iv) In the end, year-wise ranks reveal the dynamic pattern of India's exports with regard to their standings. Likewise, the coefficient of variation demonstrates that the variations in these exports have been of fluctuating nature over the period of study (Table-IV).

In addition, the government's role towards enhancing the exports of these products has been highlighted. The Union Government promoted rationalization of tariffs and duties relating to the exports of food processing sector.

SUGGESTIONS

In spite of so many natural advantages and export friendly environment for trading the processed food products, the food processing industry has been facing many problems. The main problems of the industry are related to finance, skilled personnel, raw material of good quality, cutthroat competition, insufficient dissemination of technology and lack of comprehensive database. The industry should adopt the latest technologies to inject greater efficiency, which may further lead to economies of scale and cost effectiveness.

The other issue is the absence of linkages between the industry and the farmers for the raw materials. It is suggested that the right quality and quantity of raw material be made available to the industry at the appropriate time. The most suitable method in the Indian context is to procure it directly from the farmers through contract product.

The food processing industry today is one of the most competitive and cost-effective in the world. Keeping in view the resources and strengths of India, it is in a commanding position to take on every challenge of globalization and convert it into an opportunity.

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TRADE PERFORMANCE IN CHINA AND INDIA: OPPORTUNITIES AND THREATS

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Abstract

China and India were the star performers in aggregate gross domestic product (GDP) growth in the 1980s and 1990s. In India, the trade-GDP ratio has doubled from around 15% in early 1980s to about 30% today. However, over the same period China's trade-GDP ratio rose from around the same level of 16% to over 50% of GDP. China continues to outpace India in global integration. In Information Technology (IT) sector, India has notably outstripped China. China receives a much larger flow of net foreign direct investment (FDI) than India. China has accumulated substantial foreign exchange reserves of $383 billion in 2003, exceeding its annual imports. India has done the same - its reserves, around $92 billion at the end of 2003, exceed by a substantial margin the likely imports of $60 billion. In sum, China's trade performance has been distinctly superior and it has become the world's economic powerhouse.India's competitive advantage in the global market place depends on the legal and institutional framework, use of the English language, tremendous comparative advantage, vast pool of technical and scientific personnel, competitive advantage in a global economy, huge home market, change in the mindset of India's entrepreneurs and policy makers from inward looking to outward-oriented ambition to emerge as global players. Along with India's strategic strengths, it is important to take note of strategic challenges, weak infrastructure, rapid depletion of water and other natural resources, restrictive labour laws inefficiencies and inertia in governance, corruption, and rent-seeking activities. Water, weak rural infrastructure, insufficient power availability, competition from other supplier countries, barriers to market entry involving increasingly, technical barriers, and intra-provincial trade protection will represent major challenges for China. Inevitably, China and India are often portrayed as competitors in a race for economic power. However, there are also opportunities for the two economies to grow together, learn from one another and collaborate to overcome shared problems and achieve shared goals. Opportunities for cross-border trade and investment will continue to increase dramatically in the years ahead, especially if efforts to create a free trade agreement gain momentum.

Background

Asia has been a region of economic dynamism over the past four decades and between 2005 and 2010, Asia's economy is expected to expand 25% more rapidly than the rest of the world. A consensus is emerging that global economic power is passing to Asia in the 21st century and to China and India in particular. Despite representing only 6% of the world's gross domestic product (GDP) in 2004, these two countries accounted for 12% of its growth and their rapid rise is profoundly reshaping the dynamics of trade and power within Asia and throughout the world. Inevitably, China and India are often portrayed as competitors in a race for economic power. However, there are also opportunities for the two economies to grow together, learn from one another and collaborate to overcome shared problems and achieve shared goals. India has capitalized on its workforce's superior English language skills, managerial capabilities and entrepreneurial nature, and has come to excel in the global service sector and high value industries like software, pharmaceuticals and telecom. But with 83 million new entrants into the Indian job market by 2010, and notoriously underdeveloped infrastructure, India wants to emulate China's success in building its manufacturing capacity to ensure sustainable, long-term growth. China has a 13 year head-start in the development and reform process. The country's growth has been more controlled and is rooted in low-cost export-driven manufacturing, fuelled by record levels of foreign direct investment (FDI) – US$61 billion in 2004. However, China is conscious of the need to move beyond manufacturing to higher value-added areas of business. It is increasingly seeking to learn from India's advanced service sector and its pool of internationally competitive, English-speaking graduates.

Although increased competition between China and India is certain, leaders in both countries recognize that cooperation may be a better way of overcoming many of their challenges. There has been remarkable growth in bilateral trade between China and India over recent years. Bilateral trade rose by more than 350% between 2000 and 2004, and there is strong political support for strengthening the bond with their joint objective of reaching bilateral trade levels of US$20 billion in 2008 and US$30 billion in 2010. Opportunities for cross-border trade and investment will continue to increase dramatically in the years ahead, especially if efforts to create a free trade agreement gain momentum. Besides, the business opportunities for Indian, Chinese and multinational companies are spectacular and their attempts in economic cooperation has drawn the attention of the entire world. Due to the high dependence of these large Asian economies on imports of primary commodities for industrial growth, variations in their growth performance will have strong repercussions on the terms of trade and export earnings of other developing countries. This inevitably raises the question of the sustainability of the pace of growth of these two economic powers in the medium and long term. Keeping the above in view, an attempt has been made to examine the comparative performance of trade in China and India and the possible opportunities and threats in becoming a growth pole of the world economy. The study has utilized the potentially rich sources of secondary data available through the publications of the World Bank, World Trade Organization (WTO) and other international institutions, the Governments of China and India and the research conducted by individual researchers.

Trade Performance in China

The opening wide of China's door to trade and FDI has not occurred in isolation. Trade policy around the world has become progressively more liberal as part of wider packages of market-based reforms. A veritable trade policy revolution has spread across the developing world, especially since the early 1980s, though it has been patchy and uneven (Henderson, 1998; Michalopoulos, 2001). China's first decade of reforms centred on internal liberalization, especially in agriculture, followed a brief period of uncertainty and suspense after the Tiananmen massacre. The last decade, however, has seen the biggest trade-and-investment liberalization programme in the world. In short time, China has swung from extreme protection to rather liberal trade policies. This

was crowned by its accession to the WTO, with by far the strongest commitments of any developing country. The pace of internal and external liberalization has not let up since.

Even under the current wave of globalization, Chinese leaders have been careful to retain control of their economy and the state-owned sector still produces 68% of the GDP and employs 729 million people. For Chinese capitalism, the road to national development runs parallel to globalization. In fact, China's stock of FDI to GDP was 36% in 2005. China is molding its future to the global economy as the world's best export platform and internal commodities market. Almost every transnational in the world wants to produce and sell in China, making it the world's third largest importer as well as exporter. China accounted for 60% of the world's export growth in 2005 and is more deeply integrated in the global production chain with 50% of its foreign sales and 29% of its industrial output generated by transnational corporations. China has also outstripped the US as the world's primary destination for FDIs, pulling in $52.7 billion in 2003 and $480 billion since 1990 and there is no such thing as a global strategy without China (Kaplinsky, 2005).

China has become the largest manufacturer and trading partner in an interregional market that hit $722.2 billion in 2001 and had the fastest rate of growth in the world since 1985. Recently intra-regional trade accounted for the majority of Asia's export growth, with much of the increase flowing to China. From a global perspective, China's impact is truly staggering (UNIDO, 2002). About 20% of Chinese exports are considered high tech, of these 61% come from wholly foreign-owned enterprises. In many sectors of the Chinese economy, exports emerge from regional value chains, involving coordinated production between plants in different economies and resulting in deepening regional integration (Ng and Yeats, 2003). Much of China's growth in manufactured exports, especially in electronics, incorporates components produced in surrounding economies (Lall and Abaladejo, 2004). Between 2000 and 2003, the growth of China's share of global GDP (at ppp) and global imports was more than 30%, its share in the worldwide growth in fixed investment even amounted to 60%, the corresponding figure for oil consumption being about 35% (Woodall, 2004). China is importing large quantities of investment goods and raw materials (World Bank, 2003a).

China's share of global inflows of FDI was almost 10% in 2003 (USD 53 billion of a world total of USD 560 billion), which made China the world's largest recipient of FDI in 2003 (UNCTAD, 2004). The major investors were Hong Kong and Macao, the US, Japan, Korea and Taiwan. China's largest computer firm, Lenovo, bought the IBM's PC business, while other intended acquisitions failed (Economist, 2005). By 2003, total Chinese investment abroad amounted to USD 37 billion. It is basically the size of China's population that is increasingly turning globalization into a Chinese process. China is actually still a very poor country with a per capita income (at ppp) of USD 4.900. But the overwhelming number of about 1.3 billion makes it the world's second largest economy. The size of its labour force is correspondingly large and still, to a large extent, made up of the right age cohort. China's labour pool is underemployed and marked by a huge surplus. If all U.S. jobs were moved to China, there would still be surplus labour in China (Polaski, 2004). If there were a truly global market for labour, China would be its largest supplier, exerting enormous downward pressure on wages and working conditions.

The world has to and will continue to have to adjust to the wide range of opportunities (and risks) that emerge with a more open China. But how long will the adjustment take, in particular in China itself? China is home to about 7% of global manufacturing production. Foreign-owned firms generate 50% of exports and 60% of imports (Wolf 2003; Hale and Hale, 2003). Exports and imports as a share of GDP increased from 33% in 1993 to 60% in 2003 and in comparison, Japan's share grew from 14% to 18% during the same period. China still controls inward and outward capital flows, though not completely. Palley (2005) estimates China's global trade surplus in 2002 at USD 189.9 billion. The fact that there are large capital flows even without full capital account liberalization might explain why China is trying to keep its exchange rate as it is and to accumulate a huge stock of foreign exchange. Capital inflows could – under certain circumstances such as political or economic crisis – turn into outflows which would be as hard to control as the former inflows. Without countervailing policies, a capital flight of this kind could provoke a crisis similar to the Asian crisis of 1997.

Exports from China are largely produced by subsidiaries of foreign firms. In 2002, foreign affiliates accounted for about 50% of all Chinese exports (up from 9% in 1989). In high-tech industries, the share was even higher, reaching more than 90% (e.g. mobile phones) (USCC, 2003). The foreign-funded firms are also absorbing a large share of all Chinese imports (5% in 1985; 15% in 1989; 52% in 2000) **(**Lardy, 2002). About half of the overall value of China's foreign trade is thus related to FDI. In 2002, foreign-owned firms produced 28.9% of the gross output value of all industrial enterprises in China (up from 11.7% in 1995) (World Bank, 2003b). There is still a substantial labour surplus in agriculture and in state-owned industries that could be moved into modern industries with much higher productivity. In employment terms, export production is still the tip of the iceberg. It is, therefore, questionable how far globalization has contributed to the reduction of poverty in China. Globalization advocates like to present China as a showcase for their argument that global economic integration benefits the poor (World Bank, 2002; Wade, 2004).

Trade Policies in China

By the time China entered the WTO in 2001, the import regime had been almost entirely transformed. The transformation was similarly far reaching on the export side. Three other policies were critical to the rapid expansion of China's foreign trade over the past two and a half decades. The first is the reform of the pricing and allocation of foreign exchange. Another policy supporting the rapid growth of China's foreign trade was the decision to rebate the indirect taxes that reduced the profitability of exporting. The third policy is the duty drawback system that supports China's export processing programme. China's substantial trade growth has introduced substantial new competition into its domestic market. In addition to imports, competition is enhanced through the domestic sale of goods produced by foreign affiliates located in China. This is particularly important in China since by the end of June 2003 cumulative, inward FDI was about $480 billion, far and away the largest of any emerging market economy. Over half of inward FDI has gone into the manufacturing sector, where there are very few restrictions on foreign ownership. The economic importance of foreign affiliates in China is reflected in their contribution to manufacture goods output, which in 2002 stood at almost 30%. Contrary to the impression that foreign affiliates have invested in China mostly as a manufacturing platform for sales into the global market, about 60% of the output of joint ventures and wholly foreign-owned firms is sold on the domestic market. From the point of view of local firms without foreign ownership the competitive effects of imports and of goods produced by

foreign affiliates but sold on the domestic market are similar. In both cases the goods will reflect whatever advantages of foreign technology, finance, and marketing can be brought to bear.

Three indicators suggest that increased competition is having a transforming influence on China's domestic economy. These are the decline in employment in the state sector, the dramatic shrinkage in the rate of inventory accumulation, and the upturn in profitability of China's state-owned manufacturing firms. Even as China's economic transformation was gathering speed in the 1980s and early 1990s, the number of people employed in the state sector continued to go up and that situation has dramatically reversed since the mid-1990s. Between 1995 and the end of 2006, the number of people employed in the state sector declined by a third, or 38 million. The shrinkage of employment in the state sector has been very large and very compressed.

In brief, the astounding combination of trade and FDI penetration means that China is already well integrated into the world economy and creates vast opportunities. What about effects within China? The number of people in extreme poverty declined sharply between 1978 and 2006, despite a large increase in the population and the proportion of the population in extreme poverty came down from one-third in 1990 to one-tenth in 2006. Other indicators of human welfare – life expectancy, adult literacy, infant mortality, the average daily calorie intake per person – have also seen dramatic improvements. The proportion of children aged between 10-14 years in the labour force has declined from 30% in 1980 to 5% in 2006. All this has happened during the last two-and-a-half decades of growth unleashed by market-based reforms. Thus, in China, growth has massively benefited the poor. Of course the picture is not uniformly rosy. There are widening regional disparities in China. The galloping growth in the eastern coastal provinces has left much of the central and western interior behind. 86 % of FDI goes to the east. There may be as many as 200 million unemployed and under-employed in the countryside. The state health-care system has all but collapsed, and pollution in the cities has got much worse (Wang, 2000). Reversing or even slowing down China's integration into the world economy is not the lesson to draw. That would deprive the Chinese people of further growth and poverty reduction, and more generally of further improvements to human welfare. Rather the challenge is to bring benefits of globalization to the parts of the country they have not yet reached, while devoting more public and private resources to health care, pollution control and other public goods.

Trade Performance in India

According to India's National accounts data, GDP and per capita GDP have grown at an average of 5.8% per annum and 3.7% per annum respectively during 1980-81 to 2003-04 (Virmani, 2004). The comprehensive reforms instituted in the early 1990s have increased competitive pressures on the Indian economy, while at the same time enhancing its ability to compete globally. The growth rate has, however, increased by only about 0.6% point. It is expected that the trend rate of growth in India will move up to around 7% over the next few years. India's exports have grown much faster than GDP over the past few decades. Several factors appear to have contributed to this phenomenon including FDI, which has been rising consistently especially from the early 1990s. By 1997, India became the ninth largest recipient of such investment among the developing economies (World Bank, 1998a). However, despite increasing inflows of FDI, there has not been any attempt to assess its contribution to India's export performance - one of the channels through which FDI affects growth.

The success stories of East and South East Asian countries suggest that FDI is a powerful tool of export promotion because multinational companies (MNCs) through which most FDI is undertaken have the well established contacts and up to date information about foreign markets. However, the experience of these countries cannot be generalized to India given the lower level of infrastructure, and the rigidity in both the factor as well as commodity markets. India has opened up its market since July 1991, by lowering tariff and non-tariff barriers (NTBs), and liberalizing investment policy. However, by any standard, India is far less open than many developing economies (Ahluwalia et. al, 1996). Furthermore, its factor market including infrastructure sector is less efficient compared with many East and South East Asian countries with whom India competes in international market. Hence, it is possible to argue that even with the policy liberalization, India may have failed to attract a significant amount of export-oriented FDI and the export growth may have been brought about by factors other than FDI namely the real depreciation of Indian currency, improvements in price competitiveness and provision of export subsidies etc. Apart from liberalization in foreign investment policy there have also been substantial reforms in trade and payment regimes (Bhagwati, 1993; Joshi and Little, 1994). It was only in 1990s; India experienced a significant inflow of foreign capital in the form of both FDI and portfolio capital.

While India is not yet anywhere near ASEAN countries and far too behind China in attracting FDI, it has done remarkably well in recent years compared with its own past performance (Economists Intelligent Unit, 1999). Two notable developments have taken place in India's export front since 1970s. First, its exports have grown much faster than GDP. Second, there has been a substantial change in India's export mix. Several factors appear to have contributed to these developments, namely the real depreciation of exchange rate, liberalization in investment policy especially from the early 1980s and the provision of export subsidies to reduce the anti-export bias. Whenever the real devaluation was maintained, growth in exports continued (Joshi and Little, 1994). A sharp devaluation of rupee since the early 1990s has further strengthened export growth although there was some slowdown and or declined in exports during the macro economic crisis of the early 1990s. Export growth also slow down in 1997-98 due partly to the Asian crisis. Indian exports are dominated by manufactured goods which account for about 76% share by 1997-98 increased from 50% in 1970-71 (World Bank, 1999). India's exports have been witnessing robust growth and displaying a tendency of moving to a higher growth trajectory since 2002-03. The sharp recovery witnessed in 2002-03 was further consolidated in 2003-04, with exports registering a growth rate of 21.1% on top of a rise of 20.3% in 2002-03. Under its newly announced Foreign Trade Policy 2004-09, Government, encouraged by a 20% plus growth rate in three of the last four years, has fixed an ambitious target of US$150 billion for exports by the year 2008-09, implying an annual growth rate in US dollar terms of around 20%, thus doubling the share of India in global exports to 1.5% (Government of India, 2006).

Both external and domestic factors have contributed to the satisfactory performance of exports since 2002-03. Improved global growth and recovery in world trade aided the strengthening of Indian exports. On the other hand, firming up of domestic economic activity especially in the manufacturing sector provided a supporting base for strong sector-specific exports. Recent recovery in international commodity prices and various policy initiatives for export promotion and market diversification seem to have contributed as well. The entrenchment of the growth momentum in the 1990s, the opening up of the economy and corporate restructuring has enhanced the competitiveness of Indian industry. The trade policy reforms in the recent past, with their focus on liberalization, openness, transparency and globalization, have provided an export friendly environment with simplified procedures

for trade facilitation. Such continued trade promotion and trade facilitation efforts of the Government have also aided the current strengthening of export growth. The other exciting aspect of India's recent export performance is the dramatic growth in export of services. The share of services has risen from about 20% to 33% of India's total exports in the past 10 years, especially thanks to the IT revolution and the dramatic growth in exports of IT-enabled services. Services already account for over 50% of India's GDP and it is quite conceivable that services could also account for over half of India's total exports in the next 5-10 years.

Trade Policies in India

The surprising policy reversal of 1981 was one of the earliest manifestations of the impact of globalization on India's economic policy. India's balance of payments position deteriorated after the second oil shock. At the same time, India's worst drought since independence sliced agricultural production by 15% and contributed to high inflation of 17% in 1979-80 and 18% in 1980-81 and growing fiscal deficits - 8.1% of GDP in 1980-81 (Joshi and Little, 1994). In contrast, to previous economic crises when India responded with import controls and fiscal conservatism, India responded to its problems of 1979-81 with a strategy of expansionary adjustment, which included increased investment in domestic oil production and infrastructure along with incentives to increase exports. The considerable growth in foreign remittances, which in large measure came from Indian workers in the Middle-east following the hikes in oil prices, demonstrated that the international economy could be a source of valuable capital. India's expansionary adjustment also depended on a $5.8 billion loan from the IMF. As the 1980's progressed, the government increasingly took advantage of India's high credit rating to borrow from private commercial sources. Long-term debt to private creditors rose from $1.7 billion in 1980 to $22.8 billion in 1990 and the short-term debt increased from $1.3 billion to $8.5 billion. India's total debt jumped from $21 billion to $84 billion in 1990, later peaking at $103 billion in 1994 (World Bank, 1998). The Indian government's resort to foreign finance during the 1980s, not only funded its current account deficits, but facilitated unprecedented fiscal deficits. Central government deficits grew from an average of 4.9% of GDP for the last five years of the 1970s to an average of 8.6% of GDP for the last half of the 1980s (Joshi and Little, 1994).

India's resort to foreign borrowing should be understood in the context of the evolution of its political competition. Since 1967, Indian politics at both the national and state levels have become increasingly competitive. By the 1980's, the Congress had developed into an office-seeking party that attracted most of its supporters by dispensing government largesse. During the 1960's, subsidies accounted for less than 10% of central government expenditures. Subsidies increased to almost a fourth (24.1%) of all government expenditures by 1989 (Chibber, 1995). In the 1980's, Congress leaders also turned to foreign investors and contractors for illicit contributions to fill the party coffers (Kochanek, 1996).

Many of India's reforms following the 1991 crises were responses to the changes brought about by globalization. Some of these reforms, for instance the decline in the average tariff rate from more than 120% in 1991 to 35% in 1997 did not produce much decentralization (World Bank, 1998b). Two categories of reform, however, have introduced important measures of administrative decentralization: (i) India has attempted to attract foreign capital in financial and infrastructural sectors by creating independent regulatory agencies which limit central government intervention and curtail its arbitrariness, and (ii) India virtually abolished its industrial licensing regime thereby increasing the autonomy of its states to compete for foreign and domestic investment. Prior to 1991, India was the archetypical import substituting regime with "one of the most complicated and protectionist regimes in the world" (IMF, 1998). However, following steps towards the unshackling of its trade regime, India's simple average tariff rate has come down significantly from 128% in 1991 to about 34% in 2000. More precisely, India's trade liberalization efforts can be broadly divided into two periods. The first five years from 1991 to 1996 was a period of intense liberalization as tariffs fell dramatically. The second half of the 1990s can at best be characterized as a period of consolidation of, but definite deceleration in, the pace of tariff compression in general; the average tariff rate remained largely unchanged. In fact, while the simple average tariff rate remained more or less constant, there was a slight increase in the trade-weighted tariffs from a low of 25% in 1996 to 30% by 2000. Without attributing causation, it is interesting to note that this corresponds to the decelerating trend in economic growth in the latter half of the 1990s compared with the first five years since the crisis of 1991 (IMF, 1998).

While being fully cognizant of the fact that the recently announced reforms will take time to fully come into effect, it is fair to ask if and to what extent the decade long reforms have been successful in integrating India with the global market economy. India has been able to gradually increase its share in global merchandise trade and exports from 0.58% and 0.44% in 1980 to 0.74% and 0.69% respectively in 1999. While this increase may not appear particularly striking at first, it is, considering that India's share in world merchandise trade was more or less on a declining trend during the early 1990s. Between 1990 and 1999 India's merchandise trade and exports grew at an annual compound average of 8.2% and 9.0% respectively. Since this growth was matched by an expansion of the overall economy, India's level of openness, as proxied by the trade to GDP ratio, has remained more or less constant over the past few years at 0.25 (though this was almost 70% higher than that in 1980). Since the economic reforms in India in July 1991, when India attracted less than US$0.5 billion worth of equity investments, approved FDI inflows in India increased annually to about US$15 billion in 1997. It declined thereafter to about US$8.6 billion by 2000. Overall, India approved nearly US$72 billion worth of FDI since the post-reform period. However, the realization of this approved FDI into actual disbursements has been quite slow; the average realization ratio (i.e. actual inflows-to approvals) was about 36% over the entire period. Thus, the actual levels of FDI investments in the 1990s have averaged only about US$2.5 to US$3 billion annually.

Trade Performance in China and India: Comparative Analysis

Similar development strategies were adopted in China and India prior to ushering in of market-oriented economic reforms and liberalization. China began reforming its closed, centrally planned and non-market economy in 1978. India always had a large private sector and functioning markets, which were subject to rigid state controls until the hesitant and piecemeal reforms of the 1980s and these became systemic and far broader after India experienced a severe macroeconomic crisis in 1991. The political environments under which reforms were initiated and implemented in the two countries and their consequences were very different. India continues to be an open, participatory, multiparty democracy, while China has an authoritarian, one party regime, though it is liberalizing (Srinivasan, 2002 and 2004).

China and India were the star performers in aggregate GDP growth in the 1980s and 1990s. China's average growth of 10% per year during 1980-2001 had slowed to a range of 7-8% per year during 1998-2002. It is projected to grow at 8% in 2003

(World Bank 2003a; World Bank 2003b). Growth continues to be fueled by a rising ratio of fixed investment to GDP, which is expected to reach 42.2% in 2003. This rate of investment exceeded the levels reached in the early 1990s when the economy was believed to be overheating (World Bank, 2003b) and much of the investment is apparently supported directly or indirectly by poorly monitored sub-national entities. Clearly, a rapid growth of such investment would erode its efficiency and could threaten future macroeconomic stability.

During 1980-2001, the average annual rate of growth of GDP was close to 6% in India, which reached a peak of 7.8% in 1996-97 from the low of 1.3% in the crisis year of 1991-92. Since then, it has fluctuated between a low of 4.0% in 2002-03, a year in which the economy was affected by a serious drought to a high of 6.5% in 1998-99. Due to good monsoon in 2003, GDP growth was in the range of 7.5% to 8% in 2003-04. Since 1991-92, investment as a proportion of GDP has ranged from 23.1% to 27.7% of GDP (RBI, 2003a). During 1990-2001, there is a difference of about 4.1% between Chinese and Indian growth rates. Chinese fixed investment rates exceeded India's by about 15% on average, which alone is enough to explain the difference in aggregate growth between the two countries. However, this would be somewhat simplistic argument, since investment in physical capital is not the only source of growth and in part it could be substituting for other sources, which could be contributing more to India's growth. In both countries, the issue of sustainability into the future, say during 2005 and 2025, of current growth rates is important.

India has to go a long way in integrating its economy with the world economy and in attracting FDI, and both could have growth augmenting effects. Since the late 1990s, India's domestic reform process is gathering momentum. Obviously, with an augmentation of the forces of competition (both domestic and international) and acceleration of the pace, broadening and deepening of reforms, the target of 8% rate of growth could be attained and exceeded. Whether these necessary steps would come about is an issue (World Bank, 2003c). China continues to outpace India in global integration. In 2002, it was the world's fifth largest exporter of merchandise, with a share of 5% of world exports. China is tenth in commercial service exports, with a share of 2.5%. Its growth in the share of merchandise exports is phenomenal, more than quadrupling during 1983-2002. India is a distant 30th in world merchandise trade, with a share of 0.8% in 2002, which represents a growth of only 60% during 1983-2002 (WTO, 2003). A more disaggregated picture in terms of the changes in the shares of India and China of several labour-intensive exports in the world as well as in the major markets of North America (Canada and the US) and the European Union reveals China's success relative to India's even more starkly (Srinivasan, 2004). In almost every commodity and market, China's share has grown rapidly since 1978, whereas India's share has grown much less, if at all.

Gopalan (2001) estimates of labour productivity in manufacturing suggest that except in petroleum products and non-electrical machinery, the productivity of a Chinese worker is higher than that of an Indian worker by anywhere from 30 percent to 180 percent, depending on the product. China has lower costs in many products than India. It is no surprise that China has gained, and India has lost, market shares in third markets. Unless India catches up and becomes internationally competitive, this trend is likely to continue in the future.

There is one service sector, viz. Information Technology (IT), in which India has notably outstripped China. In 2002, India's IT exports were almost $10 billion, compared with $1.5 billion from China. Interestingly and tellingly, according to a report by consultants, 40% of China's IT exports involved Indian IT companies based in China (Luce and Kynge, 2003). However, it is expected that China will catch up with India very quickly. India is also ahead of China in pharmaceuticals. Luce and Kynge (2003) point out that the United Nations buys more than half of its vaccines from a private Indian company. Much of China's vaccine production does not meet international standards. The fact that in both software and pharmaceuticals, it is India's highly educated people who are the driving force (Kripalani and Engardio, 2003). Clearly, successful use of brain power by India, with service exports as the engine of growth, would be in sharp contrast to China, whose growth acceleration was driven by manufactured exports that exploited its cheap labour.

Recently, Indian entrepreneurs have joined their counterparts in the industrialized countries in viewing the huge and growing Chinese markets as commercial opportunity. Some of the exporters to China are exploiting the relatively lower cost of IT professionals and engineers in India. This cost advantage in India has been recognized, not only by IT companies in the US and Europe, but also by Chinese manufacturers. The perception of China as offering rapidly growing opportunities for Indian exporters is reflected in rapid growth of bilateral trade, which doubled in the recent past (RBI, 2003b). During 1998-2000, China's share in world exports of garments was 20.45% and of fabrics 9.36%. India's shares were a modest 5.27% and 2.42%, respectively. China's exports will grow even more and capture nearly half of the world's clothing exports by 2010 (Fritsch, 2003).

China receives a much larger flow of net FDI than India. Luce and Kynge (2003) succinctly point out, "whether it is China's cheaper, more reliable power supply or the more rapid turn around at its ports, China remains an incalculably better environment for most manufacturing than India, which is slowly waking up to this." This environment and the bureaucratic obstacles at all levels of government in India in large part explain the huge flow of FDI to China relative to India. China has accumulated a substantial (projected at $383 billion by the end of 2003) foreign exchange reserves, exceeding its annual imports. India has done the same-its reserves, around $92 billion at the end of 2003, exceed by a substantial margin the likely imports of $60 billion.

India's main insertion into the global economy comes from its rapid advance in information technologies and pharmaceuticals. It's a high-end strategy that has attracted much attention, particularly as India became the choice for off-shoring IT jobs from the US. This model is the opposite of China's massive integration based on low wage manufacturing. In fact, India's industrial base lags far behind China offering fewer opportunities for foreign direct investment. While India's factory wages are low they are still above Chinese standards. China has 100 million workers in its manufacturing sector compared to just nine million in India. This gap shows up in their export figures that in 2003 were $318 billion for China and just $60 billion for India. But China's strategy has created a greater urban economy attracting millions caught in rural poverty and is more effective in creating a wider consumer base. But India shines with its outstanding world-class education system in information technology and business, and it's estimated that India's middle class has grown to 150 million people.

The economic growth in India has attracted foreign portfolio investments with inflows growing to $7 billion in 2003, up from just $739 million in 2002. The Bombay Stock Exchange and the National Stock Exchange are among Asia's best performers with investments spreading out beyond the technology sector to consumer goods, energy, banking and commodities. The danger for India is that $1.5 billion are in short-term funds that can quickly flee if investors get nervous over political scenario in the country or

if profitable opportunities appear elsewhere. What is probably of more concern to Indian policy makers is the downward trend in the levels of FDI inflows in the last few years. Accordingly, a more proactive approach may be needed to encourage FDI, especially if it is to hope to come close to attaining the stated goal of attracting US$ 10 billion in actual inflows annually (Blaxill and Maira, 2000; Sachs et al., 2000). This effectively implies quadrupling the level of annual inflows that India currently receives.

In brief, the services sector in India has outperformed merchandise trade, especially over the post-reform period. India's growth in services trade was nearly doubles that of merchandise trade during the 1992–98. India's share in Asia's exports of commercial services increased from 3.5 to 5.8% between 1990 and 2000. India's share in 2000 was about two-thirds of that of China (WTO, 2001). In 2000, India ranked 22nd in terms of its share in world exports of commercial services, with China and Korea being the only two East Asian economies ranked higher than India. Within the service sector, while the ICT and related services were viewed as being non-tradable just a few years ago, they have in fact been the main thrust of rapid expansion of services trade in India - accounting for nearly 58% of service exports and about 16% of total exports in 1998. Its share in India's services exports was almost doubles that in 1995. The share of ICT exports (to total services exports) in India was higher than that of China. A comparison of the major potential factors influencing the development of IT-enabled services reveals that India ranks favourably in comparison with China, with a clear advantage in terms of workforce availability and skills and also in terms of a cosmopolitan work culture. Some segments of IT-enabling services (such as back-office operations, remote maintenance, medical transcription, call centers, content development and remote maintenance) have been important sources of employment generation in India.

Opportunities and Threats

India was among the ten fastest growing economies of the world since 1980 and projected that in the next decade its growth rate would accelerate and China would remain the fastest growing economy in the world during the first decade of the 21st century. By 2050, both China and India will become high-income countries, with India lagging China by about a dozen years in reaching this category and the gaps will be completely eliminated by the end of the century, thus restoring the position that prevailed in the early 1980s. It is, therefore, imperative for China and India to normalize their bilateral relations based on mutual respect and recognition of each other's role in Asia and across the World. As China is the stronger power its attitude to relations with India will be an important driver of the India-China relationship.

India wants to increase its influence in trade and economic negotiations, while China wants to become a global superpower, counterbalancing the US. They have common interests in carving out new regional and global roles. For example, both are challenging the WTO's current framework and China is supportive of India's bid to play a more active role in the United Nations Security Council (UNSC). Poverty, education and pollution are key social issues for both countries. Collaboration and sharing of best practices to alleviate these conditions could lead to a much more rapid improvement in living standards for the hundreds of millions of people in both countries who still live on less than US$2 a day. While remaining competitors on one level, China and India share an interest in creating a more stable, efficient and equitable global energy market. Collaboration can lead to critical economies of scale and new market opportunities.

As the Indian and Chinese economies diversify, they will inevitably compete more intensely and in more markets. Common opportunities are often rooted in shared problems. Both countries are trying to manage sharp economic growth, the speed of which is bringing extreme imbalances in income, both between regions and between the different layers of society. Their vast areas and populations also make effective governance a complex matter, at central, regional and local levels. Meanwhile, as their economic status improves, both countries are working to increase their global influence. The challenges they face, though daunting, offer some significant opportunities for collaboration.

The above analysis raise question as who will win the India-China race. However, such question is based on a false premise, because it assumes that trade and development are zero-sum games, which they are not. Some firms in India will indeed compete with firms in China, but there will be other firms which will form strategic partnerships with Chinese firms to exploit their synergies for global competition. Overall, it is quite likely that both China and India will win, feeding on each other's success through trade linkages, to emerge as leading players not only in Asia but globally. China is likely to emerge as a global manufacturing hub while India will become a global hub for services, which is quite a likely scenario since services already account for over half of India's GDP, whereas in China it is industry that accounts for over half of GDP.

In India, the legal and institutional framework of a modern market economy goes back at least 150 years, which is a tradition not many developing countries can boast about. A special aspect of this is the use of the English language. While the rest of the developing world is working hard to acquire this skill, India and Indians already have this tremendous comparative advantage. The second strategic advantage is India's vast pool of technical and scientific personnel, which gives India a great strategic advantage in a global economy increasingly driven by scientific knowledge and technology. A third strategic advantage is India's huge home market, with a large middle class and its rapidly growing buying power, which allows Indian enterprises to reap economies of scale and reduce costs within the domestic market, thereby positioning themselves to penetrate global markets. Last but not least, there is a remarkable change in the mindset of India's entrepreneurs and policy makers from an inward looking, control ridden outlook to a confident, outward-oriented ambition to emerge as global players.

India and China have a great deal in common. Both are enormous economies seeking to diversify and to compete across the board on global markets. Indian software companies are moving into China and Chinese technology hardware companies are expanding their presence in India, building research and development (R&D) facilities and targeting the increasing purchasing power of India's middle classes. The governments of both countries are actively fostering cooperation and encouraging the development of internationally competitive Sino-Indian brands through joint IT ventures. The IT sector is just one example of the learning opportunities that arise from China's proficiency in manufacturing and India's expertise in services. But sustainable economic growth requires both countries to diversify and move beyond their existing strengths. India's success in the service sector has been impressive, but 44 per cent of its workforce is illiterate and only a third have the necessary education to function in a modern economy. China's challenge is to continue its climb beyond manufacturing to more lucrative, high-value sectors of business, such as software design and R&D. This is the reason for the government's educational focus on science, technology and engineering, and its success can be seen in China's emerging hi-tech businesses.

China's ability to attract FDI has caught the attention of the world. It has been made possible by the Chinese government's efforts to develop an investor-friendly environment, including the establishment of special economic zones (SEZs) that provide the infrastructure, and the legal and tax conditions, necessary to kick-start new sectors. In contrast, foreign investors in India often complain about its stifling bureaucracy, unreliable infrastructure, inflexible labour laws and complex, burdensome taxation rules – not an enticing package. Despite these weaknesses, India's overall institutional framework is, by and large, superior to China's, with a stronger legal system, better financial supervision and, crucially, a clearer rule of law. China would do well to learn from India's vibrant capital markets, with regulatory and institutional frameworks that have been strengthened regularly since 1991. Along with India's strategic strengths, the strategic challenges are also important. These are weak infrastructure, poor roads and transport connectivity, unreliable power supply, and poor telecommunications, which have been a major impediment to growth and greatly escalated costs. In the recent past, there has been significant improvement, but India has still a long way to go.

Conclusion

At the dawn of the new millennium the momentum of Asia has been significantly strengthened by the very rapid growth of two very large economies – China and India, each with around 20% of the global population, have seen sustained rates of economic growth exceeding 7% annually. Their integration into the world economy, still in its early stages, promises to be more momentous than that of Japan and the East Asian Tigers, and perhaps on a par with the rise of the US as a global economic power in the late nineteenth century. But it is not just these two economies which underlie Asia's growing presence in the global economy. These Asian Drivers are likely to have a significant impact on the global economy for three major reasons. The first arises as a consequence of their growing competitiveness, their size and their rapid growth. The second way in which these newly dynamic Asian economies will have an impact on the global economy is as a result of their conduct as investors and buyers and in institutions of global governance. And, third, as a consequence of the impacts of the Asian Drivers on the global economy, low-income economies who previously saw their future as lying in promoting North-South links, are now increasingly looking towards Asia and/or to their regions as sources of future dynamism.

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TECHNICAL EFFICIENCY OF AGRO-BASED INDUSTRIES IN HARYANA

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Abstract

This paper examines technical efficiency for six agro-based small-scale industries in the Sirsa district of Haryana. The stochastic frontier production function approach has been used to estimate the technical efficiencies of these industries using ten years time series data. There found wide differences in efficiency of these industries among the district which ranges from 83 to 88 per cent. The study also found that the productivity/efficiency in these units can be increased by 13 to 17 percent without increasing the amount of inputs just by way of realizing efficiency. The study further observed that the efficiency in Rice Mill is stagnant, declining in Straw Board Units and Rice Bran Units and found increasing in Cattle Feed, Poultry Feed and Oil Mill in the last ten years.

1. Introduction

Small-scale Industries has been regarded engine of the economic growth all over the world including India, where they enjoy special state patronage, which is visible in terms of reservation of items for the same. These units have been given so much importance due to their contribution in employment, output, exports as well as their supportive role to the medium and large scale industries. The development of small-scale industries has been considered sin-qua-non to industrial development as well as overall development These industries were given the special task to generate employment, regional dispersal and equitable distribution of income and wealth in the county-side with requirement of lowest capital investment. These industries are widely scattered all over the country and produces a large number of consumer goods, industrial goods and services and a major segment of the SSI is unregistered and lies in the unorganized sector resultantly a sizeable portion of its output goes unrecorded. These industries also assume vital importance due to the capacity to generate employment for idle manpower in India.

The government of India has provided various incentives and preferential policies for this sector which was manifested in Industrial Policy resolutions since 1948, 1956 and 1991**.** The preferential policies includes financial facilities from various types of banks, tax benefits/exemptions, purchase preference from small-scale units, access to cheap and subsidized raw material by government agencies, provision of training and infrastructural facilities along with promotion of products of small-scale units. The small scale sector no doubt has emerged as a pivotal and vibrant sector of the Indian economy since independence owing to its contribution to national output, employment and exports. The protectionist measures adopted by the government for growth and promotion of these units actually render them weak instead of making them competitive. After the initiation of New Economic Policies in 1991, the business environment for these industries is changing slowly forcing to make them competitive. The small-scale sector in India is defined (Micro, Small and Medium Enterprises Act in 2006) in terms of investment limit which is in fixed assets such as plant and machinery and presently this limit is Rs.2.5 Crore for Small-Scale Industries and Rs 25 Lakhs for Micro Units

The small-scale sector too assumes a significant place in Haryana, which has experienced a phenomenal growth in the field of small scale sector. With the operation of New State Industrial Policy 1997, the overall scenario for SSIs has changed and is changing dramatically. The number of units, registered with directorate of industries, in 1966 was 4519 gone up to 138251 in 2004-05. The employment provided by these units is 8.65 Lakhs with the turnover of Rs 4519 Crores. The growth of small scale industries in the district is low as compared to other district of the State. The small scale industries in the district are heterogeneous in nature and mostly are agro based and chemical based besides some leather and textile base industries. However the district cannot remain untouched with the change in industrial environment at national and state level. Many new units in small-scale sector have been emerging beside the some old and traditional units.

Inefficiency is the inability of the firm to produce maximum possible output with a given bundle of inputs. Recent researches in Indian Small-Scale Industries have shown that there is high degree of inefficiency in this sector. Goldar (1988), Bhavani (1991), Ramaswamy (1994), SIDBI (1999) Nikado (2004) noticed the presence of inefficiency.

Production can be enhanced by using more inputs while productivity can be enhanced by using various inputs efficiently. In this background, the present paper investigates the technical efficiency of six agro-based small scale industries in Sirsa District of Haryana . The paper will continue as follows. Section 2 discusses methodology employed in the course of the study. Results will be discussed in Section 3, whereas technical efficiency of individual group will be highlighted in Section 4. Conclusions and suggestions are made in Section 5.

2. Methodology

The notion of technical efficiency was propounded by Farrell(1957).The technical inefficiency of an individual firm was estimated by fitting deterministic frontier production function proposed by Little, Page and Mazumdar (1984) whereas the stochastic production frontier approach was used by Ramaswamy (1993) and Nikado(2004 on Indian Small Scale Industry. In Such a specification, output of each firm is bounded above by a frontier, which varies across observations. This technique measures efficiency of firms relative to their own frontier. In stochastic frontier production the disturbance term is composed of two parts; one symmetric, which captures the random effects outside the control of firms including droughts, floods etc. and the statistical noise contained in every empirical relationship and the other one-sided, which captures deviations from the frontier due to technical inefficiency.

2.1 Model Specification

Technical inefficiency of a modern small-scale firm is estimated through the stochastic frontier production function, which is defined as:

$InYi = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + Vi - Ui$ (1)

Yi = Output in Rs.

X_1 = Total Human labour man-days

X_2 = Working capital in rupees

β's = Parameters to be estimated

V_i = Symmetric error term which is assumed to be independently and identically distributed having $N(0,\sigma_V^2)$ distribution; and

U_i = One sided error term, reflecting technical inefficiency, which is assumed to be independent of V_i, is such that U_i is the non-negative truncation (at zero) of the normal distribution with mean μ and variance σ^2.

The technical efficiency of a firm, is defined by $TE_i = E(-U_i)$, given the specification of the model in Equation (1). Thus the technical efficiency of firm varies between zero and one. The parameters of the stochastic frontier production function model are estimated by the method of maximum likelihood using the Program FRONTIER Version 4.1XP.

2.2. The Data

The Present study uses both the primary and secondary data. The firm-level time series data for ten years data pertaining to the period 1997-2007 was collected through survey methods with the help of a well structured questionnaire whereas the secondary data on some desired variables was obtained from the District Industrial Centre, Sirsa. The data on variables as production, employment, fixed investment, working capital and number of units have been collected and utilized.

In the present study, output is measured as gross value added in the respective industry. The present study also use number of persons (workers or employees) as a measure of labour input to estimate the technical efficiency. Similarly the working capital employed in the small-scale units is taken as an explanatory variable for measuring technical efficiencies.

It was observed duirng the survey that none of the units have followed the concept of division of labor and specialization and most of the units are individual proprietorship except Rice Mills. It was further observed that all firm they have local supply of their product except one Rice Mills and most of the entrepreneurs did not got any training for their business. Most of the units adopted the latest packaging and labeling as desired by BIS. All units found relying on their own capital except Rice Mills and have got any finance facility as they feel difficulty in getting access to the finance available to the SSI.

It is also interesting to note that none of the units is the study allowed their labour to attend/ organize any labor training programme.

3. Results and Discussion

A basic summary of the key variables used in the study is presented in Table 1 in Appendix. The average employment in the Rice Mills was 75 persons, average working capital was Rs. 98 crore and the average turnover was 250 lakhs in the year 2007-08. For Cattle Feed Units it is observed that the gross turnover is twice the working capital whereas in the case of Straw Board unite it is nine times the working capital and just six times in Rice Bran Oil Units. In case of Poultry the working capital output ration required is near to unity while in Oil mills it is again seven times the working capital. So it stems from the Table that less capital is required in Straw Board Units and Oil Mill. Output per worker is higher in Straw Board Units, Rice Bran Oil Mills and Oil Mill as compared to other units.

Table1: Maximum-Likelihood Estimates for Parameters of the Stochastic Frontier Models for Small-Scale Industries in Haryana

Variable/ Parameter	Group I	Group II	Group III	Group IV	Group V	Group VI
Constant β_0	2.5565* (0.9531)	0.1854 (0.1093)	1.2255* (0.3638)	0.8295* (0.3676)	0.2725 (0.2056)	1.2812* (0.5562)
Labour β_1	-0.3973 (0.5376)	0.6578* (0.3247)	0.3308 (0.2826)	0.3294 (0.3666)	0.5038* (0.2456)	0.8478* (.02421)
Capital β_2	0.3513* (0.1762)	0.6972* (0.3265)	0.4289 (.04813)	0.9206* (0.4256)	0.0447* (0.0236)	-0.2264 (0.2622)
Variance/ Parameters σ^2	0.0030	.0022	0.0032	0.0194	0.0044	0.0036
γ	0.0925	0010	0.0999	0..956	0..568	0.0965
Log likelihood function	21.17	16.35	20.90	11.69	12.86	19.76

Source: Primary

Note: Figures in parentheses represent standard errors

*Significant at 5 percent level

The maximum likelihood estimates of the parameters of the stochastic production function are resented in Table 1 which indicates that for Rice Mill and Rice Bran Oil Units capital input is found significant at 5 per cent levels whereas in Cattle Feeds Units and Poultry Feed Units both the labour and capital are found significant at 5 per cent level. In case of Straw Boards Units both the inputs

under consideration were turned out to be insignificant. While labour input was found significant in the Oil Mills units. Interestingly, the capital input, though insignificant, turns out negative indicating excessive or improper use of the same. The Table 1 reflects that there is possibility of increasing the amount of one or both inputs in all the aforesaid units for enhancing their profitability/efficiency.

4. Technical Efficiency of Agro Based Small Scale Industry

The technical efficiency of each group of small-scale units has been estimated using Equation (1) and the results are reported in Table 2 below. The mean technical efficiency was highest in case of Oil Mills, followed by Straw Board and Rice Bran Oil Units, Cattle Feed Units, Poultry Feed Units and Rice Mills. The Units wise analysis reflects that the technical efficiency of Rice Mill remains almost same in the last ten years and has a declining trend after year 2000-01. In case of Cattle feed Units it has increased by 7 per cent in last ten years, whereas for Straw Board Units it actually declined by 2 percent and the same trend is true for Rica Bran Units where the same has declined by 8 per cent in the period studied. For Poultry Feed Units and Oil Mill the technical efficiency have found increased by 8 per cent and 4 per cent respectively.

The mean technical efficiency in case of Rice Mills is though stagnant was came out to be 83 per reflecting that there exists 17 per cent inefficiency in the operations of Rice Mills in Sirsa district of Haryana. In other words, the production of Rice mills can be increased by 17 per cent without increasing the amount of inputs. Similarly in the case of Straw Board Units and Rice Bran Units is found operating with 87 per cent efficiency indicating that the output in these units can be increased by 13 per cent with out any addition to the inputs used. The efficiency in Cattle Feed Units and Oil Mill turned out to be 86 per cent and 88 per cent respectively thereby pointing that the output in these units can be increased by 14 and 12 per cent respectively without increasing the amount of inputs to the same.

Table 2: Inter-Temporal Variations in Technical Efficiency of Small-Scale Industries in Sirsa District of Haryana

Years	Group I Rice Mills	Group II Cattle feed Units	Group III Straw Board Units	Group IV Rice Bran Oil Units	Group V Poultry Feed Units	Group VI Oil Mills
1997-98	0.84	0.79	0.89	0.95	0.78	0.84
1998-99	0.83	0.76	0.86	0.80	0.79	0.87
1999-00	0.86	0.74	0.85	0.81	0.84	0.87
2000-01	0.89	0.86	0.91	0.82	0.86	0.92
2001-02	0.83	0.89	0.88	0.75	0.85	0.86
2002-03	0.82	0.86	0.86	0.95	0.84	0.85
2003-04	0.75	0.91	0.87	0.96	0.89	0.87
2004-05	0.79	0.94	0.80	0.90	0.91	0.89
2005-06	0.87	0.92	0.88	0.86	0.87	0.91
2006-07	0.84	0.89	0.92	0.86	0.84	0.93
Mean Technical Efficiency	0.83	0.86	0.87	0.87	0.85	0.88

4.1 Sources of Technical Efficiency

The estimated technical inefficiencies of different units might be due to the local marketing of the product and heavy reliance on non-institutional finance. The other reason for perceived technical efficiency was also due to the improper or inadequate promotion of their products with a proper advertisement and their marketing strategy might be based on their relation with local people/dealers. The other reason any also be the untrained labour force working their in. Exact data on the sources is not available and this is one of the limitations of the study. We even tried to include some sources of inefficiency as dummy variable but again the same limitation there.

5. Conclusion

The technical efficiency of six groups of small and micro units have been measured by using stochastic production frontier based on primary data collected through a scheduled questionnaire for ten years data. The results indicate that their found 83-88 per cent efficiency in various categories of units. The highest technical inefficiency was in the Rice Mills which is 17 per cent and lowest in the Oil Mills. The presence of this high degree of inefficiency reflects that the output in these units can be increased can be increased by 12-17 per cent without increasing the amount of inputs used just way of realizing better management of inputs and technology. It was further observed that the efficiency in Rice Mill is stagnant, declining in Straw Board Units and Rice Bran Units and found increasing in Cattle Feed, Poultry Feed and Oil Mill in the last ten years. A two pronged strategy is suggested to improve the efficiency of these units-one should based on proper marketing and promotion of their products and the other should be organization of training programme both for entrepreneurs and labour .

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Appendix

Table 1: Average Statistics of Agro Based Industries in Small-Scale Sector in Sirsa

Agro-Based Industries	No. of Units	No. of Persons Employed	Working capital (Rs lacs)	Production (Rs. Lacs)	Gross Output Per Worker Rs. lacs
Rice Mills	3	75	98	250	3.33
Cattle feed Units	2	16	10	20	1.25
Straw Board Units	2	18	20	180	10
Rice Bran Oil Units	1	25	25	150	6
Poultry Feed Units	3	15	15	18	1.2
Oil Mills	2	20	18	135	6.75

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