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Dietmar Rothermund

The Industrialization of India

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Preface

My interest in industry began in my childhood, long before I became a student of history. My father was the chief engineer of a large foundry with 600 workers at Henschel, Kassel. The company produced locomotives, but during the Second World war it was involved in the production of the Tiger tank. I visited my father several times at his place of work and asked him many questions. In the early 1950s he had a young Indian trainee, Satish Rastogi, he was the first Indian I met and I learned much from him. I later on visited him at TELCO, Jamshedpur, where he then was the chief engineer of the TELCO foundry. After TELCO I also visited the steel mill at Rourkela in 1961. I was later on told that people there thought I was an East German spy, because I asked so many pointed questions. I was amused by this suspicion. It seems that by picking my father's brain, I had absorbed a good deal of technical knowledge. During my stay in India, I often visited factories and workshops and talked to industrialists as well as labour leaders.

In 1992 I joined the Indo-German Consultative Group, which consisted mostly of Indian and German industrialists, with a few professors added to the team. Prime Minister P.V. Narasimha Rao had asked Chancellor Helmut Kohl to convene this group, which then met every year, alternating between India and Germany. We had the task to produce a letter to both heads of government, indicating prospects of Indo-German cooperation. After our discussions we also visited important places. I still remember the impressive tour of ISRO in 1999. I learnt a great deal by talking to the Indian members of the group to which I belonged from 1992 to 2002. Prof. Ragunath Mashelkar, Director General of the Council of Scientific and Industrial Research, was also a member of this group. I got to know him there and kept in touch with him in later years. My assessment of the work of the CSIR in this book owes much to my discussions with him.

My colleague and friend, Prof. B.B. Chaudhuri, asked me then to contribute a chapter on the industrialization of India to his edited volume on the economic history of India from the 18th to the 20th century, (see bibliography) He kindly permitted me to reproduce much of the text here. I up-dated it. I had written two books after this text: *India: The Rise of an Asian Giant* for Yale University Press, in 2008 and *Contemporary India. Political, Economic and Social Developments since 1947* for Pearson Publishers in

New Delhi, in 2013. In both these books I also referred to industrialization, I added some of this information to the present text.

Dossenheim near Heidelberg, October 2019 *Dietmar Rothermund*

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Introduction: Studying the Industrialization of India

The industrialization of India has many aspects. One way of studying it could be to divide the text into separate sections on the major industries. But here a different approach has been adopted. The text has been divided into 10 chapters, which are devoted to different historical periods such as the beginning of industrialization in the 19th century, the impact of the First World War and of the Great Depression, the rise of state interventionism in the Second World War, the Nehru era, the period of stagnation, 1965-1980, the up-swing after 1980, the impact of the economic reform of 1991, etc. The emphasis is on the general political atmosphere. which influenced the pattern of industrialization. In each period all relevant industries will be discussed. This survey concerns industrialization in terms of manufacturing. The programming of software is also included, although by official defintion it belongs to the service sector. The "tourist industry" is excluded. But as it is important for the Indian economy it will be briefly mentioned in this introduction. "Incredible India" is definitely very attractive, but in earlier years international tourist agencies used to avoid India, because there were not sufficient luxury hotels. This has changed in recent years. While in the 1990 s about 2,5 mill. foreign tourists came to India every year, there were about 10 mill. in 2018 when earnings from tourism reached 28 billion $. Of this more than 10 % are due to medical tourism. Foreigners save money by getting expensive operations done at cheaper rates in India. The employment created by the "tourist industry" amounts to about 42 mill. jobs. Its importance is growing rapidly.

Industrialization is a process, which is moulded by different forces. There are the economic forces, which emanate from the society concerned and there are the policies of political leaders who wish to foster industrialization in the interest of the development of the nation. The vagaries of political decisions as they determine the development of Indian industries are therefore highlighted in this book. But the internal dynamics of industrial development are also analyzed. Issues of industrial policy have been hotly contested in India. I had a glimpse of this in an interview with Finance Minister Dr. Manmohan Singh in October 1995. I knew that he was advocating the privatization of the public sector. Most of the firms in this sector were suffering heavy losses. The government had nevertheless invested more in this sector in order to increase employment. This had succeeded,

but the workforce had proved to be unproductive. The government had then made some feeble moves towards privatization, calling them "disinvestment" – an accurate description, but a negative term. I asked Dr. Singh to what extent he had progressed in this field. He then raised his hands, touched his turban in a gesture of despair and said: "The cabinet is against me on this issue". Elections were approaching and Dr. Singh knew that he had no chance to go ahead with an unpopular policy. These frank discussions impressed me very much. In my arrangement of the present text, I was guided by such experiences.

In January 1996 I convened a conference on "Liberalizing India. Progress and Problems" in the Nehru Memorial Library, New Delhi, with my friend, Prof. Ravinder Kumar, who was then the director of this remarkable institution. I was lucky to get some of the best economists of India as contributors and discussants. Dr. Singh gave the inaugural lecture, which was his political testament as he soon lost his office due to the elections held in that year. I edited the proceedings of this conference, whose results have also left a mark on the present text.

With this background, I started writing the text, which was first published in 2005. Much has happened since then and I have done my best to add new information to the present edition.

1. India and the British Industrial Revolution of the 18th century

India was industrialized even before Europe, if one defines the work of skilled artisans as industrial activity. Jawaharlal Nehru was convinced that the great tradition of Indian workmanship would also help India to make rapid progress in the world of modern industry. He did not realize that the skills of Indian artisans had actually prevented an early rise of modern industry in India. They could work miracles with the most elementary means of production. Since there were many of them in various crafts, they could always cope with any demand. Modern industry implies the substitution of capital for labour and the replacement of the skills of artisans by the functions of machines. It enhances the productivity of labour in this way. But as long as there is an ample supply of cheap skilled labour, this kind of substitution is not required.

The assertion that skills may prevent industrialization will surprise all those who conceive of skills as an essential element of human resources and think of "skilled labour" as the mainstay of industrial productivity. But skills are of different kinds and those which are useful in one context may not fit in with another. The skills of Indian artisans consisted of their dexterity. This is an attribute of the integration of various procedures of doing things with one´s hands. It is usually directed towards completing one specific piece of work after another. Industrial production consists of deconstructing dexterity and simulating its functions by means of mechanical devices. Workers who operate such devices must be trained so as to service them according to their functions. "Unskilled workers" can perform this kind of service in most cases. A "skilled worker" in this context is one who knows about the process of production and can instruct others to keep it going and may even be able to repair or adjust the respective devices if they do not function properly. This kind of skill is very different from the dexterity of the artisan. It will also command a higher price in the labour market, the more so when the maintenance of expensive capital goods depends on such skills. The evolution of industrial skills is a complex process, which requires an adequate environment.

British colonial rule in India certainly did not contribute to the creation of such an environment. At home the British had an advanced political system, which had long since made the transition from a land revenue state to

a modern type of government. In India they followed the pattern set by predecessors like the Mughals and maintained a land revenue state. British revenue officers used to debate the point whether land revenue was a tax or a rent. Keynes, when he was still working at the India Office in 1909, endorsed the point of view that it was a rent. He stated: "By immemorial right the State is part landlord of the country and can derive its revenue from this source of wealth without injustice to individuals or disturbance to industry." (Keynes 1971: 38) Because a substantial amount of the income of the colonial state was rent rather than tax, Keynes thought that India was very lightly taxed. However, this colonial rentier state did not act as a dual landlord who converts the rent derived from agriculture into industrial capital. Keynes did not comment on this, but one of India´s greatest nationalist economists, M.G. Ranade, had even earlier criticised the British colonial state for its sins of omission rather than of commission. He argued that this state as a capitalist power had done nothing for productive investment in India. (Ranade 1920: 26-30)

This book does not deal with British colonial rule of India. We shall first turn to a subject, which has not been discussed in the relevant literature: the rise of a modern industry in Britain in competition with the traditional industry of India. This rise was facilitated by a mercantilist policy, which was abandoned once Great Britain was sufficiently advanced in industrial development. By shifting to a policy of free trade and denying mercantilist protection to India, the British postponed India´s industrialization without having to resort to any outright obstruction of industrial growth. Moreover, the draining of silver from India in the first half of the 19th century caused a severe deflation, which put a brake on Indian economic development. We shall turn to this problem in the second section of this text. In subesequent sections we shall then deal with the fragmented and stunted industrial development after 1850, paying attention to the different branches of Indian industry. The sequence war - depression - war will then be highlighted. The rise of state interventionism in the Second World War marks the transition from the colonial economy to that of independent India. The instruments of interventionism were subsequently utilised for setting India on a path of rapid industrialization. In the Nehru era this seemed to be quite successful, but soon after his death structural problems led to a prolonged industrial recession. A serious drought made matters worse. A "plan holiday" not only affected the public sector but also caused a stagnation of the private sector. There was an up-swing in the 1980 s, which will be analysed in detail. A balance of payments crisis upset India in 1991, but it also triggered off a determined attempt at economic reform.

After discussing what this reform has meant for Indian industrial progress, we shall turn to a specific aspect of recent development: information technology and the production and export of software. Finally we shall describe the developemnt of Indian industry in the 21st century.

The political economy of industrialization in India has been analysed by several authors. Sometimes this analysis has been pursued in order to criticise the trend towards globalization. (Swamy 1994) This is undoubtedly an important subject, but the approach in the present text is that of looking at the interaction of technological change, the policy environment and exogenous factors such as wars, price movements in the world market etc. While tracing this interaction in historical time brackets, special attention will be paid to the evolution of technological capability and the progress of research and development (R&D). This capability implies the transition from "know-how" to "know-why", from operational skills to innovative improvements. (Lall 1987: 14) Thus the gradual emergence of India as a leading industrial nation will be the central theme here.

A history of the evolution of technological capability in India could focus on individual industries, but this would not do justice to industrialization as a comprehensive process, which is affected by historical constellations. Therefore references to specific industries have been integrated in the text. Another aspect which deserves attention is the emergence of industrial leadership. Only Jamshed Tata has been singled out for special treatment in a section of this text. But other important industrialists have also been mentioned in their particular historical context. Phenomena like industrialization seem to fit well into a deterministic interpretation of history. But industrialization is a creative process in which human agency is of great importance. This will be reflected in the following pages.

The impact of the trade in Indian textiles on the development of the British textile industry and the "de-industrialization" of India

India had exported cotton textiles even in the days of the Indus civilization. Indian weavers had great skills in this field, they could produce even the finest textiles on simple looms. First the Dutch and then the British discovered that Indian textiles found a ready market in Europe. In supplying this market by re-exporting these textiles to continental Europe, the British helped to expand this market. This created the demand which later on contributed to the rise of the British cotton textile industry. The trade in Indian textiles was resented by the manufacturers of woollens, the sup-

pliers of the major British export industry. Actually they were not hurt by the competition of the Indian textiles. They had long since adopted new lines of production. Their light woollens with combed yarn sold very well They were called "worsteds" after Worstead near Norwich in England. They belonged to the New Draperies with which the weavers of Northwestern Europe competed with those of Italy ever since the 16th century. The English weavers captured a large share of this market: The export of English woollens increased steadily. Its total value amounted to 3 mill. Pounds around 1700 when re-exports of Indian cotton textiles only fetched 340,000 Pounds. (Rothermund 1981: 36-37,61) In the course of the 18th century the import and re-export of Indian cotton textiles increased very rapidly. In 1700 the British Parliament had enacted legislation prohibiting the import of printed Indian textiles for the home market. Importing them for re-export was still permitted. This legislation fostered import substitution by British cotton printers. They required white cotton cloth, bleached to precise specifications in India. This became an essential semi-finished input for the London cotton printers whose production increased by leaps and bounds in the first half of the 18th century. They often employed up to 400 workers in one plant and invested heavily in mechanical equipment. (Aiolfi 1987: 169-176) In fact, they were the vanguard of the industrial revolution. (Rothermund 2001: 495-506)

The rise of the London cotton printers was paralleled by a dramatic increase in the supply of piecegoods from Bengal in the period from the 1720 s to the 1740 s. The East India Company was good at tapping new sources of supply, but in the 1740 s this was not very easy because wars affected the conduct of trade. (Rothermund 1999 c: 283) From 1745 to 1760 there was a decline in the export of white cotton piecegoods from Bengal. The difficulties of adequate supplies of semi-finished goods for their booming business must have caused the London printers to look for import substitution. It would be more convenient to get cotton cloth woven in England. But this presupposed a supply of cotton yarn – and handspinning was highly labour intensive. One weaver normally depended on the output of about six spinners. Labour was expensive in Britain thus there was an urgent need to reduce costs. This induced inventors to apply their minds to the task of enhancing the productivity of labour with mechanical devices. The first of a line of such creative men was James Hargreaves (1720-1778), an illiterate handloom weaver, who invented a spinning machine in 1764, which he named "Jenny", this was not the name of his daughter, but a local slang for "engine". This spinning-jenny could spin several threads at once. Spinners had the tricks of their trade literally at

their fingertips. Hargreaves´s major achievement was the invention of a mechanism which could replace this work of nimble fingers. This was an exemplary case of the deconstruction of dexterity in the interest of mechanisation. But the thread produced by Hargreaves' "jenny" was a soft one, more suitable for the weft than for the warp. Five years later Richard Arkwright invented an improved spinning machine, which he then provided with a waterframe in 1775. This gave rise to the establishment of spinning mills driven by water power. Arkwright´s machine produced a strong thread suitable for the warp. Arkwright produced the thread with rollers running at different speeds. For this he needed gears supplied by watchmakers. (Allen 2009: 204) This showed the combination of different skills in the construction of new machinery. Moreover, while the source of power for Arkwright's machine was originally a watermill, he later replaced this with James Watt's steam engine. Earlier Samuel Crompton had invented the "mule" around 1780. This machine could produce finer and stronger yarn suitable for mechanical looms, and in 1784 Edmund Cartwright promptly invented such a loom. The industrial revolution picked up speed.

In contrast with the rapid progress of mechanical spinning, Cartwright ´s loom took a long time to replace the handloom. Weavers with improved shuttle looms were still getting better results than the mechanical loom. Thus the number of handloom weavers increased in England from about 100000 in 1788 to 240000 in 1830. It was only by 1860 that their number dwindled to 10000. (Paulinyi/Troitzsch 1997: 307) It is, therefore, wrong to assume, that the weavers, "whose bones bleached in the plains of Bengal", were the victims of industrial powerlooms. They had been outproduced by British handloom weavers working with improved looms and industrial yarn. Cartwright´s powerloom was initially a slow and cumbersome machine. He and his brother were the only entrepreneurs who invested their money in weaving mills equipped with this machinery. But both failed by about 1793. It took a number of further improvements to make powerlooms a paying proposition. But by 1830 about 100000 had been installed in British mills. (Paulinyi/Troitzsch 1997: 310) The rise of the powerloom depended on advances in the production of machine tools which enabled mechanics to work on metal parts with great precision. The legendary Henry Maudslay (1771-1831 who established his workshop in 1797 was a pioneer in this field. He invented the industrial turning lathe, followed by numerous other machine-tools. He did not apply for patents, but concentrated on expanding his production, which made him the lead-

ing industrialist in this field. (Paulinyi/Troitzsch 1997: 332) The synergies of all these inventions contributed to the industrial revolution.

Economic historians have been puzzled by the fact that this revolution was sparked off by the British cotton industry, which was smaller than the contemporary French one and which even in the British context was initially a minor industry. (Davis 1973: 311-312) The solution of this puzzle may be that due to the trade in Indian textiles the scope for import substitution as well as the export market were enormous in this field. Therefore this industry could forge ahead at a rapid rate. Unfortunately this sealed the fate of Indian weavers in the export business. The mechanical devices. which have been described above. did not require much capital investment and could have been easily reproduced in India. But as they were invented in order to save labour, nobody felt the need for them in India. The debate on the crucial question why India did not make the transition to capitalism has usually centred on "capital" rather than on "labour". Only in recent years British historians have highlighted the role of labour and its wages in the industrial revolution. (Allen 2009: 34) In India the "Jenny" would not have been profitable, (Allen 2009: 194) It was the surfeit of labour, which prevented the transition to capitalism in India. Of course, if this assertion is true, modern industry should never have had a chance in India as there was always plenty of labour. The crucial problem is the cost and the productivity of labour. When food prices rose during the second half of the 19th century, labour became more expensive in India without adding anything to its rather modest productivity. At the same time textile machinery had reached a stage of maturity that it could enhance the productivity of labour enormously without requiring too much investment. It was at this stage that capital was substituted for labour even in India – but only in a very limited field of industrial production.

The industrial revolution in England put an end to the demand for Indian textiles in Europe and British textiles then entered the colonial market. This has often been referred to as the de-industrialization of India. But this process was regionally differentiated. It undoubtedly affected Bengal most severely, where more and more weavers had been employed for the production of white cotton cloth for export. South Indian weavers, working mostly for the home market, were able to survive for quite some time. (Specker 1988: 333-346) Moreover, the first half of the 19th century was a period of deflation. The silver, which had been pumped into India in the 18th century in payment for Indian textiles, was drained out of the country now as the British collected a great deal of revenue but spent hardly anything in India. Under such conditions the prices of raw cotton and food