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EDITORIAL

Statistics bearing on Industry have been being compiled more or less regularly for the purpose of analysing its behaviour in the past so that its present behaviour can be better understood and its future behaviour can be predicted. We can possibly replace the somewhat too amorphous and ambiguous word 'behaviour' by the more intelligible and meaningful term 'performance' without entering into a debate. Of course, we must remember that 'performance' relates both to the process of performing relevant tasks as well as the results thereof. And there cannot be a unique measure of either. The usual focus is on the manifest results, rather than the latent process.

Measures of performance include input-oriented efficiency indices, output-oriented effectiveness measures and productivity indices based both on inputs and outputs. When we talk about inputs and outputs we take into account inputs of all kinds like materials and energy, labour and capital on the one hand and products, by-products and wastes (with or without commercial value) on the other. Further, talking of any input or output, we consider some of its relevant and preferably quantifiable aspects like cost or quantity or quality. Going by any chosen aspect, different input and output items may not be equally important in making up for the performance measure adopted by us; these could be related one to the other and may have different scales of measurement. Simple addition failing to provide a good aggregation, we introduce weights, either exogenously or based on the data themselves, as in Data Envelopment Analysis.

Analysis of performance at any level (micro-, macro-, or meta-) for different industry groups differentiated in terms of product/ service profile, scale of operation, type of management, and such other features, as may affect the input-output relationship, based on adequate data on inputs and outputs as also on market forces upto the present point of time is expected to give us a good insight into what really contribute to the performance in any industry group or—for that matter—for a single industrial unit (supposedly big to justify an analysis). However, such an analysis using a parametric or non-parametric model may not always continue to remain valid even in the near future and, given some realistic estimates of the inputs to be committed, we may fail to come up with credible results relating to performance.

Let us look at the important drivers of performance in any organisation which can act as reasonable predictors also, although some of them are latent and not manifest variables and have to be incorporated in any analysis or prediction exercise in terms of good proxies or substitutes. The Balanced Business Score Card introduced about two decades back deals with four facets of an organisation, which in order

of priority, can be stated as (1) Customer Focus (2) Internal Business Processes (3) Learning and Innovation and (4) Financial Results. It may be added here that earlier performance was judged only in terms of financial results and even a sophisticated prediction exercise failed to yield results that would agree well with the realisations. At the same time, we find that the first three facets of the organisation involve several entities that are not easily amenable to quantification and it becomes an almost challenging problem to identify relevant parameters and to collect data thereon. We may also note that the use of the Business Score Card has by now become quite a common practice in our forward-looking Industry. We all appreciate that the performance of any industry depends a lot on the extent to which it uses new materials like composites, adopts new technologies or processes, invests on its people (in programmes to enhance their knowledge, skill and involvement) etc. As of now, we do not any worthwhile information about these activities.

We can consider a parallel paradigm proposed in the Business Excellence Models, which were motivated not just to predict the future performance of an organisation but more to improve this performance. Such models also are not unknown to our Industry. And we speak of Drivers (of excellence) like (1) Leadership (2) Strategies and Policies (3) People Management (4) Resource Management (5) Process management and Results like (1) Stakeholder Satisfaction (2) Impact on Environment and (3) Financial Results. To use any such model again we need more data to be identified and subsequently compiled.

All this would imply that all those who have a stake in Industry as a vital player in our Economy — including data producers and data users— will have to involve themselves in serious and prolonged discussions and debates to decide on the nature and quantum of data which would be needed to raise the status of and the contribution from Industry. We can take a lead and we should start as early as we can. Comprehensive manuals for the Malcolm Baldrige National Quality Award (USA) and the Rajiv Gandhi National Quality Award (India) can provide inputs for a Base Paper.

While we may embark on an exercise in the above direction, we should remember the over-riding consideration of feasibility of data collection and the quality of data eventually collected. Both these concerns delimit both the nature and the volume of data which should be collected and, beyond that, analysed to hint at the need for a re-look.

September, 2012 — S. P. Mukherjee
Kolkata — Editor-in-Chief

A Comparative Study on India and China in Key Manufacturing Sectors

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Abstract

This paper focuses on comparisons of top five manufacturing industries in India and China. The top five manufacturing industries have been considered on the basis of GVA (Gross Value Added). The top five manufacturing industries considered in this paper are basic iron and steel, other chemicals, basic chemicals, basic precious & non ferrous metal and non metallic mineral products. Apart of GVA the paper also focussed on the differences in wage & salary, number of employees, no of enterprises and GFCF (Gross Fixed Capital Formation) with respect to the top five industries in India and China. We first provide a comparison between India and China with respect to the five variables under study. We found that China is much ahead in GVA, labour productivity, number of employees, number of enterprises than that of India. Though China stands number one in manufacturing products followed by India (Deloitte and Compete, 2010)*, however the difference is at higher level. In the second half of the paper, we make an analysis of industry level differences in value added per employee, wage & salaries per employee and value added per enterprise for both the countries. From the analysis it is found that there is no significant difference observed in value added per employee, wage & salaries per employee and value added per enterprise in both the countries. Through in bivariate analysis there is no strong evidence to conclude the exact reason of wide difference in GVA in both the countries. An attempt has been made to look into the multivariate analysis by considering GVA as dependent variable over wage & salary, number of employee, number of enterprise and GFCF for both the countries. It is found that the higher wage & salary may be contributing higher GVA in China over India.*

1. Introduction

1.1 A globally competitive manufacturing sector creates a sustainable economic ecosystem, encourages domestic and foreign investment, and improves a country's balance of payments. It creates good jobs—not just within the sector but spilling over into such areas as financial services, infrastructure development and maintenance, customer support, logistics, information systems, healthcare, education and training, and real estate. And a strong manufacturing sector boosts a country's intellectual capital and innovativeness, underwriting research and development, pushing the technological envelope and driving the growth in demand for highly skilled workers and scientists.

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1.2 The look east policy of India and emergence of China as a global leader in growth have created a definite need of comparison between India and China so far as economic growth is concerned. Among countries with heavy population load of more than 10 million people in 2009, China and India have been growing very rapidly since 1980. The average annual growth of China between the years 1999 to 2009 was 10.6 % whereas India grew at an average 7.5 % during this period, according to World Development Indicators, World Bank. Though only one country, Vietnam, grew faster than India in this period, only China's and India's rapid growth has been sustained for two and a half decades since 1980. The projected average growth between the year 2009-2013 of China and India is 9.0% and 8.7% respectively with projected average growth of per capita GDP of China standing at 8.5% and that of India at 7.7 % during the year 2009.

1.3 While looking into the structure of the economy, it is noted that the dominance of manufacturing sector in Chinese economy is well pronounced. The share of manufacturing sector in Chinese GDP has been almost stable with 34.3% in 1989, 31.6% in 1999 and 33.9% in 2009 whereas such share in India goes down from 17% in 1989 to 14.8% in 2009. The average annual growth of manufacturing sector in China is 11.2 % during 1999-2009 compared to 8.3% in India.

1.4 The present scenario has led to huge and unprecedented opportunities for both countries' business and investors while bringing about a greater stability in the region. India-China bilateral trade touched $2 billion in the year 2000-01 and has grown to the target of $60 billion in year 2010. Chinese accession to the World Trade Organization (WTO) has further underlined the potential of the Chinese market.

1.5 Now if we see the structure of industry, with reference to manufacturing sector, in both the countries, then a similarity is noticed in top five industries based on GVA viz. Basic Iron and Steel, Chemicals, Basic Precious and Non Ferrous Metal, and Non Metallic Mineral Products. For comparability, the year 2007 has been taken into account where ISIC-Rev 3 was used by both the countries. Moreover, the huge availability of the Chinese products under ISIC (Rev-3) Div 30, 31, 32, 36 and 39 in Indian market has necessitated a close look on the industries producing such products in both the countries. An analytical study has been made to understand the strength and weakness of those manufacturing industries through some economic indicators based on official statistics of both the countries

2. Data Source

2.1 Secondary data have been used for this paper. For analysis, necessary data are taken from UNIDO (United Nations Industrial Development Organization) publication of Industrial Statistics of 2011, ASI 2007-2008, ISIC Rev-3, NIC 2004 and World Bank reports. For comparison purpose attempt have been made to bring the uniformity among the variables used for both the countries. From the report the currency figures are reported with respect to the country concerned. For standard measures the currency figures have been converted to dollar (USD). This paper considers only the relevant figures for the following five broad industries under ISIC Rev-3.

ISIC-Rev 3	Description
271	Basic Iron and Steel
242	Other Chemicals
241	Basic Chemicals
272	Basic Precious and Non-Ferrous Metal
269	Non-metallic Mineral Products n.e.c

3. Discussion

3.1 Table-1 presents top five industries in China based on GVA for the year 2007-08. From the table it is evident that basic iron and steel industry contributing 122.26 billion USD followed by other chemicals (73.75 billion USD), basic chemical (60.09 billion USD), basic precious and non-ferrous metal (58.72 billion USD) and non metallic mineral products (55.75 billion USD). Table-2 presents top five industries in India based on GVA for the year 2007-08. From the table it is evident that basic iron and steel is in the top most industry and contributing 20.53 billion USD followed by refined petroleum products (17.34 billion USD), other chemicals (10.57 billion USD), non metallic and mineral products (8.68 billion USD) and basic chemicals (7.65 billion USD).

3.2 From the table-1 and 2, it is evident that except Refined Petroleum products industry, and Basic Precious and Non Ferrous Metal, all others are almost same for both the countries in terms of top value adding industries. But such industries in China are operating at much higher level with significantly higher contribution in the economy. In Basic Iron & Steel industry is generating much higher value of GVA than that of India even if the higher number of industries in China is compensated. In all the above top five categories such reflections are well exhibited. It shows better technological efficiency of Chinese industries explicitly. Industries like Iron and Steel, Non-metallic Mineral Products and Basic and Other Chemicals are the most contributory in two respective nations; such industries are more contributory in China.

3.3 Apart of GVA an attempt has been made to look into wages and salaries with respect to the above top five industries. From the table-1 and table-2 it is found that China is spending comparatively higher wages and salaries than India. Not only wages and salaries, an attempt also made to look into number of employees in each of the industries. From the above two tables it is evident that the number of employees in China is much higher than the number of employees in India. From this analysis it is difficult to conclude anything in this stage. The following section will looked into value added per employee and wage and salary per employee in both the countries.

3.4 Other than looking into GVA, wages and salaries and number of employee an attempt also made to look into the number of enterprise in each of the industries. It is evident that in China number of enterprises are much more than the number of enterprises in India. The higher number of enterprises in China may be one of the reasons of contributing higher GVA. Similarly Gross Fixed Capital Formation (GFCF) is also much higher in China than India.

3.5 From the above analysis it is difficult to conclude the exact reason behind the higher level of GVA in China in comparison to India. The next section will looked into the value added per employee, wage & salary per employee and value added per enterprise.

3.6 Figure 1 presents the value added per employee in China and India. From the figure it is observed that there is significant variation in value added per employee with respect to industry division in China and India. It is observed that in Basic Iron and Steel, and other Chemicals value added per employee in China is higher in comparison to India. Whereas, in Basic Chemicals value added per employee in India is higher than that of China. In Non-metallic Mineral Products n.e.c there is no significant variation observed in both the country.

3.7 Similarly figure 2 presents wage and salary per employee in China and India. From the figure there is no clear pattern of wage and salary per employee in both the countries; however it is observed that there is significant variation in wage and salary per employee with respect to industry division. In other Chemicals and Non-metallic Mineral Products n.e.c wages and salary per employee in China is comparatively higher than that of India. Whereas, Basic Iron and Steel, and Basic Chemicals, wages and salary per employee is comparatively higher in India than that of China.

3.8 Figure 3 presents the value added per enterprise in China and India. From the figure it is evident that in China the value added per enterprise is higher than India. It is observed that there is significant variation with respect to industry division. In China the Basic Iron and Steel industry the value addition per enterprise is 170 lakh USD whereas in India it is 50 lakh USD. Similarly in other Chemicals the value addition per enterprise in China is 40 lakh USD whereas in India it is 10 lakh USD. In Basic Chemicals and Non-metallic Mineral Products n.e.c, the value addition per enterprise in China is comparatively higher than that of India.

3.9 An attempt has been made to look into the multivariate analysis by considering GVA as dependent variable and wage & salary, number of employees, number of enterprises and GFCF as independent variables. From the linear regression analysis it is found that wage & salary have significant contribution in high level of GVA in China. It means higher is the wage & salary there is high probability of high level of GVA. There is also strong positive correlation between wage & salary with GVA.

4. Conclusion

4.1 With manufacturing playing such a vital role in the economic health of a country, a country must, in turn, play a key role in building an environment in which manufacturing can flourish. Especially today, when the landscape of manufacturing dominance is shifting, synchronizing government policy with the investment decisions of manufacturing executives is critical for a country to remain competitive and create a positive cycle of prosperity.

4.2 China's ascent to the top of the list (Deloitte and Compete, 2010) is not surprising, given its rising eminence in the manufacturing sector over the past ten years, particularly

as a regional hub for foreign outsourced production, foreign direct investments, and joint ventures. Executives see China as possessing strength along most of the top drivers of competitiveness. An abundance of highly skilled workers, scientists, researchers, and engineers contributes to a high rating for talent-driven innovation. The government's dedication to investments in science, technology, and manufacturing physical infrastructure is aimed at accelerating the technological value-add of Chinese production and innovation. Couple this advantage with a relatively low-cost base that is geographically mutable, and China has a clear leadership position, taking the top spot for manufacturing competitiveness, now and in the near future. Because of the speed and magnitude of change over the past two decades, China's role as a manufacturing superpower has been solidified.

4.3 Perhaps more surprising is that India is now positioned at number two (Deloitte and Compete, 2010) and gaining an even stronger foothold on that position over the next five years. India's rich talent pool of scientists, researchers, and engineers as well as its large, well-educated English-speaking workforce and democratic regime make it an attractive destination for manufacturers. Since the mid-1990s, India's software industry has escalated to new heights and post-economic liberation has also opened a pathway to unprecedented market opportunities for Indian manufacturing. Not only this India also have a large number of skilled worker who can contribute in the production process. Initiative should be taken to proper utilization of human resources through talent driven innovation, cost of labour and materials, energy cost and policies, economic, trade, financial and tax systems, quality of physical infrastructure for strengthening the manufacturing sector in India.

5. Limitations of the Study

5.1 As this paper is based on the secondary data sources and limited to some of the available data for both the countries. From the analysis it is observed that there might be variation in technology in the manufacturing industries which are not available for both the country. For this reason this paper did not find a suitable conclusion of high GVA in China. Variability in technology might be one of the reasons of high GVA in China. It will be interesting to study the variability in technology in manufacturing industries in both the countries which might contribute high GVA in China. Apart of technological variability one might look into the difference in economic and political aspects of both the countries.

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Table 1: Top Five Industries in China based on GVA for the year 2007-08

ISIC-Rev 3	Description	Value Added at Producers' prices (in billion USD)	Wages and salaries(in billion USD)	No. of employees (in Thousand No.)	No. of enterprises (in Number)	GFCF(in billion USD)
271	Basic Iron and Steel	122.26	12.42	3044	7161	171.63
242	Other Chemicals	73.75	10.58	3037	17954	65.10
241	Basic Chemicals	60.09	6.76	2212	11042	105.98
272	Basic Precious and Non-Ferrous Metal	58.72	5.30	1487	6117	56.96
269	Non-metallic Mineral Products n.e.c	55.75	8.83	3774	21258	69.09

Table 2: Top Five Industries in India based on GVA for the year 2007-2008

ISIC-Rev 3	Description	Value Added at Producers' prices (in billion USD)	Wages and salaries(in billion USD)	No. of employees (in Thousand No.)	No. of enterprises (in Number)	GFCF(in billion USD)
271	Basic Iron and Steel	20.53	2.51	562.8	4098	7.44
232	Refined Petroleum Products	17.34	0.48	76.1	524	1.66
242	Other Chemicals	10.57	1.99	665.4	8209	3.12
269	Non-metallic Mineral Products n.e.c	8.68	1.05	613	15234	3.28
241	Basic Chemicals	7.65	1.02	207.6	2921	2.19

Table-3: Regression Analysis of GVA in China

Model	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta
(Constant)	25.811	0.000	
Wage & Salary	7.629	0.000	0.785
No of employees	0.008	0.000	0.249
No of enterprises	-0.003	0.000	-0.759
GFCF	0.002	0.000	0.004

Table 4: Correlations with respect to China

		GVA	Wage & Salary	No. of employees	No. of enterprises	GFCF
Pearson Correlation	GVA	1.000	.804	.227	-.407	.874
	Wage & Salary	.804	1.000	.708	.210	.616
	No of employees	.227	.708	1.000	.761	.176
	No of enterprises	-.407	.210	.761	1.000	-.452
	GFCF	.874	.616	.176	-.452	1.000
Sig. (1-tailed)	GVA	.	.050	.356	.248	.026
	Wage & Salary	.050	.	.090	.367	.134
	No of employees	.356	.090	.	.067	.389
	No of enterprises	.248	.367	.067	.	.223
	GFCF	.026	.134	.389	.223	.

Figure 1: Value added per employee (in USD) in China and India

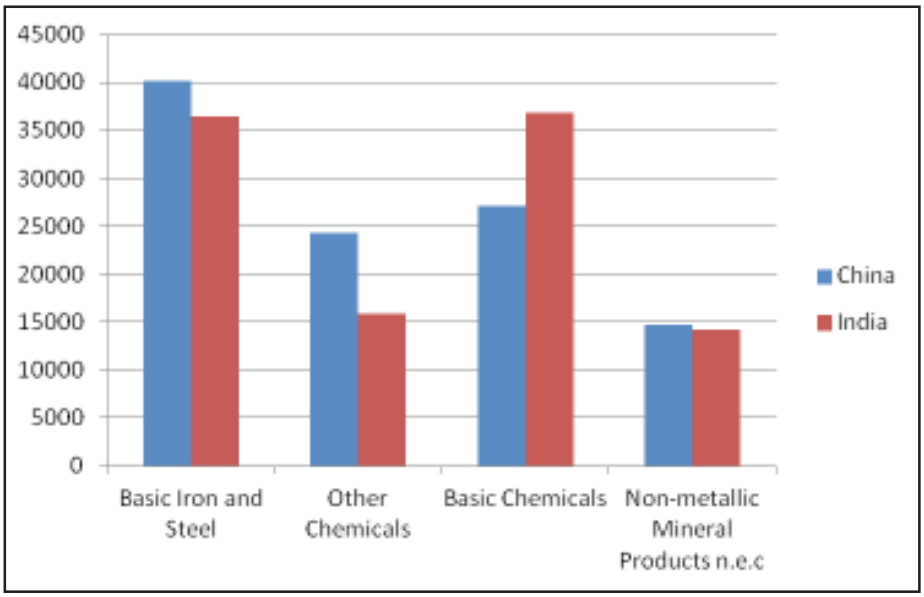

Figure 2: Wage and Salary per employee (in USD) in China and India

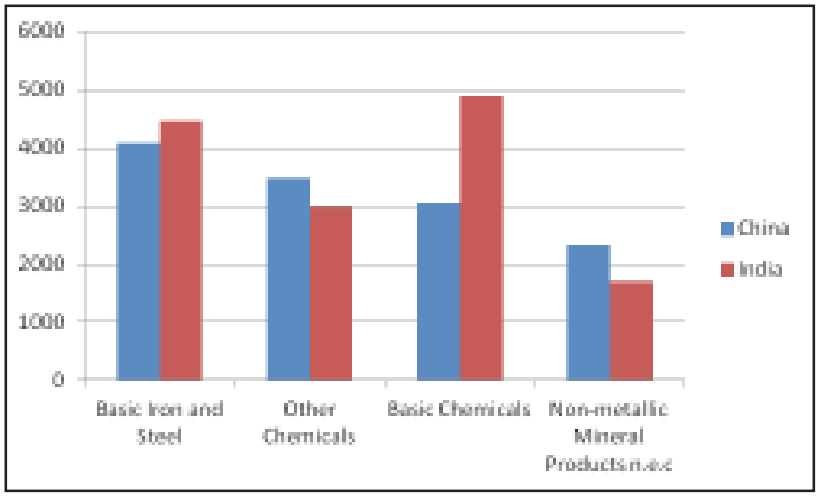

Figure: 3: Value added per enterprise (in USD) in China and India