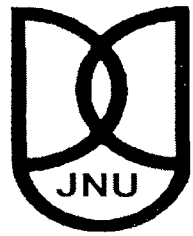
Technical Education and Industrialization in Kanpur (1914-1939)

Dissertation Submitted to Jawaharlal Nehru University

For the Award of the Degree of

MASTER OF PHILOSOPHY

PRAKRATI BHARGAVA



Jakir Husain Centre for Educational Studies

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SCHOOL OF SOCIAL SCIENCES

DECLERATION

I Prakrati Bhargava, declare that the dissertation entitled '**Technical Education and Industrialization in Kanpur (1914-39)**' submitted by me for the award of the degree of **MASTER OF PHILOSOPHY** of Jawaharlal Nehru University, New Delhi, is my bonafide work. I further declare that the dissertation has not been previously submitted for any other degree of this university or any other university.

Prakrati

Prakrati Bhargava

CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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CONTENTS

Chapter 1

INTRODUCTION

The Indian economy was a predominantly agricultural and artisanal economy- in which large scale mining and manufacturing accounted for a small portion of the net domestic product, until the outbreak of Second World War.[1] The first step of India in the field of modern industry, can be traced back to 1854, when a successful cotton mill was established at Bombay by C.N. Devar. The first Jute Mill started operating in 1855.[2] There followed a gradual and steady development of the modern industrial sector. These modern industrial establishments drastically altered the socio-economic and political scenario of the country. India was once a great manufacturing nation whose industrial products had fulfilled for centuries the needs of vast Asian and European markets, the spinning and weaving and other handicrafts had provided whole time and part time employment to millions of men and women. But all this had gradually disappeared with the advent of the British rule and India had lost not only its foreign markets, but also started importing foreign manufactures on an equally large scale.[3] Ranade puts it, "India, fifty years ago; clothed herself with her own manufactures, and now she is clothed by her distant masters. The same is the case with wool, silk and other textiles, with oil and hides.... This is our condition, and when the whole situation is thus taken in at one view, we feel that we are standing on the edge of a precipice, and the slightest push down will drive us into the abyss below of unmixed and absolute helplessness".[4]

Thus the impoverishment of Indian artisans and the steady process of industrialization generated social, political and economic chaos. The establishment of the Railways, telegraph and PWD were guided by the colonial motive of exploitation. The expansion of the railways was thought of not as a promoter of industries, but mainly as something that would, on the economic

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[1]Roy, R.K. 1994. Entrepreneurship and Industry in India (1800-1947), OUP, New Delhi, p. 8.
[2] Ibid.
[3]Chandra, Bipan. 2004. The Rise and Growth of Economic Nationalism in India, Anamika Publication, New Delhi, p. 35.
[4]Ranade. Essays, p.185 quoted in Ibid.

side, ease the supply of raw material to England and help the marketing of British manufactures in India.[5]

Industrialization and technical education are closely associated in the modern developed economies. With the onset of industrialization, the demand for trained technicians emerged. One of the important factors hampering the growth of industry in India was the dearth of adequately trained technicians. The existing requirement of trained personnel were met in most cases by the import of highly paid technicians, hence the view that large scale industry could never take root in India, till we technically trained personnel fully, to plan, establish and work in every department of manufacturing and trading with efficiency and cheap native skill.[6] The Indian National Congress took up the cause of technical education in the third session of its annual conference in 1887 and demanded that with regard to the poverty of the people, the government should, inter alia, 'elaborate a system of technical education'.[7] Moreover, the political leaders and scientists were also concerned about the nature and organization of technical education. The graduates of the four engineering colleges were absorbed into lower cadre jobs in government departments. The government schools of art at Calcutta, Madras, Bombay and Lahore had an industrial section which concentrated on imparting training in crafts like cotton-weaving, pottery, engraving, enameling, wood carving, gold and silver work, and ornamental metal work.[8] The national leadership took strong exception to, and trenchantly criticized, the official policy of confining technical education mostly to the improvement of the style of work of carpenters, smiths and other handicraftsman. The main goal of technical education was, to be not the revival of extinct and dying industries but the establishment of new large scale industries which would produce goods which were at that moment being imported.

The turn of the century saw education suddenly politicized in the struggle between British authorities and an awakening nationalism with technical education being one of the

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[5]Headrick, R. Daniel. 1981. The Tools of Empire: Technology and European Imperialism in the Nineteenth Century, New York; Headrick, R. Daniel. 1988. The Tentacles of Progress, Technology Transfer in the Age of Imperialism, New York; Thorner, Daniel. 1950. Investment in Empire: British Railway and Steam Shipping Enterprise in India, 1825-49, Philadelphia; An Interesting Discussion Regarding the Introduction of Railway in One Particular Region of India can be found in Sethia, Tara. 1991. "Railway Raj and the Indian State: Policy of Collaboration and Coercion in Hyderabad", In Wood, Clarence B. and Wilburn, Kenneth E. Jr. (Ed.). Railway Imperialism, New York; Baber, Zaheer. 2007. "Science, Technology and Colonial Power", in Raina and Hbib. (Ed). Social History of Science in Colonial India, OUP, New Delhi, p. 119.

[6]Chandra, Bipan. 2004. The Rise and Growth of Economic Nationalism in India, Anamika Publication, New Delhi, p. 43.

[7]Ibid.

[8]Ibid. p. 44.

demands. The opening move was made by Lord Curzon, Viceroy from 1899-1905. Curzon out rightly rejected the demand for Technical education at the Simla Conference in 1901. He remarked, 'to start with polytechnic and so on, is like presenting a naked man with top hat, when what he wants is a pair of trousers'.[9] The officials of the British government always disregarded or delayed the demands for higher technical education.

Framework of the Study

It is universally agreed that techniques are part of, rather they form the basis of, what, Braudel calls material civilization.[10] Technology was earlier defined as technical artifact and science as knowledge. Is technology science's other?[11] Probably not. Both are historical variables.[12] Science in part is knowledge about technology and technology can be embodied knowledge. Thus they are two sides of the same coin, enmeshed in a symbiotic relationship.[13] Techno-scientific development can be presented as non-determined, multidirectional flux that involves constant negotiation and renegotiation among the groups and between the forces shaping history. The transmission of science and technology was certainly one component in the process of political domination, in which it was necessary to convince the colonized that knowledge whether in the sphere of culture, science and technology, could be acquired through the mediation of the colonial rulers.[14]

The period 1850-1900 was seen as the period of extensive exploitation of natural resources to establish military and economic hegemony. Inkster concludes 'that even the more spectacular infrastructural and industrial projects instigated or encouraged by the British rulers may be questioned as either generally developmental or specifically conduits for the generation

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[9]Delks, David. 1970. Curzon in India, Vol.2 London, 1: 244; Edwardes, Micheal. 1965. High noon of Empire: India under Curzon, London, pp. 144-45.

[10]Braudel, Fermand. 1979. The Perspective of the World, Harper and Row, New York.

[11]In an interesting exposition, a recent work relates technology to science in terms of female-male relationship. Cowan, S. Ruth. 1996. 'Technology is to Science as Female is to Male', Technology and Culture, XXXVII, 3, pp. 572-82.

[12]Otto, Mayr. 1976. "The Science Technology Relationship as a Historiographic Problem", Technology and Culture, XVII, 4, pp. 663-73.

[13]Barnes, Barry. 1982. "The Science-technology Relationship: A Model and Query", Social Studies of Sciences, XII, pp. 166-72.

[14]Joseph, G.G., Reddy, V. and Chaterjee, M. Seatle. 1990. "Eurocentrism in the Social Sciences", in Race and Class, 31(4), p. 3.

of skills and learning processes'.[15] In the engagement between science, technical education and industrialization became one of the themes in the nationalist discourse in the first decade of the twentieth century.[16] In the period 1900-14 technical education was stalemated by conflicting ideas, Indian nationalists demanded more of it, believing it would stimulate, or at least facilitate economic development. British employers refused to hire Indian graduates at technical schools because it was felt that they were poorly prepared and averse to manual labour. The government was reluctant to expend technical education as there were no job openings in this sphere. The contrasting views between nationalists and colonizers remained contested for a long time[17]. Robert Crane argued: "Nor has it been possible to arrive at a satisfactory answer to a subsidiary question which arises whenever the role of technical education in economic growth is discussed: i.e. whether technical education breeds industry or industry calls forth technical education".[18] Proposals and recommendations for industrialization and technical education were made in industrial conferences, but these were fell on deaf ears. However, the First World War compelled the government to investigate the overall condition of industries in India which resulted in the formation of the Holland Commission. Subsequently Montford Reforms were executed which transferred technical education and industrial development to the Provincial governments[19]. The great depression once again presented challenges for the industrial development for India. Under this background it would be interesting to investigate the development of industries and in response to that evolution of technical education in Kanpur. Kanpur was not a port but an industrial centre catering mostly to military needs and trade in internal markets. Moreover, its industrialization was pioneered by Europeans, The question arises as to where, they looked for the development of a skilled workforce? In the absence of Indians from the industries till the First World War, no efforts were made in this direction as was evident in Bombay and Ahmedabad.

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[15]Inkster, Ian. 2007. "Science Technology and Imperialism in India" in Habib and Raina. (Ed).. Social History of Colonial Science, OUP, New Delhi, p. 219.

[16]Habib S. Irfan. 1995. "Science, Technical Education and Industrialization: Contours of Bhadralok Debate 1890-1915" in Macleod, Roy and Kumar, Deepak. (Ed). Technology and the Raj: Western Technology and Technical Transfers in India 1700-1947, Sage Publication, New Delhi, p. 235.

[17]Headrick, R. Daniel. 1988. The Tentacles of Progress, Technology Transfer in the Age of Imperialism, 1850-1940. OUP, New York, pp. 331-32.

[18]Crane, I. Robert. 1965. Technical Education and Economic Development in India before World War I, p. 167-68.

[19]Thavraj, M.J.K. 1978. "Framework of Economic Policies under British Rule", Social Scientist, Vol. 7, No. 5, pp. 13-44.

The Question of Technical Education

The transition of traditional artisanal based production to the mills and factories drastically altered the relationship between man and skill. The newly emerging industrial system necessitated the training of individuals in the underlying principle involved in a technical process and to develop new technology. Thus it became essential to train the workers on modern lines which was referred to as technical education. Headrick defines technical education which covers a spectrum of activities and their meaning has changed over time to cover every sort of work oriented learning[20]. Thus technical education includes various types of occupation and training at various levels.

Sir Phillip Magnus defined technical education in 1883 at the opening ceremony of the Finsbury Technical College: 'Technical education is that education, training or instruction which has a direct relevance to the career of the person who receives it'. J.C. Ghosh illustrates that this definition is however, restricted in application as it applies to the training of an engineer or a chemist rather than to that of managers or a lawyer.[21]

However Germans define technical education: 'Technical education is the study of the principles underlying any kind of human craftsmanship'. Thus Germans emphasized on the cultivation of mind with the understanding of scientific principles.[22]

In India, Lord Curzon in 1901 expressed his views on technical education: 'Technical education is that practical instruction which would qualify a person for the practice of some handicraft, industry or profession'.[23] Curzon stressed the narrow aspect of technical education which included practicing some profession rather than to innovate or endeavor for new applications. Curzon viewed technical education for developing skills in artisans rather than for training in modern industrial practices. However, the report of Simla Education Conference in 1901 opined that 'technical education is originally (a) the study of scientific methods and principles underlying the practice of any handicraft, industry or profession, and secondly (b) the

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[20]Headrick, R. Daniel. 1988. The Tentacles of Progress Technology Transfer in the Age of Imperialism 1850-1940, OUP, New York, p. 305.
[21]Ghosh, J.C. 1943. Technical Education: Being a Guide to the Solution of the Problem of Unemployment and an Introduction to a New Conception of Indian Education and Career, Calcutta, p. 6.
[22]Ibid.
[23]Ibid.

application of these methods and principles to the practice of handicraft industry or profession'. The first is the primary or technological aspect of the subject; the second is its subsequent and practical application. Thus technical education is a specialized training which assures the practicing of skills in the respective industry.[24] Whereas literary education equips the individual for general work which would not essentially require practicing and understanding of scientific principles. Having said this, there were two considerations which should be addressed (1) What classes of people did it propose to cater to? (2) What openings were available to them.[25] A major concern of technical education was that it would only incorporate the population already engaged in any type of craftsmanship or would attract common people to learn these skills and contribute to economic development.

Subsequently, in the 1940s, with the rapid industrialization in western countries due to the increased demands of the two World Wars the narrow definition of technical education concerning skill development was redefined with the inclusion of managerial and commercial activities. This broad vision of technical education was accepted in the report of the committee appointed by Central Advisory Board of Education in 1943 on technical education. The report suggested that:

'Technical curriculum today must be a wider and more liberal form of training than it has been in the past; It must comprehend the scientific principles underlying the process of manufacture as well as the process themselves; it must link up the sciences of production and business organizations with the arts of design and salesmanship. It must take cognizance of social sciences in relation to the effect of industrial development on the life of a previously non-industrial community and it cannot even neglect the provision of purely cultural and recreational facilities as an antidote against mental and moral stagnation for those workers who are destined to remain the semi-skilled servants of the machine'.[26]

The committee strongly felt that it is a prerequisite for industrial development to have a skilled workforce in every aspect of industrialization viz. technical, commercial or managerial. However, the concept of technical education for this study is confined to the development of skill

[24]Resolution of the Simla Conference (1901) on Technical Education in Bhargava, K.D. (Ed.). 1968. Selections from Educational Records of the Government of India: Technical Education in India 1886-1907, Vol. IV, Manager of Publication, Delhi, p. 202.
[25]Ghosh, J.C. 1943. Technical Education: Being a Guide to the Solution of the Problem of Unemployment and an Introduction to a New Conception of Indian Education and Career, Calcutta, p. 8.
[26]Report of the Technical Education Committee of the Central Advisory Board of Education, 1943. Published by the Managers of Publication, Delhi, p. 122.

for local industries. Some efforts were made for imparting scientific understanding by introducing research courses in the technological institute.

An Introduction to Kanpur City

Kanpur has a latitude of 20° 30° and longitude of 80° 20°. The city covers an area of about 1,200 sq. km. and lies at an altitude of 126 m. above sea level. Kanpur district has the natural boundaries towards the north and south. In the north this boundary is the holy river Ganges and in the south it is Yamuna. Towards the east the city is extended up to the district of Fatahpur and to the west up to Kannauj and Auraya.[27] Thus the geographical surrounding of Kanpur between two rivers made it fertile and accessible by river.[28]

The advent of the British into the Kanpur district was by the military possession of the district and as of a military force in the district, led to a considerable demand not only for food but also for clothing and equipment. Soon, a market and cottage industries flourished, in and around the cantonment. In the years 1812 to 1819, there was a remarkable growth in indigo and cotton trade. Meanwhile due to financial conflicts between the East India Company and Zamindars, there was a set back to trade.[29] However, the security and amenities afforded by the cantonment attracted many traders and merchants to settle down. Kanpur had a fairly large population of Chamars, who concentrated to provide the troops with leather goods and footwear. The annexation of Oudh in 1856, gave very considerable impetus to Cawnpore's trade and industry, and brought to Cawnpore many of the renowned craftsmen of Lucknow.[30]

Though, the Mutiny of 1857, brought ruin to many and nearly extirpated the British merchants and their descendents, there followed after the Mutiny a period of still greater industrial activity. One of the first modern factories - if not the first modern factory- to be set up in Cawnpore was the Government Harness and Saddlery Factory.[31] The need for which arose directly out of the difficulty of securing supplies of harness and saddlery during the Mutiny of 1857. A young Artillery officer, Captain John Stewart was authorized to make experiments in improving the quality of the leather made at Cawnpore: for this purpose the services of soldiers who had worked at tanyards in England were utilized, and commissariat cattle were slaughtered.

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[27]Arora, Arvind Mukt. 2005. History of Kanpur, Kanpur Itihas Samiti, Kanpur, p. 1.
[28]Singh, V.B. 1968. Climate for Industrial Relation: A Study of Kanpur Cotton Mills, Bombay, p.12.
[29]Golden Jubilee Souvenir (1888-1938). 1938. Upper India Chamber of Commerce, Cawnpore, p.11.
[30]Ibid p.12.
[31]Bagchi, A.K. 1972. Private Investment in India 1900-39, Cambridge University Press, 1972, p. 186.

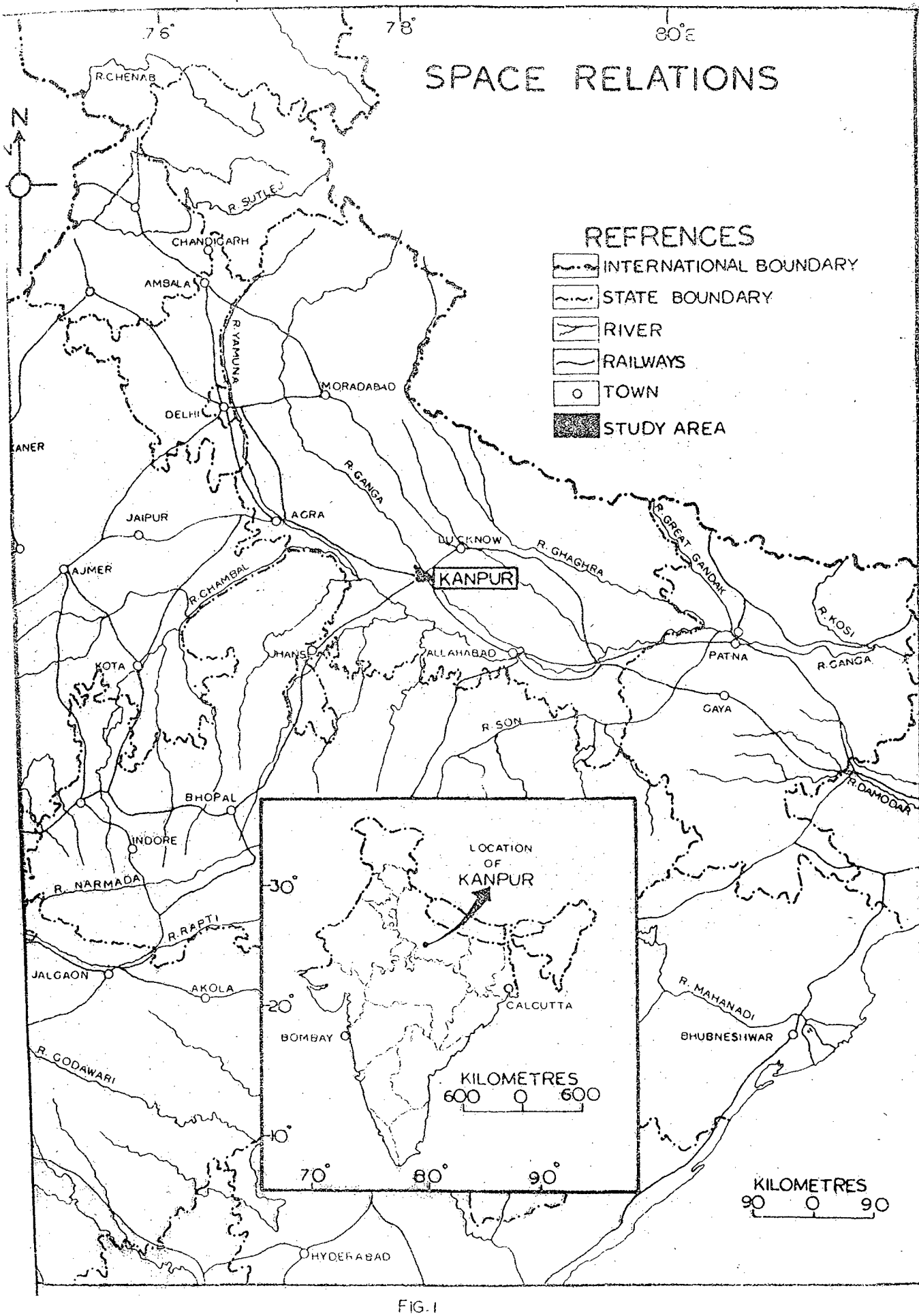
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FIG. 1

The experiment proved successful and led to the establishment of the Government Harness and Saddlery Factory in 1863.[32]

The railway, which had become the life line of the British empire, reached Cawnpore in 1859, when the lines of the East Indian Railway traveled westwards from Allahabad. This was followed by the Kanpur-Etawah line in 1861. The railway brought much new enterprise and greater incentive to industrial growth. The Station Master of East Indian Railway, Mr. Buist showed keen interest in the cotton trade and founded the 'Cawnpore Cotton Committee'. Many Indian and British merchants and military officers, notable among them was Mr. Hugh Maxwell were active on the committee. This association was in a way responsible for the founding of the Elgin Spinning and Weaving Corporation Limited.[33]

The industrial city of Kanpur was created primarily because of colonial intervention and British enterprise. Unlike other industrial centers, Kanpur does not have any industrial history prior to the colonial rule. The city was developed in 1778 as an army camp, and by the 1940s it had become the fourth largest industrial centre of India. It had been able to attract private investments in various sectors and industrial activity reached its peak in the areas of Textile and Leather - two important industries of the colonial economy. The European business communities dominated the industries of Kanpur for the period under study. Though Indians were always present, they did not have any significant big business till the 1930's. Bagchi actually cites the case of Kanpur's industrialization to explain the typical pattern of European dominance in Indian industries in the colonial period: "no other city displays these factors (of European dominance) supporting the maintenance of European control better than Kanpur".[34] Interestingly, the Europeans in Kanpur moved into the cotton textile industry, which was dominated by the Indians in other industrial centers like Bombay and Ahmedabad. Kanpur's rise as a manufacturing and trading centre is also significant because it was the first non-port city to attain such industrial prominence.

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[32]Nevill, H.R. 1909. District Gazetteer of United Provinces of Agra and Oudh, Vol. XIX, Cawnpore, Allahabad, p. 75.
[33]Ibid.
[34]Bagchi, A.K. 1972. Private Investment In India 1900-39. Cambridge University Press Cambridge, p. 186.

Review of Literature

The policy of industry, trade and technical education during the period of colonial rule was multi-dimensional; on the one hand it involved the colonial agenda of economic exploitation and ethnic discrimination, on the other hand its complex authoritative, bureaucratic and financial obligations often denied technical education. The review of literature will focus on the economic policies which were the result of modern industrialization in the second half of the nineteenth century. Further it would analyze, how the colonial government's ex-parte policies for technical education hampered the participation of Indians in industrial development. Moreover, it will also focus on the complex administrative mechanisms that retarded the spread of higher technological institutes in the first half of the twentieth century.

The eighteenth century Indian economy was predominantly artisanal and agricultural. The onset of colonial rule posed a challenge for a transition in the system by the introduction of modern economic practices and new modes of production. Inkster observed that the barriers in the generalized use of new techniques resulted from the operation of objective economic forces, such as the lack of capital and skill required to operate a system of geared rollers.[35] Indian technical occupations were composed of a range of agricultural workers, village artisans (blacksmith, carpenter, potters, weavers, water housemen, water carriers), many other engaged in technical industries of cotton-textile, silk, jewelry and weaponry as well as small traders in saltpetre, indigo, sugar, opium and ginger.[36] In these occupations sophisticated and advanced technologies for cooling water with saltpetre, rivetting and oil distillation were employed. Irfan Habib sees a major problem in the relatively limited application of such advancement, but sees this more as the result of low labour cost and the specificity of skills than of inhibition resulting from the caste system. Moreover, many merchants limited their activity to financing and organization rather than innovative production, but so too was the case in such nations as Tokugawa Japan.[37] The lack of entrepreneurship amongst Indian artisans can be attributed to

[35]Inkster, Ian. 2007. "Science, Technology and Imperialism in India" in Habib and Raina. (Ed).. Social History of Science in Colonial India, OUP, New Delhi, p.203.
[36]Maddison, Angus. 1970. "The Historical Origin of Indian Poverty", Banca Nazionale del Lavoro, Quarterly Review, Vol. 23 cited in Ibid.
[37]Hirschmeier, J. 1964. The Origin of Entrepreneurship in Meiji Japan, Harvard; Hirschmeier, J. and T. Yui. 1975. The Development of Japanese Business, 1600-1973, London, cited in op. cit (n.35).

complex economic policies. As a result there was no inbuilt resistance in the economic system to technological change.[38]

However, trade and revenue policies of Raj also affected the Indian economy.[39] Dutta, Frykenberg and Maddison asserted that the financial demands imposed by the Raj resulted in land sales, peasant indebtedness, subletting, the rise of a relatively small, rich peasant and comprador class, and the consequent unsettling of traditional village community.[40] Between 1700 and 1825 imports of silk manufacturers from India to Britain were prohibited by law and heavy duties on cotton textiles which were established during 1797-1825, precisely following Samuel Crompton's invention of 1779 permitting machine spinning of fine yarn for muslins which had previously been imported from the hand-spinners of the subcontinent.[41]

The decline of the local economy is explained in terms of Drain of wealth and Deindustrialization theories. Drain involved all home charges, interest paid to Britain on Indian Public debt, all military charges[42], the cost of purchasing stores in Britain and the civil charges of British administration in India.[43] But surely Naroji had a point here when he argued (before the Welby Commission in 1895) that the amount being drained away represented a potential surplus which might have raised Indian income considerably, if invested properly inside the country.[44] Bagchi presented the views of Strachey, where he defended the Raj by claiming, "England receives nothing from India except in return for English services rendered or English capital

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[38]Habib, Irfan. 1980. "The Technology and Economy of Mughal India." Indian Economic and Social History Review, Vol. 17, p.32 cited in op. cit. (n.35).

[39]Helen, Lamb. 1959. "The Indian Merchant" in Singer, Milton. (Ed.). Traditional India: Structure and Change, Philadelphia in op. cit (n. 35).

[40]Dutt, Ramesh. 1956. The Economic History of India in the Victorian Age, London; Frykemberg, R.E. 1969. (Ed.). Land Control and Social Structure in Indian History; Maddison, Angus. 1970. "The Historical Origin of Indian Poverty." Banca Nazionale del Lavoro, Quarterly Review, Vol. 23 cited in op. cit. (n. 35).

[41]Chaudhari, K.N. 1968. "India's International Economy in the Nineteenth Century: An Historical Survey", Modern Asian Studies, Vol. 2; Latham, A.J.H. 1978. The International Economy and the Underdeveloped World 1865-1914, London cited in op.cit. (n.35).

[42]In the year 1870-1900 defense spending represented some 30 percent of total British expenditure in India

[43]Mukherjee, T. 1972. "The Theory of Economic Drain: The Impact of British Role on Indian Economy 1840-1900." in Boulding, K.E. and Mukharjee, Tapan. (Ed.). Economic Imperialism, Ann Arbor; Chaudhari. 1968. "India's International Economy in the Nineteenth Century: An Historical Survey", Modern Asian Studies, Vol.2.

[44]Naoroji, Dadabhai. 1901. Poverty and Un-British Rule in India, London.

expended."[45] The drain had offset any gain from trade which might have resulted from British rule and therefore significantly reduced the ability of the Indian economy to import developmental technologies and capital investment.[46]

Another theory which was put forth for the economic stagnation of Indian under colonial rule was deindustrialization. The deindustrialization theory claims that "in pressing for the conversion of India into a market for British manufactured goods, the British inhibited India's own manufacturing industries and gradually converted India into an agricultural hinterland of Great Britain".[47] This theory is more emphatically explained by Amiya Kumar Bagchi's. Bagchi compared Buchanan Hamilton's survey of a number of Bihar districts in the early nineteenth century with the 1901 census data. There was a decline in the percentage of population dependent on industries from 18% to 8% and a massive decline in the number of spinners. Deindustrialization left the village artisan without any technical skills to earn livelihood.[48]

Technical education and the Colonial Policy

The formal declaration of the introduction of science and technology was traced in the historical Wood's Education Dispatch of 1854. The object of the educational dispatch was specified, 'as the diffusion of the improved arts, science, philosophy and literature of Europe; in short of European knowledge'.[49] It states that

"this knowledge will teach the natives of India the marvelous results of the employment of labour and capital, rouse them to emulate as in the development of vast resource of their country, guide them to their efforts and gradually, but certainly confer upon them all the advantages which accompany the healthy increase of wealth and commerce, and at the same time, secure to us a larger and more certain supply of many articles necessary for the

[45]Bagchi, A.K. 1973. "Foreign and Economic Development of India." in Douch and Sharma. (Ed). Imperialism and Revolution in South Asia, New York, p.115.
[46]Maddison, Angus. 1970. "The Historical Origin of Indian Poverty." Banca Naziomale del Lavoro Quarterly Review, Vol. 23.

[47]Myrdal. G. 1969. Asian Drama, London, p. 455.
[48]Deindustrialization in the Gangetic Bihar, 1809-1901 in Essays in honour of S.C. Sarkar, in Sarkar, Sumit.1983. Modern India 1885-1947, Macmillan India Ltd., Delhi, p. 30.
[49]Richey, J.A. (Ed).1922. Selections from Educational Records 1840-59, Part 2, Calcutta, p.158.

manufacture and extensively consumed by all classes of our population, as well as an almost inexhaustible demand for the produce of British labour."[50]

The dispatch clearly marked the utility of skilled labour for the production of goods for internal market, but no steps were initiated for industrial training. However, prior to this historical declaration; the first half of the nineteenth century witnessed the initiation of a number of gigantic public works that led to state involvement in the application of science and technology which culminated in the creation of Public Works Department for the government of India in 1854. Chesney states that the creation of the Public Works Department coincided with Wood's Educational Dispatch of 1854 and indicated a shift in the official policy that had previously viewed public works as a colonial administrator put it, as 'an unavoidable evil, to be undertaken only when it could not be postponed any longer, and not, if possible, to be repeated.'[51]

Various critics have remarked on the social, political and economic agenda behind the establishment of PWD. Zaheer Baber describes that the transfer of power from company to crown after 1858 followed a number of changes including the reorganization of armed forces, more pronounced social distance between Indians and the English, and the deployment of a combination of concessions and coercions for the maintenance of imperial power and authority.[52] Dionne & Macleod designated these engineers associated with the Public Works Department as scientific soldiers, who worked in various fields of science and technology, such as forestry research and exploration and mining, manufacturing of Iron rails and locomotive design etc.[53] The foundation of PWD resulted in the expansion of scientific and technical education. Headrick describes that to maintain the social hierarchy PWD spawned two education systems- one in India and other in England. The students of the four engineering colleges at Roorkee, Poona, Sibpur and Madras were recruited in the lower grade jobs while a separate engineering college at

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[50]Ibid. p. 365

[51]Col. Chesney, cited in Dionne and Macleod. 1979. p.61, in Baber, Zaheer. 2007. "Science, Technology and Colonial Power" in Habib and Raina. (Ed).. Social History of Science in Colonial India, OUP, New Delhi, pp. 116-17.

[52]Ibid.

[53]Dionne & Macleod. 1979. p. 63 in Baber, Zaheer. 2007. "Science, Technology and Colonial Power" in Habib and Raina. (Ed).. Social History of Science in Colonial India, p. 125.

Cooper's Hill near London produced engineers for the higher cadre of engineering jobs.[54] The PWD irrigation projects, railway workshops, agriculture departments and private European owned mills and factories became the site for racial discrimination.[55] The persistence of ethnic discrimination of labour had two causes. One was the guarantee system, which put no pressure on companies to cease recruiting in Britain. The other was the belief that Indians would or could not learn to do technical work as well, as Europeans.[56] The discrimination policies of British Indian Government restricted the expansion of higher technical education. Sen points out, between 1871-1882, of 3,300 Indian College graduates, two third entered some form of Government employment rather than industry or agriculture, only 53 graduated in engineering. The higher colleges which did exist (e.g. Sibpur Engineering College, Calcutta University, Allahabad University) offered meager scientific and technical provisions and demonstrated little sensitivity to the specific, highly localized needs of the Indian economy.[57] As late as the 1930's a mere 63,000 students were enrolled in adult and industrial training establishments.[58]

Despite the recommendation of the Famine Commission of 1880, the Government of India did not make any serious effort to encourage the growth of large scale industries in India till the First World War. There was no state support for the modern industries to be established by Indians. The East India Company was actively engaged in organizing and financing those industries in the production of which it had special interest. Pillai in his *Economic Condition of India*, describes that the government pioneered the tea and cinchona plantation till their commercial success was established beyond doubt.[59] But, whenever similar measures were contemplated for the encouragement of Indian industries, the English manufacturers frowned with jealous, suspicion and brought pressure from every possible direction to nip such attempts

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[54]Headrick, Daniel R. 1988. The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850-1940, OUP, New York, pp. 323-325.
[55]Ibid.
[56]Ibid. 322
[57]Ibid.
[58]Sen, S.N. 1966. "The Character of the Introduction of Western Science in India during the 18th and 19th Centuries", Indian Journal of History of Science, Vol. 1; Kumar, D. 1980. "Patterns of Colonial Science in India", Indian Journal of History of Science, Vol. 15; Kumar, D.1984. "Science in Higher Education: A study of Victorian India", Indian Journal of History of Science, Vol.19.
[59]Pillai, P.P. Economic Condition of India, pp. 306-307.

in the bud. No less a statesman than Gladstone has acknowledged the invidious and unequal free trade policy imposed on India.[60]

The cumbersome and complex constitutional structure of the British Raj was a great hindrance in effective framing of educational policy. Before the Viceroy could decide on a policy, he had to discus with his own council members and secures the cooperation of the finance member, who almost always opposed anything that might involve any additional expenditure. Sir Walter Lawrence thought that the finance member of the Viceroy's council was the most powerful man in India, next to Viceroy.[61] The complex process of checks and controls prompted the involvement of the Secretary of State and his council and further the British Parliament. Thus the government of India was fettered by a peculiar constitutional relationship with another government 8000 miles away and this was the frequent source of delay and frustration.[62] The mechanism for ruling India, wrote Curzon was better adopted to administer a kingdom like Bavaria. The government of India, he thought, was mighty and miraculous machine for doing nothing.[63].

Basu argued that although the Viceroy was supposed to be the most powerful person in the colonial state yet all the financial power were in the hands of Secretary of State. The Secretary of State was further accountable to the India Council and British parliament.[64] The India Council opposed the introduction of free primary education in 1911-12; it rejected Harding's proposal for a grant of one crore rupees for technical education.[65] Local government showed their reluctance in executing Curzon's technical education scheme. Financial stringency was another important constraint for the advancement of education. Mishra pointed out that in 1902 the government was spending a paltry sum on education 9% of its total budget, which rose to 9.3% by 1920-21.[66] This increase in budgetary allocation was inadequate to fulfill the

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[60]Quoted by A.J. Wadia in his written evidence before the Indian Industrial Commission 1916-1918, Minutes of Evidence, vol. IV, pp. 133-136.
[61]Lawrence, W.R. 1920. The India we served, London, p.108 in Basu, Aparna. 1974. The Growth of Education and Political Development in India 1898-1920, OUP, New Delhi, p. 94.
[62]Ibid p.95.
[63]Curzon to Hamilton, 09.04.1902, C.P. 161 in ibid.
[64]Ibid.
[65]Basu, Aparna. 1974. The Growth of Education and Political Development in India, 1890-1920, OUP, New Delhi, p. 95.
[66]Mishra A. 1962. Educational Finance in India, London, p510.

expanding need for education. The proposal to establish a technical institute at Kanpur was delayed for more than twelve years because London thought the expense too great.[67]

In the period 1900 to 1914, Headrick argued, technical education was stalemated by conflicting ideas. The Indian nationalists demanded more of it, believing it would stimulate or at least facilitate economic development.[68] While discussing the Swadeshi Movement in Bengal Seal, Sarkar, Raina & Habib describes that certain sections of the intelligentsia were concerned that industrialization had a connection with economic prosperity, and the growth of scientific and technical knowledge.[69] The turn of the century witnessed that a large number of Indian intelligentsia had drawn towards a Baconian conception of science and technology.[70] The swadeshi movement thus made economic development and education their content of their protest.[71] On the economic front it led to the boycott of imported cloth that resulted in the decline of sales by 75%. Whereas two educational institutions viz. Bengal National College and Bengal Technical Institute paved the way for the establishment of academic institutions outside the state sponsored education system. Headrick outlines that the BIT did not attempt to compete with the engineering colleges, but provided Bengal, for the first time, with the equivalent of Bombay's Victoria Jubilee Technical Institute.[72]

However, the orientation of Indian students towards technical education was not satisfactory. Although the period during 1894-1940, recorded a sixfold increase in the case of secondary education, almost eightfold in the enrollment of college students, yet there was hardly

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[67]Basu, Aparna. 1974. The Growth of Education and Political Development in India, 1890-1920, Oxford University Press, New Delhi, pp. 97.

[68]Headrick, R. Daniel. 1988. The Tentacles of Progress, Technology Transfer in the Age of Imperialism, Oxford University Press, New Delhi, p. 331.

[69]Seal, B.N. 1933. "Ram Mohan Roy: The Universal Man." in Ram Mohan Roy and His Work, Centenary Publicity Booklet, No1; Sadharan, Brahmo Samaj; Sarkar, Sumit. 1975. "Rammohan Roy and the Break with the Past" in V.C. Joshi (ed.), Rammohan Roy and the Process of Modernization in India, Vikas Publication, New Delhi, pp. 46-65, Raina and Habib. 2004 "The Introduction of Scientific Rationality into India: A Study of Master Ramcahndra: Urdu Journalist, Mathematician, Educationist", in Domesticating modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi.

[70]Raina and Habib. 2004 "Copernicus, Columbus and the role of Science in Nineteenth Century India", in Domesticating modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi.

[71]Headrick, R. Daniel. 1988. The Tentacles of Progress, Technology Transfer in the Age of Imperialism, OUP, New York, p. 334, Raina and Habib. 2004 "The Unfolding of an engagement: The Dawn on Science, Technical Education and Industrialization, 1896-1912", in Domesticating modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi.

[72]Headrick, R. Daniel. 1988. The Tentacles of Progress, Technology Transfer in the Age of Imperialism, OUP, New York, p. 335.

any change in the proportion of students majoring in technical education. Thus the prolonged argument of Colonial government that Indians were more inclined towards academic subjects was justified; on the other hand Indians claimed that the number of technical student was rising fast.[73]

The First World War gave a new outlook for the industrial development in India. The seven volumes of the Indian Industrial Commission Report along with the journal Science and Culture, constitute the two most important texts in the archives of science policy in India since 1900.[74] Shiv Visvanathan, has very extensively described the distinguished features of the report and broadly marked the shift in Colonial Policy under three broad levels. First, the report was an official recognition of the need to transform India from an agriculturale to an industrial society. Second, the discourse was an attempt to understand the role of science in mediating the transition from plantocracy to technocracy. The third level of the discourse sought to work out the relation of science and technology to the industrial process.[75] As Amburajan has argued, in India, there was no single-minded expansion of technical education. Chance more than foresight determined how the future was to be.[76] This is evident in the policies of the Raj. As soon as the uproar of First World War subsided, the colonial government introduced the policy of withdrawal of guaranteed appointment in 1924. The absence of guaranteed appointments combined with the effects of the depression created significant unemployment among engineering graduates.[77]

Objectives of the Study:

- To study the development of technical education with special reference to two prominent industries viz. Textile and Leather during 1914-1939 in the industrial city Kanpur.
- To study, the political and economic background of industrial development during this period at all India level and specifically in Kanpur.

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[73]Ibid p. 337.
[74]Visvanathan, Shiv. 1985. Organizing for Science: The Making of an Industrial Research Laboratory, OUP, Delhi, p. 42.
[75]Ibid. pp. 42-43.
[76]Amburajan, S. 1995. "Science and Technology Education in South India" in Kumar, Deepak and Roy, Macleod. (Ed). Technology and the Raj: Western Technology and Technical Transfer in India 1700-1947, Sage Publication. New Delhi, p. 131.
[77]Kumar, Arun. 1995. "Colonial Requirement and Engineering Education: The Public Works Department 1847-1947" in Macleod, Roy and Kumar, Deepak. (Ed). Technology and the Raj: Western Technology and Technical Transfer in India 1700-1947, Sage Publication, p. 128.

- To study, the impact of national and international events on the industries of Kanpur during the period of study.
- To study, the demand and supply of technical personnel for the industries.
- To study, the nature of private enterprise in industries and their relationship with colonial rule.
- To study, the establishment, structure and organization of technical institutes in Kanpur.

Scope of the Study:

The study will historically investigate the development of technical education with regard to the industrialization of the city. The period under investigation is 1914 to 1939. The year 1914 was significant as the requirements of the First World War exposed the backwardness of industries in India and subsequently the Holland Commission was appointed to look into the matter. Moreover in this year Kanpur got its first industrial school the Government Dyeing and Printing School. The study will restrict itself to 1939, when the Second World War broke out. The study will cover the two major industries viz. the leather and textile industries of Kanpur. These industries were established for catering to the military needs of the colonial rulers. These two industries required the skilled technicians, which led to the establishment of various technical institutes viz. Government Leather Institute, Harcourt Butler Technological Institute and Government Central Textile Institute. In the study the focus will be on the colonial policies on technical education which were influenced by national and international events.

Methodology of the Study:

The present study is an exploratory effort into the primary sources in the National Archives, New Delhi, Uttar Pradesh State Archives, Lucknow, Personal and Public Libraries in Kanpur.

Primary Sources:

The primary sources of the study comprise of files and reports of the Industries Department. The files of the Department of the concerned period provided substantial information regarding technical education, which were available in Uttar Pradesh State Archives, Lucknow. Reports of the Upper India Chamber of Commerce were available in Kamla Tower Library, Kanpur. The personal library of Late Muneshwar Nigam and S.P. Mehra provided the

rich sources of contemporary literature Souvenir, Gazetteer and reviews of various organizations were consulted. Various reports of the Education Department, Selections of Educational Records, Report of Indian Industrial Commission available at National Archives, New Delhi enriches the material at the national level with regard to technical education and industrialization.

Secondary Sources

Extensive work has been done on triple engagement of science, technical education and industrialization. Scholarly work of Dhruv Raina, S. Irfan Habib, Deepak Kumar, Ian Inkster, Zaheer Baber, Ray Macleod, Gyan Prakash, S. Ambirajan, Arun Kumar, Daniel R. Headrick, Aparna Basu, S.N. Sen and Shiv Vishvanathan was helpful in understanding the debates and discourses of the contemporary period. The work on economic history by A.K. Bagchi, R.K. Ray, Sumit Sarkar and Bipan Chandra has contributed to the economic aspect of the topic. Apart from this, various reviews, articles, thesis and dissertations related to the topic have been consulted.

Limitations of the Study:

The present study is limited to technical education for the textile and leather industries of Kanpur city. The study has focused on the organization and functioning of three technical institutes; two of which were started as industrial schools these being the: Government Central Textile Institute and the Government Leather Institute and Harcourt Butler Technological Institute. Although, these institutes do not possess relevant information for the period of the study. Additionally, I have also tried to explore the discourses on technical education and industrialization at the national level during 1914-39. There is a paucity of information regarding students and teachers as the institutes do not have old records.

Chapterisation of the Study:

The introductory chapter comprises the rationale of the study, framework and a brief history of the Kanpur city. It also includes the objective and scope of the study, followed by methodology with a brief description of the sources and limitations of the study.

The first chapter reviews the literature related to the onset of industrialization, discourses on nationalism and industrialization, the colonial policy on technical education and industrialization in the early decades of the twentieth century.

The second chapter deals with the economic policy of the colonial government after the First World War and the impact of the First World War on industrialization in Kanpur city and the debates regarding industrial policy of the Raj with special reference to Kanpur.

The subsequent chapter closely investigates the qualitative and quantitative aspects on the development of technical education in the concerned period in India. What was the impact of the Indian Industrial Commission on the development of technical education and how far was it successful. Moreover, it addresses the development of technical education in Kanpur with respect to the institutions under study.

The fourth chapter examines the linkage between technical education and industrialization at the all India level and subsequently in Kanpur.

The last chapter consolidates the discussion and findings of the study. This chapter attempts to throw light on the shortcomings in the colonial policy regarding technical education and, how it subsequently affected the industrial development of India.

Chapter 2

Industrial Development of Kanpur during Inter-war Period

The onset of the twentieth century witnessed great social, political and economic turmoil in Colonial India. The Swadeshi movement; strongly urged for the economic development of the country. The Government's New Industrial Policy came into being during the period 1900-20.[1] The need for rapid industrialization raised various concerns among the Indian intelligentsia. The presidency states of Bengal, Bombay and Madras possessed new modern industries based on western science and technology and an active debate regarding the socio-economic and cultural consequences of western industrialization was waged in these quarters. In these presidencies Indians were employed in modern industrial establishments. However, the state of United Provinces had modern industries managed entirely by Europeans. This chapter will look into the industrial policy of the Imperial government between the two world wars and closely examine the influence of these policies on the industrial development of Kanpur city.

The early 20th century was dominated by private European enterprise, which relied heavily on international markets. The period between 1900-14 saw the development of light manufacturing industries like jute and cotton textiles, plantation crops like tea, cotton and indigo and mining industries such as; the coal industry, catering mainly to the internal railway and a very modest steel industry.[2] Of these only the cotton-textile industry was dominated by the Indians. Due to the export bias of both trade and manufacturing in this period, owning and controlling external trade was crucial for business. Except for Bombay, the Europeans, mostly British, controlled the external trade in all other parts of the country. In Bombay too though there was a significant presence of Indians, major part of trade passed through European hands.[3] Hence the period till 1914 was marked by the free trade policy of Government of India. The fledging cotton-textile industry, which could have gained immensely from policies of modest tariff protection on cotton and yarn, suffered competition not only in their overseas markets but

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[1]"Progress from the Evolutionist Point of View", Article in 'The Dawn Society' Magazine, June 1898 in Raina and Habib. 2004. Domesticating Modern Science A Social History of Science and Culture in Colonial India. Tulika Books, New Delhi, p. 83.

[2]Chakrabarty and Chatterjey. 2006. "Business Conduct in Late Colonial India European Business in Kanpur 1900-1939", Economic and Political Weekly, Vol. 41, No. 10, pp. 904-911.

[3]Bagchi, A.K. 1972. Private Investment in India, 1900-39, Cambridge University Press, Cambridge, pp. 167-68.

also in the domestic market. This was largely because India was the most crucial external market for the most important industry of Great Britain- cotton-textiles.[4]

The four years of the First World War irrevocably altered the political economy of the globe. Though Britain was on the winning side its political and economic hegemony over the world's economy declined and new power centers emerged from the ravages of the war. India did not directly participate in the war but because of the imperial connection, India had to face trade and commerce restrictions. Indirectly this provided conditions conducive for the development of Indian industry.[5]

Great Britain's participation in the First World War had far reaching effects on the Indian masses. Massive recruitment, heavy taxes and war loans and a very sharp rise in prices, grew a large section of peasantry and business groups towards the Gandhian movement.[6]

The war brought about an element of fiscal protection due to the government's financial needs.[7] There was a sharp decline in import of piece goods and parts, a rise in Indian textile mills production, a decline in handloom production.[8] These changes posed a challenge for Indian industrial production as the Indian market was opened for Japanese goods.

The war years saw a shift in British Indian Government policy towards Indian industrial development, which was an outcome of a combination of financial demand (which led to hike in import duties) and the realization that a certain minimum degree of economic self-sufficiency was a strategic necessity. The First World War exposed the basic weakness of the Indian economy. The dislocation of international markets and oceanic transportation exposed the extent of India's dependence on European material and capital equipment. The domestic market offered excellent opportunities which private enterprise was unable to exploit. Hence, the government set up an Industrial Commission in 1916 under the chairmanship of Sir Thomas Holland to explore, within the existing framework of fiscal policy, the opportunity for the profitable employment of Indian capital in commerce and industry as well as the desirability and extent of direct

[4] Saul, S.B. 1960. Studies in British Overseas Trade 1870-1940, Liverpool University, Liverpool.
[5]Chakrabarty & Chatterjey. 2006. "Business Conduct in Late Colonial India European Business in Kanpur 1900-1939", Economic and Political Weekly, Vol. 41, No.10, pp. 904-911.
[6]Ibid. p.
[7]The 7.5% import duty of 1917, while the excise on Indian textile remained unchanged at 3.5 %
[8]The handloom production was adversely affected by the higher cost of imported goods as well as competition from the Indian factory production.

encouragement (technical and financial) which the state could extend.[9] The Commission was concerned about the under-developed manufacturing industry. Hence they advocated the policy of energetic intervention in industrial affairs as the only way to open up profitable investment opportunities for Indian capital and reduce the extreme dependence on imported skill and technology. They wanted to direct governmental activities towards research, industrial and technical education, commercial and industrial intelligence, direct financial and technical assistance and a suitably designed stores purchase policy with a view to promote industries. These activities were to be carried out through the agency of the central provincial department of industries manned largely by the 'All India Scientific and Technical Services'.[10]

Further the Montford reforms made the government of India responsible for the formulation of general policies for the control and direction of industrial activities. The Central Institute of Scientific and Industrial Research and the control of mineral development were also made all-India subjects. On the other hand, the development of industries including industrial research and technical education were included in the transferred list of subjects. However, the Central government was in control of tariffs, railway and foreign trade relation and so on which had a profound influence on industrial development. It was felt that with their slender resources the provincial government will not be able to encourage industrial development through costly experiments or finance or bulk purchase of products. Moreover experiments on a commercial scale were felt necessary if dangerous gaps in the Indian economic armour were to be closed and essential links in the industrial chain were to be forged.[11] Nevertheless, the Functions Committee, which delimited powers entrusted the main responsibility for the development of industry to the provincial government. Since the industry was listed as a transferred subject, the provincial government was not in favour of the creation of the All India Services, which they were afraid, would not be easily amenable to their control. The functions of the Central Government were restricted to the collection and dissemination of industrial information and the purchase of stores.[12] Thus unequal distribution of power regarding industrial development between centre and provinces created chaos.

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[9]Clow, A.G. 1928. The State and Industry, Government of India, Calcutta, pp. 2-3.
[10]Chaudhery, R. pp. 429-30 cited in Thavaraj. M.J.K. 1978. "Framework of Economic Policies Under British Rule." Social Scientist, Vol.7 No. 5.
[11]Dispatch of the Government of India, April 16, 1918.
[12]Chaudhery R, p. 435.

Moreover, the worldwide depression of 1930 and accompanying financial difficulties restricted the scope of provincial activity geared to rapid industrialization. The gap in the policies proposed at the time of Montford reforms became apparent. Except in technical education the achievements of the provincial governments were restricted. Only three of the Provinces (Madras, Bihar and Orissa), created the legal and institutional framework for extending assistance to promote industries.[13]

Meanwhile, during the war there was a reduction in international trade and a large quantity of capital accumulated in the hands of Indian speculators and traders. Subsequently, growth in industry unlike during the earlier period was primarily oriented towards the domestic mass market and was led by the Indians- particularly the Marvaris.[14] Besides the established cotton-textile industry- other light manufacturing industries like sugar, paper etc, emerged and expanded, protected from international competition owing to the war, the depression and imposition of tariffs. After the period of enforced protection owing to the First World War the colonial government in 1923 adopted the principle of discriminatory protection. This was as much to assuage Indian big business interests and its increasing association with the rising nationalist movement as to promote the protected industries. But due to the lack of clear industrial policies the attempt did not have a profound impact.[15]

The government's 'sound' financial policy and strong inflationary policy in the face of acute depression was largely responsible for arresting the possibility of higher industrial growth.[16] On the other hand, Dewey, Kumar and Tomlinson, while conceding that the overall government's assistance to industry was limited do not subscribe to the analysis that British interests significantly influenced the levels of tariff in India.[17] Gupta's findings support the

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[13]Thavaraj, M.J.K. 1978. "Framework of Economic Policies under British Rule." Social Scientist, Vol. 7, No. 5, pp. 13-44.

[14]Chakrabarty & Chatterjey. 2006. "Business Conduct in Late Colonial India European Business in Kanpur 1900-1939." Economic and Political Weekly, Vol. 41, No. 10, p.907.

[15]Bagchi, A.K. 1972. Private Investment in India, 1900-39, Cambridge University Press, Cambridge, p. 46-47.

[16]Ibid., Chaterjee, B. 1992. Trade, Tariffs and Empire: Lancashire and British Policy in India 1919-39, OUP, New Delhi; Ray, R.K. 1979. Industrialization in India: Growth and Conflicts in the Private Corporate Sector 1914-39, OUP, New Delhi.

[17]Dewey, C.J. 1978. "The End of the Imperialism of Free Trade: The Eclipse of the Lancashire Lobby and the Concession in Fiscal Autonomy in India," in Dewey, C.J. and Hopkins, A.G. (Ed). Imperial Impact: Studies in the Economic History of Africa and India, OUP, London; Kumar, D. 1983. Cambridge Economic History of India, Vol. II, Cambridge University Press, Cambridge; Tomlinson, B.R. 1979. Political Economy of the Raj 1914-1947: The Economics of Decolonization in India, Cambridge Commonwealth Services, Cambridge Press, London.

former assertion.[18] British businessman in India, with their primary interests in international trade and export-oriented industries like tea and jute, did not foresee any advantage in the protectionist policy of the government and generally opposed it.

The Indian capitalist class on the other hand, had consistently campaigned for protection and welcomed the government's tariff policies.[19] The cotton-textile industry, particularly in Bombay, got a respite from Japanese competition.[20] The Indians also entered the newer industries committed to import substitution. The inter-war period, in contrast (to the earlier period), saw a sharpened conflict between foreign capital and indigenous enterprise. The conflict arose from the resistance of European interests to the increase in import-substitution industries, predominantly an Indian initiative, catering to the domestic market for goods of mass production.[21] Markovits attributes the relative 'passivity' of British capital to the decline of the British colonial grip on India. "Once the Raj was reduced to the strategy for survival, British enterprise in India also lost much of its dynamism and hung on to its position but lost its major incentive to expansion".[22] Ray on the other hand denies the influence of extra-economic considerations and concludes the profitability of the enterprise was the only guiding factor for investment.[23]

Besides import substitution, there was a tendency wherein, local producers, who were earlier producing for export, shifted the sale of goods to the home market. Further, the link between agriculture and industry began to grow, reversing the earlier trend where the former was increasingly linked to metropolitan industry. The strong linkage between agriculture and industry was expressed in the most flourishing industry of cotton-textile.[24] In the early decades of the 20th century Bombay was beginning to shift from export of yarn to the Far East (particularly China)

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[18]Gupta, P.S. 1987. "State and Business in India in the age of Discriminating Protection", in Tripathi, D. (Ed). State and Business in India: A Historical Perspective, OUP, New Delhi, pp. 157-216.
[19]Markovits, C. 1985. Indian Business and Nationalist Politics 1931-39: the Indigenous Capitalist and the Rise of the Congress Party, Cambridge University Press, Cambridge, pp.57-60.
[20]Chaterjee, B.1992. Trade, Tariff and Empire: Lancashire and British Policy in India 1919-39, OUP, New Delhi.
[21]Ray, R.K. 1979. Industrialization in India: Growth and Conflict in the Private Corporate Sector 1914-47, OUP, New Delhi, p.5.
[22]Markovits, C. 1985. Indian Business and Nationalist Politics 1931-39: The Indigenous Capitalist and the Rise of the Congress Party, Cambridge University Press, Cambridge, pp.65.
[23]Ray, R.K. 1979. Industrialization in India Growth and Conflict in the Private Corporate Sector 1914-47, OUP, New Delhi, p.249.
[24]Mukherjee, Aditya. 2002. Imperialism, Nationalism and the Making of the Indian Capitalist Class 1824-1947, Sage Publication, New Delhi, p. 23.

to production of yarn and cloth for domestic markets. Also, other textile centers in the interior areas, such as Ahmedabad, Kanpur and Coimbatore, which grew faster than Bombay in this period, produced yarn and cloth mainly for the domestic market.[25] The demand for cloth had increased significantly between 1901 and 1941, resulting in inward orientation of the cotton-textile industry. The total internal consumption of cotton piece goods in India was 9,387.9 million yards for the period 1900-01 to 1902-03 and 16,594.6 million yards for the period 1936-37 to 1938-39, an increase of about 77%. The production of India grew by about 36% during this period.[26]

There was a substantial increase in per capita cloth consumption up to 1913-14 that declined during the First World War, and just about recovered to the pre war level during the last five years of 1930s.[27]

The Ascent of Kanpur as an Industrial City

Against this background, Kanpur developed as a prominent industrial centre in Upper India. The industrialization was the outcome of European enterprises catering to the military demands of the British army. The flourishing industries of cotton-textile and leather gave the city international fame and reputation in the early decades of twentieth century.[28]

The first textile mills in Kanpur were established in the1860s, when Lancashire faced shortage of cotton due to a shortage in the supply of American long- stapled cotton. There was a spurt in the demand for Indian cotton. Kanpur, which had been a trading centre for cotton since the eighteenth century, suddenly had more raw cotton flowing in, that it could handle.[29] The glut in raw cotton could be redirected to meet the army requirement for tents and uniform. This provided the context within which plans to produce textile locally were floated. Officials from

[25]Bagchi, A.K. 1972. Private Investment in India 1900-37, Chapter 3 and 7.
[26]Davis. Population of India and Pakistan, p.27.
[27]Cf. the estimate of per capita consumption given in Gov. India, CISD. 1937. Review of the trade of India in 1936-37, Delhi, p.43; 1932-3 was an exceptional year because of the large imports of cotton piece goods particularly from Japan.
[28]Nevill, H.R. 1909. District Gazetteer of United Provinces of Agra and Oudh, Government Press, United Provinces, Vol. XIX, Cawnpore, Allahabad, pp. 76-79.
[29]'Cawnpore was flooded with countless bales of cotton that poured from Bundelkhand, Rohilkhand, Awadh and the Doab in huge streams, beyond the carrying capacity of the railway. The roads in the city were piled high above the house tops completely blocking the way.' Jones, Gavin. "Rise and Progress of Cawnpore," in Playne, Somerset and Wright, Arnold. Bombay Presidency, The United Provinces, Punjab, Kashmir, Sind, Rajputana and Central India - Their History, People, Commerce and Industrial Resources p.496.

the army commissariat tried to give shape to a scheme, and Elgin Mill, named after the ruling Viceroy, was set up. Eventually the Company had to be auctioned because it ran out of credit and Hugh Maxwell, from the family that had long business links with Kanpur became the proprietor. Indian merchants and bankers played an important role in financing Elgin Mills. The names of Lala Ishaq Lal and Lala Ganeshi Lal figure among the directors of the company, although as a proportion of total shareholders Indians constituted only around 12 per cent. Technical expertise was provided by Europeans, leading among whom was Gavin Jones, celebrated as a hero of 1857 in contemporary European accounts. He had trained as an engineer after the decline in the indigo fortunes of the family. His shift to the textile industry, as manager of Elgin Mills, was related partly to his family ties with the Maxwells. Elgin Mills made successful inroads into the market supplied formerly by imported products and towels, drills, tents, and dhotis and the Elgin trade mark became famed for quality and durability.[30]

The mills that came up in subsequent years were largely established by a different kind of entrepreneur. Skilled workers, technicians, fitters, weaving masters and chemists, had sailed out from England to explore job openings in the new textile mills of India.[31] The quick success of Elgin Mills and the growing demand created by the Afghan Campaigns provided an opportunity for new enterprises to come up in Kanpur. Two entrepreneurs, John Harwood and Atherton West, were both from a working class background in Lancashire. Harwood worked briefly in a Bombay mill, from where he was drawn upcountry to Kanpur by the hope of better terms.[32] After a stint as weaving master in Elgin mills, he set up the Cawnpore Cotton Mills. West joined Elgin as weaving master in place of Harwood after initial training in Bombay. Later, in 1886 he started Victoria mills with financial help from Jaggilal. Francis Horsman was a Yorkshireman, after working in mills of Bombay and Indore, he joined Elgin mills as a fitter, and many years later set up Swadeshi Cotton Mills in 1911.[33] Thus Elgin Mill was the training centre for young entrepreneurs, who later established their own enterprise. These entrepreneurs were fortunate to hold the key position which Indians never normally obtained..

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[30]Yalland, Z.1994. Boxwallahs, The British in Cawnpore 1857-1901, Norwich, p.184.
[31]Most jute mill managers in Calcutta; similarly were from a working class background in Chakrabarty. 1989. Rethinking Working Class History, New Delhi, p. 168.
[32]Joshi, Chitra. 2006. Lost World Indian Labour and its Forgotten Histories, Orient Longman, New Delhi, p. 38.
[33]Ibid. p. 38

Elgin Mills and Muir Mills started with 10,000 spindles and 100 looms and had 89,405 spindles and 1,676 looms respectively and employed over 5000 men by 1938.[34] The Swadeshi Cotton Mills founded in 1911 had 83,904 spindles and 1,740 looms and employed about 5000 operators. The Victoria Mills Co. Ltd. founded by Mr. Atherton West, assisted by Messrs Baijnath Ramnath had increased their capital from the initial Rs. 5 lakh with which they started in 1886 to Rs. 26 lakhs by 1920, when they were taken over by the New Victoria Mills Ltd. with an authorized capital of Rs.5 crores, of which Rs.135 lakhs were subscribed principally in India.[35] These mills employed over 3900 workers and possessed 95,069 spindles and 1,615 looms. The Atherton Mills started in 1923 with 22000 spindles and 400 looms and further had been raised to 38,500 spindles and 900 looms and employed 2,600 operators on day and night shifts. The Cawnpore Cotton Mills employed over 5700 workers and were equipped with 75,092 spindles and 972 looms.[36] The early European entrepreneurs who established the cotton mill industry were of British origin coming from the ranks of middle classes - an army officer, a station master, a lawyer, a surgeon and an engineer most of whom were brought up at the time of the maturity of the Industrial Revolution in England. When they found cheap raw material and cheaper labour in India, they could not resist the temptation of becoming pioneer industrialists. In this British venture, the Indian traders and money-lenders lent support as financers, who were mostly Marvaris and Banias. But in due course, the Indian financers were completely 'swallowed' by the British mill-owners. This could be possible because of the economic and political compulsions practiced by the British business community.[37]

Thus Kanpur emerged as a prominent industrial centre of the United Provinces. Almost all the industrial units in the province were located in Kanpur. They were exceptionally large in size and contributed to more than 90 per cent of the cloth produced by the Cotton Mill industry of the province.[38] Combined spinning weaving units dominated the cotton-textile industry of Kanpur. Out of 15 spinning weaving units working in the United Provinces Kanpur had the

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[34]Golden Jubilee Souvenir (1888-1938). 1938. Upper India Chamber of Commerce, Cawnpore, p.16.
[35]Ibid. p.17.
[36]Ibid. p.17.
[37]Singh, V.B. 1968. Climate of Industrial Relation: A study of Kanpur Cotton Mills, Bombay, p. 19.
[38]Mehta, M.M.1949. Structure of Cotton-Mill Industry of India: A Study in the Size and Location of Industrial Units in the Cotton-Mill Industry of India, Allahabad, p.132.

lion's share of 11 combined spinning weaving units.[39] Thus Kanpur became the third largest centre of cotton textile industry next to Bombay and Ahmadabad.

The following table illustrates the changes that had occurred in the size of combined spinning weaving unit in the cotton mill industry of Kanpur in the first four decades of the 20th century-

Trends in the size of Combined Spinning Weaving Units in the Cotton Mill Industry of Cawnpore 1905-1944

Spinning Section

Spindles installed	1905	1911	1921	1931	1941	1944	Change between 1905-1944
1-20,000					1	1	+1
20,000-40,000	..	1	..	2	3	4	+4
40,000-60,000	2	1	1	3	2	2	..
60,000-80,000	2	2	2	1	2	2	..
80,000-100,000	..	..	..	1	2	1	+1
Above 100,000	..	..	1	1	..	1	+1
Total	4	4	4	8	10	11	+7

Weaving Section

Looms installed	1905	1911	1921	1931	1941	1944	Change between 1905-1944
0-500	-	-	-	1	1	2	+2
500-1000	3	3	1	3	3	3	..
1000-1,500	1	1	1	2	4	4	+3
1,500-2,000	-	-	2	2	2	2	+2
2,000-2,500	-	-	-	-	-	1	+1
Above 2,500	-	-	-	-	-	-	-
Total	4	4	4	8	10	11	+8

Source M.M. Mehta Structure of Cotton Mill Industry of India 1949, p.133

[39] Ibid., p. 133.

The above table reveals that all the industrial units that came into existence during the earlier periods were organized on a fairly large scale. They were established by rich and experienced European merchants or employers who conceived industrial organization on somewhat bold and larger lines.[40] The ample financial resources, the proximity of the sources of raw material and consumption markets and the abundant supply of cheap and skilled labour, appraised them of the vast potentialities for the development of textile industry in so promising a centre as Kanpur. The conditions were therefore, very congenial for a beginning on a fairly large scale. It was significant that some of the industrial units working in 1905 had less than 40,000 spindle and 500 looms. Elgin Mills, Muir Mills, Cawnpore Cotton, and Victoria Mills were; all owned and managed by European firms and directors.[41] It was only after 1921 that a few enterprising Indian Industrialists with modest resources but great organizing ability entered in the field. They mostly belonged to the trading class of Indian merchants who had vast business experience but little technical training. The units organized by them were somewhat smaller in size, most of them having 20 to 40 spindles and 300 to 1000 looms.[42]

In no other centers except Bombay, were the units in the cotton-mill industry organized on such a large scale as Kanpur.[43] In 1944-45, nine units out of the total of eleven were equipped with more than 50,000 spindles and 1000 looms. One of them viz. Swadeshi Cotton Co. Ltd. had a capacity of over 100,000 spindles and 2000 looms. Undoubtedly, some of the units in Kanpur such as Muir Mills and Cawnpore Cotton Mills and the New Victoria Mills were the most well known and best organized units in the cotton-mill industry of India.[44]

The landmark industrial enterprise of Kanpur was the Cawnpore Woolen Mill, another of Mr. Gavin Jones' project, and it may suffice to say in regard to this mill that its products were known universally throughout India under the 'Lalimli' trade mark of the company. These mills were the largest woolen spinning and weaving undertakings in India till 1938. Their products were to be found in every home and every bazaar, and the quality of their goods competed successfully with that of the best imported woolen goods. These mills for many years were

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[40]Ibid. p.134
[41]Ibid. p.134
[42]Ibid. p.134
[43]Ibid. p.134
[44]Ibid. pp134-35

managed by Mr. Alexander McRobert, who was quite accurately referred to on a certain special occasion by Mr. Gavin Jones as the "uncrowned king of Kanpur".[45]

The splendid technical and organizational structure of Kanpur cotton mills significantly contributed to the First World War. A dramatic spurt in textile production occurred during the First World War when most of the mills were busy supplying government contracts in yarn and cloth.[46] By 1917 more than 50,000 tents had been supplied and an outturn of 17,850,000 yards of cotton material was recorded.[47] The total production of woven goods increased from an index figure of 100 in 1908-10 to 135 in 1915-16, and yarn production increased from an index figure of 100 to 134 in the same period.[48]

The woolen mills also had huge orders for army supplies, some of the work being subcontracted to village weavers. The supply and distribution of yarn to weavers and the collection of woven blankets from them was organized by syndicates, which were also responsible for finishing them according to army specification.[49] To meet increased production targets the mills worked longer hours and tightened labour discipline.[50] The profits of the textile industry went up sharply, despite the steep rise in raw cotton prices.[51] The hike in yarn and cloth prices more than made up for the increased costs of raw cotton. In fact the mills made huge profits by selling large stocks that they had produced out of cheap cotton purchased early in the year.[52] The heavy army orders led to a decline in the production of ordinary 'country cloth' purchased by lower income groups.[53] The production of dhotis for instance, declined from an index of 100 in 1907-10 to 58 in 1914-15.[54]

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[45]Golden Jubilee Souvenir (1888-1938). 1938. Upper India Chamber of Commerce, Cawnpore, p. 17.
[46]Commerce and Industries Department, GOI, 1917, Files 20-1 in Joshi, Chitra. 2006. Lost Worlds Indian Labour and its Forgotten Histories, Orient Longman, New Delhi, p. 45
[47]UICC Report, 1917, p. X.
[48]Joshi, Chitra, 2006, Lost Worlds: Indian Labour and its Forgotten Histories, Orient Longman, New Delhi, p. 145.
[49]Commerce and Industries Department 1917, Nov. 20-1 in Ibid.
[50]Joshi, Chitra, 1991. Formation of Work Culture: Industrial Labour in a North Indian City (1850's-1940's).
[51]'The year 1916-17 witnessed a sensational rise in the price of cotton, but the year under report (1917-18) had witnessed a rise in prices in levels never previously recorded' UP Ind. Progress.
[52]Commercial and Industrial Progress, Dec. 1917, No. 20-1.
[53]ARI, 1916-17 and 1917-18, UP industries Dept. 1919, File 24 Bundle 45 in C. Joshi
[54]Financial and Commercial Statistics of British India for Relevant Years cited in Bagchi, A.K. 1972. Private Investment in India, 1900-39, Cambridge University Press, Cambridge.

The expansion of the textile industry during the war period gave the Kanpur mills an opportunity to reach out to the markets that had earlier been supplied by Lancashire. There was now a growing domestic market for mill made shirting and dhotis. The 1920s saw a steady growth of the cotton industry in UP, interrupted only by a slight dip between 1919 and 1923. Production and export of cotton textiles showed a continuous increase after 1925, with export matching up to the war levels in 1930. The depression years were marked by a decline in mill profit, wage cuts and retrenchment, yet production figures do not indicate any decrease. On the contrary evidence of textile production and the amount of cotton consumed by the Kanpur mills shows a continuous increase.[55]

Leather Industry

Leather has traditionally been prepared from the pelts of the number of domestic and wild animals by processing of either the bark or fruits of certain trees and shrubs or some mineral oils. These vegetable substances and chemicals are called tanning material. The tanning industry is, thus dependent upon two things for its development: the pelts of animals and tanning materials. Thus in a number of cases the industry was located near the forest or other areas producing tanning materials.[56] The tanning industry developed in India in the bark tanning belt of Avaram (*Cassia auriculata*) running from Madras to Bombay and the other depending upon babul (*Acacia arabica*) running from Sind in the west to Cawnpore in the United Provinces in the East. The two biggest factories of India engaged in making boots and shoes were situated in U.P. (Cooper Allen & Co.) and in Bengal - the Bata Company at Batanagar near Calcutta. The Government Harness and Saddlery Factory, the only of its kind in India, was also located in Kanpur.[57]

Government Harness and Saddlery factory in Kanpur was said to be the first organized production unit of consistently reliable and properly finished leather in India. The establishment of Harness and Saddlery factory was followed, in 1880, when Sir William Earnshaw Cooper and Sir George Allen formed the private firm of Cooper Allen and Co. Army Boots and Equipment factory. The factory began to manufacture, with the help of few workman, leather, leather

[55]Joshi, Chtra. 2006. Lost Worlds Indian: Labour and its Forgotten Histories, Orient Longman, New Delhi, p. 49.
[56]Sharma, Tulsi Ram. 1946. Location of Industries in India, p. 163.
[57]Ibid. pp. 163-272

equipment and footwear for army purposes.[58] The British army met its army requirement by importing leather goods from England. In 1883, however, Cooper Allen & Co. secured their first contract from the Government and began the organized manufacture of British army boots in real earnest.[59]

Simultaneously another concern the North West Tannery Company was established in 1892. The factory started mass-producing civilian footwear by 1900 employing the latest machines of the day by 1900. The Cooper Allen & Co. made steady progress as is evident from the following production figures:

Years	Campaign	Production of Army Footwear
1891	Manipur	175,807 pairs
1895	Chitral	242,000 „
1897	Tirah	338,426 „
1901-1900	South Africa	944, 713 „
1904	Tibet	456,338 „
1914-1918	World War I	6,143,322 „
1939	World War II	20,00000 „

Source [60]

Harness and Saddlery factory owned by the Government of United Provinces was in a critical and deteriorating condition, but the start of the First World War in 1914 provided a new lifeline for the factory. The British army's requirement of leather goods were provided for by this factory. The increase in demand of leather provided a boost to the leather industry as is evident by the factory's administrative report of 1914-15.

The factory made improvements in the tanning process of leather there-by increasing the production of leather goods. See the table below:

[58] Foot Prints on the Sands of Time an Epic Relating to Industrial Effort in World War II, 1946. With Complement from Cooper Allen & Co., Cawnpore, p.1
[59] Ibid., pp. 1-2
[60] Ibid. p.3

Year	Quantity	Prices of the Product
1913-14	3,97,000	
1914-15	15,96,000	
1915-16	17,61,000	52,46,000

Source[61]

By the end of 1917 the net value of factories production was 53, 43,320 pounds. The ancillary of this factory Messer Cooper Allen & Co. Cawnpore assisted in manufacturing 6,143,322 pairs of shoes during the period of First World War. In 1915 and 1916 two more factories were opened in the private sector to meet the requirement of boots for the British army.[62]

The interwar period was an uneasy one of constant struggle. Cooper Allen & Co. was so heavily dependent on government demand that when the government withdrew support the company announced "with every good reason, their inability to maintain their heavy machine in idleness any longer."[63] In the days of the great depression company had to switch over its production to civilian footwear from army footwear to maintain its equipment. However, the depression eventually compelled the factory management to liquidate their idle heavy equipment, and replace them with dual use machines (machines primarily used for light work and could also be converted for heavy work) in 1937 and 1938.[64]

The discriminatory policy of the government was evident in the interwar period when the government provided an allowance for army personnel to purchase its footwear individually instead of supplying the footwear annually to the military. The reason for this policy shift was to support the cottage leather industry. But on the outbreak of Second World War the British government returned to its original policy and argued "...However, laudable the idea of supporting the cottage industries, these industries with all the good intention in the world would not begin to meet the colossal and accessing requirement of the major war". What did the

[61]Ibid
[62]Ordinance Equipment Factory 1972, an article of Shiv Prasad Morya Chakr.
[63]Foot Prints on the Sands of Time: an Epic Relating to Industrial Effort in Second World War. 1943, with Complement from Copper Allen & Co., Cawnpore, p. 3
[64]Ibid. p. 4

government do to train village artisans on modern technological lines needed for the new leather tanning processes? Why didn't the government place large orders with any Indian owned firms?

Cooper Allen & Co. and the North West Tannery had introduced the footwear with the brand name 'flux' footwear and this brand was quite popular throughout the country before the company adopted the new chrome leather. However, chrome leather was extensively used in the West in 1914-18, but it was not until 1935, that a chrome-tanned boot was universally accepted in India.[65] Thus, by 1937 India was the largest supplier of chrome-tanned leather to the United Kingdom. The chrome leather branded 'gold muhar' made by Cooper Allen & Co. occupied a very prominent position.[66]

Nevertheless, the interwar period was not conducive for the smooth functioning of these factories. The production of the factory dropped down to 2500 pairs of army footwear per month by 1939. However, when Britain's Prime Minister Neville Chamberlain, announced Britain's entry into the war in September 1939, the European industrialist prepared themselves for quick action. To the Indian masses the war was too far away to cause uneasiness. But among the European industrialists many of the top executives had served in the 1914-18 war. They had vivid memories of the war, and they did not underrate the task ahead. It was a time for immediate and far-reaching decisions.[67] These industrial houses prepared themselves to meet the new production demands. The Cooper Allen & Co received the highest orders during the Second World War.[68]

Indian Industries Houses in Kanpur

One of the important factors, which prevented the participation of Indians in industrialization, was racial divide between European (particularly British nationals) and Indians, fostered and maintained by the British rulers. Professor Habakkuk, for example, writes: "the contrast of Japan with India is certainly one which requires explanation, since India has many of the basic conditions of industrialization - a merchant class, banking and transport facilities, considerable production for the market - and perhaps in this case difference in character and

[65]Ibid. p.13
[66]Ibid
[67]Ibid. p. 23
[68]Ibid. p. 26

quality of the native entrepreneurs was the decisive factor".[69] The emergence of entrepreneurship in most parts of India was systematically discouraged by the political, administrative and financial arrangements maintained by the British rulers. Nevertheless, in the few cases before 1914 in which 'native' entrepreneurship had emerged, it was not interested in industries. Bagchi writes: "If anything, Indians showed a greater degree of courage, since they did not have many of the tangible advantages that British businessman enjoyed because of their birth".[70]

Anti British feelings and movements fuelled the rise of Indian entrepreneurs, but the particular forms of industrial organization was inspired by British precedents. Industrialization driven by a rising Indian industrial class started in the later part of the nineteenth century with the 'textile first' slogan, because of the readily available raw material, skill and capital, which was small indeed. In the beginning, the necessary capital to start the cotton–textile industries came from joint families, relatives and friends of the traditional trading and money lending communities.[71] A similar pattern was evident in the establishment of industries in Kanpur. The Indian entrepreneurs were encouraged not only by national leaders of U.P. but also by the national movements, as it created conditions for the growth of handloom industry which needed more and more yarn.[72] Thus the first mill established by an Indian was in 1920 by Sir Padampat Singhania. He hailed from the Singhania family, which was already in trade and commerce including the sale and distribution of agricultural commodities and lending money to agriculturists. When they moved to Kanpur, they began supplying raw products for manufacture and selling the finished products of several textile mills in Kanpur. Till 1905 the firm run by them was called Baijnath Ramnath that comprised three jute mills, one hydraulic press association, three ginning factories and two flour mills. They were also selling agents for Cawnpore cotton mills and commission agents for Victoria Mills and Elgin Mills. After 1905 the J.K. family was split and separate firms came into existence.

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[69]Habakkuk, H.J. 1955. "The Historical Experience on the Basic Condition of Economic Progress" in Dupries, Leon H. (Ed.). Economic Progress, Papers and Proceedings of a Round Table held by the International Economic Association, Louvain-Institute de Recherches Economiques et Sociales, pp. 149-169 cited in Bagchi, A.K. 1972. Private Investment in India 1900-1939, Cambridge University Press, p. 423.
[70]Bagchi, A.K. 1972. Private Investment in India 1900-1939, Cambridge University Press, p. 423.
[71]Singh, V.B. 1968. Climate for Industrial Relation: A Study of Kanpur Cotton Mills, Bombay p. 4.
[72]Ibid. p. 20.

Baijnath Jaggilal

Baldeodas Kedarneth

Jaggilal was the selling agent to Cawnpore Cotton Mills and Victoria Mills Ltd. They also started their piece goods department and imported cloth from England in partnership with Lala Bhagvandasji. The firm also owned a ginning factory in Madhogunj. Lala Kamlapath Singhania belonged to the family, and was considered a man of great vision and enterprise.[73] The ongoing national movement inspired Lala Kamlapath, and was fired with the ambition of making India self-sufficient in manufacturing. He gave up his profession as a selling agent and established J.K. Cotton Spinning & Weaving Co. Ltd. in January 1921, registered as a private limited company under the joint stock companies act in 1923. The spindle strength at the start was 25,000 with 500 looms. By 1949 the capacity of the installed machinery was 44,964 spindles and 1,116 looms. The average production of yarn was 5 million lbs and that of cloth 30 million yards a year.[74] Lala Kamlapath also started the following industrial and commercial enterprises:

Name of the Concern	Year of establishment
Kamla ice factory	1921
J.K. Oil mills	1924
J.K. Hosiery factory Kanpur	1929
J.K. Jute mills	1931
M.P. Sugar Mills	1932
J.K. Cotton Manufacturers	1933
J.K. Iron & Steel Co. Ltd.	1934

Source: J.K. House that J.K. Built. J.K. J.K. Review, 1949.

Mangru Ram Jaipuria, was a trading agent for Swadeshi Cotton Mill in 1946. By the 1930's many merchants who had financed European concerns became industrial entrepreneurs themselves.

[73] J.K. House that J.K. Built, J.K. Review, 1949.
[74] Ibid.

The divide between European and Indian capitalists was evident in the organization of separate chambers of commerce. A brief description of these associations follows in order to understand the nature of the industrial groups.

Business Associations in Kanpur

The industrial development of the city was initiated by European businessmen. The Indian business class, although engaged in finance and trade, entered the manufacturing sector as late as the 1920's. The business communities of Kanpur organized themselves into various groups to safeguard their economic interests and actively participated in influencing contemporary economic policy with government. In the Presidency towns of Calcutta, Madras and Bombay, Chambers of Commerce had been formed between the years 1834 and 1836 and in Karachi the Chamber of Commerce was formed in 1860. The commercial activity in Upper India had not grown in sufficient importance to necessitate the formation of a representative body to safeguard its interest. For several years after the commercial and industrial growth had expanded, there appeared to be no necessity for protecting or advancing the general interests of the young undertakings in Cawnpore but, towards the close of the 1880's, the growing commercial and industrial interests led to the formation of Upper India Chamber of Commerce on 12th September 1888 with the help of European industrialists of the city.[75]

The Chamber played a crucial role in shaping the industrial and fiscal policies of the region. It took active interest in the activities of the provincial and central legislature and played a key role in shaping important policies such as the Morley Chelmsford report, the Simon Commission, the Franchise and Delimitation Committees, the Round Table Conference and the joint Select Committees.[76] The Chamber was the most important mouthpiece of the European business of Kanpur on all issues affecting it, including government policies, industrial disputes, political position and labour. The economic interests of the European business community in general in India were closely tied up to imperial interests, therefore they whole heartedly supported measures like 'imperial preference' (giving preferential treatment to goods from U.K. and the empire as a whole) and 'protectionism'(imposing tariffs on goods from outside the

[75]Golden Jubilee Souvenir (1888-1938). 1938. Upper India Chamber of Commerce, Cawnpore, p.8.
[76]Annual Report of Upper India Chamber of Commerce. 1936, UICC, Cawnpore, p.6.

empire) during the war.[77] Protectionist policies might after all encourage the growth of indigenous Indian entrepreneurship and force the Europeans to compete with the Indians on somewhat more equal terms in the home market. European commercial enterprise in Kanpur; on the other hand was opposed to the policy of restricting the trade within the Empire and were keen to explore trade relations with countries outside the Empire. Thus, though the chamber professed its external loyalty to Great Britain and the allied effort in the war, they opposed all loyalties that were detrimental to their own economic interest. They feared that the imperial character of the Indian state would compel it to promote the interest of 'home' industries and trade at the cost of indigenous industrial efforts including their own.

They actively campaigned for protective tariff for all industries, not only those related to their direct interest, like cotton-textile and sugar, but also in industries in which they had no interest at all. Further they contested the claim of the 'free traders' (who were mostly European) that India would gain by reverting to a free trade policy.[78]

The Chamber also sent their representatives to the management committees of technical institutes and demanded educational facilities as and when required according to the needs of the European mill owners.

United Provinces Chamber of Commerce

In 1914 an organization of Indian traders and industrialists, the UP Chamber of Commerce was set up in the changed context of pressure generated by the Swadeshi movement. They criticized the fiscal policy of the colonial state and urged the government to help industry through measures like financial aid, encouragement to commercial and technical education and representation of non-officials in the Fiscal Commission. The two chambers shared many concerns, a fact publicly acknowledged by the members of UICC.[79] There were also important differences. Till the early 1920's the majority of the members of UP Chamber were connected

[77]Chakrabarti & Chaterjey. 2006. "Business Conduct in Late Colonial India European Business in Kanpur 1900-1939", Economic and Political Weekly, Volume 45, No. 10, pp. 904-911.
[78]Annual Report of Upper India Chamber of Commerce. 1915. UICC, Cawnpore, pp.14-15.
[79]Welcoming the formation of the UP Chamber, the President of the UICC noted 'There has been room for the chamber and its establishment is a welcome sign of our time. Its creation can be valuable assistance to our common purposes.....' UICC Annual Report 1914, p. II.

with trade and banking and not manufacture.[80] Many were involved in the import and sale of piece goods from Europe, and it was during the non-cooperation movement that several switched to trade in locally manufactured products.[81] Various constraints inhibited Indian enterprise. The close racial ties with the military commissariat gave European entrepreneurs a large captive market- the army being a major consumer of the defense related production.[82] One of the issues that the UPCC pressed for was the appointment of Indians to the Directorate of Presidency Banks. In the 1930, however, European and Indian industrialists banded together in the Employers Association of North India, which was set up to deal collectively with labour uprising.[83]

Conclusion

The duration of the post-war boom and depression was somewhat different for various industries. The new fiscal policy, following the recommendations of the Indian fiscal Commission and the appointment of the Tariff board in 1923, and the era of protective duties, no doubt helped in industrial development. The European industrialists in Kanpur had close association with Colonial administration and had full advantage of Colonial policies. The supply of military orders proved to be a boon for the initial development of these industries. Whereas Indians industrialist, were not fortunate enough to had favourable concession for their enterprise. The European industrialists of Kanpur had considerably contributed to the industrial advancement but their success was dependent on foreign machine and manual skill. The Indians were restricted to the lower cadre of jobs, who were trained for manual work and in moral conduct. In the following chapters we will analyze the role of European mill owners and their role in the development of technical education in Kanpur.

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[80]There were however those like Shyam Mahadeo Prasad who owned flour mills and an iron foundry in Silver Jubilee Souvenir 1914-39. UP Chamber of Commerce, Cawnpore, p.110.

[81]Seth Laxminarayan Girtharilal, an importer of printed and coloured cloth from Europe, stopped trade in imported goods and became a sole agent for Cawnpore Cotton Mills and later for Victoria Mills, Silver Jubilee Souvenir 1914-39. UP Chamber of Commerce, Cawnpore, p. 100.

[82]Bagchi, A.K. 1997. The Evolution of the State Bank of India 1876-1920. Delhi, p. 190.

[83]In a vote of thanks at a meeting of the Employers Association, Singhania commended the services of Gavin Jones "You have done a great service to the employers of North India by combining them and organizing them into such an institution as this from which they can see the great benefits of unity'. National Herald, 6.4.1939.

Chapter 3

Dynamics of Technical Education during the Inter-war Period in Kanpur

The relationship between technical education and industrialization could be well captured by the remarks of Abbott Wood, educational experts from England who visited India in 1936-37, "No country can initiate and carry on industrialization on a large scale, unless it has an adequate supply of men specially trained for the direction and management of large industrial concerns as well as of others qualified for minor but very important supervisory post in them. On the other hand it can not be expected that capable and ambitious men will devote themselves to acquiring this special knowledge and skill unless they see a reasonable prospect of exercising it and giving a decent livelihood thereby."[1]

The above statement on the one hand signifies the importance of technical education for industrial development, on the other it underlines the availability of opportunities in industrial sector to attract the young people to persue technical education. Mr. Abbott, who held the office of chief inspector of Technical Schools under the Board of Education, England was regarded as a world authority on many aspects of technical instructions. His report had thoroughly dealt with the duration, scope and content of courses that should be provided in technical schools.

The years 1914-39 were essentially the period of transition in India. During this time India embarked on a phase of industrialization under the shadow of the two World Wars in which she was not directly involved. This chapter will discus the policy of the colonial government towards technical education, the emergence of technical education in Kanpur as the prominent industrial centre in North India and outlines certain significant events of that period.

Except for the cotton-textile industry in Bombay Presidency and the Tata Iron and Steel Works, there were few industries before 1920, which were financed and controlled by Indians.[2] When the European managed industries required technical staff in the upper echelons of the

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[1]Bureau of Education, India; Post War Educational Development in India Report of CABE, Third Edition, Jan 1944, p.29.

[2]Basu, Aparna. 1991. "Indian Response to Scientific and Technical Education in Colonial Era. 1820-1920" in Kumar, Deepak (Ed). Science and Empire Essays in Indian Context, (1700-1947), Anamika Prkashan, Delhi, p. 130.

industry European was preferred. There was a wide spread notion among British officials and private employers that Indians lacked aptitude for technical training. In 1911, a Committee under the chairmanship of F.A. Stacke was constituted to go into the question of shifting the Bengal Engineering College from Sibpur and the creation of Technical Institute at Calcutta.[3] The report also discussed the question of the employability of Indians. Many of those who gave evidence before the Committee held that Bengalis as a race, were unfit for practical work and because they lacked interest and stamina, they could not find employment. Dawson, principal of the Victoria Jubilee Technical Institute Bombay, however disagreed. He said that in Calcutta the foreman were generally English and hence preferred to employ Englishman. In Western India this was not so.[4] The Atkinson-Dawson Committee appointed by the Government in 1912 to inquire into bringing 'Technical Institutes into closer touch with employers of labour in India' came to the conclusion that there was no opening for those who possessed higher technical training. The report said it was almost the universal opinion of the employers they had interviewed that "a man however carefully trained in a Technical Institute was utterly useless....till he had practical experience...." There was almost no opening for higher grade mechanical and electrical engineers in India.[5] It is clear from these reports that there was a bias among European employers against employing Indians. Under these circumstances together with the fact that government itself was unwilling to employ highly-trained Indians, the growth of higher scientific and technical education naturally suffered. No wonder even as late as 1919, senior government officials regarded one single engineering college as sufficient for the whole of India.[6]

The debate regarding technical education took on different form in different presidencies. On the one hand, in Bengal the efforts were made by Bengali Bhadralok motivated by the nationalist spirit for the cause of national education, on the other, in United Provinces and Madras efforts were made, by either the colonial government by organizing an industrial

[3]Proceedings of the Committee appointed to advice on the Creation of The Technical Institute at Calcutta, 1912 cited in Ibid.
[4]Ibid.
[5]E.H. Atkinson and T.S. Dawson, 1912 "Report of the Enquiry to bring Technical Institution into Closer Touch and More Practical Relation with Employers of Labour in India", cited in Basu, Aparna. 1991. "Indian Response to Scientific and Technical Education in Colonial Era, 1820-1920" in Kumar, Deepak. (Ed). Science and Empire: Essays in Indian Context, (1700-1947), Anamika Prkashan, Delhi.
[6]Edn A, No. 36, Jan 1919 cited in Basu, Aparna. 1991. "Indian Response to Scientific and Technical Education in Colonial Era, 1820-1920" in Kumar, Deepak. (Ed). Science and Empire Essays in Indian Context, (1700-1947), Anamika Prkashan, Delhi.

conference in Nainital in 1907 or by progressive colonial authorities like Alfred Chatterton for the industrial development of the Madras Presidency.

Satish Chandra Mukherjee, the apostle of national movement in Bengal and editor of the Dawn magazine founded the National Council of Education in the last decades of the nineteenth century and included scientific and cultural intelligentsia of Bengal as its active members.[7] It attempted to extend the research charter of Indian Association for the Cultivation of Sciences (IACS), founded by Mahendra Lal Sarkar in 1876, into the domain of pedagogy namely, founding an education system on 'national lines' and under 'national control'.[8] The outbreak of the swadeshi movement stimulated the attempts of the members of the NCE. The foundation of national education movement rested on the critical assimilation of Ideas from the west and the east.[9] Through their cultural organ, *The Dawn*; members of the council sought to institute a critical examination of tradition and modernity.[10] Science and technology was not merely the tool for intellectual advancement, but the orientation towards modern science in the twentieth century could be explained with two concepts. First, Thackray saw science as radical ratifier of a new world order,[11] and second saw it as a harbinger of economic prosperity and well being.[12] The new conception of science shaped the nature and content of scientific and technical education. The ongoing discourse on national education was strengthened with the outbreak of swadeshi movement as the consequence of partition of Bengal and increasing resentment amongst educated unemployed youth of Bengal.[13]

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[7]Sarkar, Binoy Kumar. 1946. Education for Industrialization: An Analysis of Forty Years of Jadavpur College of Engineering and Technology 1905-45, Chackerverty Chaterjee & Co. Calcutta; Sarkar, Sumit. 1975. The Swadeshi Movement in Bengal, People's Publishing House, New Delhi, in Raina and Habib. 2004 Domesticating Modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi, p. 202

[8]Raina and Habib. 2004 "Bhadralok Perception of Science, Technology and Cultural Nationalism" in Domesticating Modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi, pp.120-147.

[9]Raina and Habib. 2004 "The Moral Legitimation of Modern Science: Bhadralok Reflections on Themes of Evolution", in Domesticating Modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi, pp.148-181.

[10]Ibid.

[11]Thackray, Arnold. 1974. "Natural Knowledge in Cultural Context" American Historical Review, Vol. 79, pp. 672-702, cited in Raina and Habib. 2004 "Big Science and the University in India" in Domesticating Modern Science: A Social history of Science and Culture in Colonial India, Tulika Books, New Delhi, p. 202.

[12]Raina, Dhruv, Gupta, B.M. and Kandhari, Rohit. 1995. "Collaboration in Indian Physics: A Case Study of Macro and Micro Parametrization of Sub-disciplines (1800-1950)", Scientometrics, 33, 3, pp. 295-314; Raina, Dhruv. "The Early Years of P.C. Ray" cited in Ibid.

[13]Ibid., p. 202

The National Council of Education was split in 1906 into the National Council of Education and the Society for the Promotion of Technical Education with their separate institutions viz. Bengal National College and Bengal Technical Institute.[14] The cause of dissociation related to the manner of imparting scientific and technical education along 'national lines', with the scientist and engineers going one way- drop the cultural and moral component, they said - and those with a liberal arts background going other way.[15] However, the BTI could not attract a sufficient number of students in its courses when the fever of swadeshi movement subsided after 1910. Moreover, industrial education in Bengal had not acquired a fillip in this period, as opposed to the pattern in Gujarat and Maharashtra.[16] As Shewaram Pherwani wrote, 'Technical schools have not found favour with the masses nor have they attracted any good number of sons of working men.'[17] However the immediacy of the nationalist struggle, and growing demand for professional engineers and scientist to manage India's modernizing industry, resulted in patch up between two camps.[18] The two arms of the NCE came to be referred to as Jadavpur College of Engineering and Technology.[19]

The Upper India Provinces remained untouched with this discourse of technical education. It was stated "in North Western Provinces and Oudh there was no school of Art which is so full of artistic industries and this is a defect which should be assuredly remedied."[20] The Industrial Conference held in Nainital in 1907, discussed the need for a technological institute that would undertake industrial research and trained the educated classes to be managers, overseers, foreman and investigators. The conference decided that the best and most economic course was to concentrate engineering work at Roorkee, developing the Thomson College and raising it to the level of research work and to concentrate industrial work at

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[14]Ibid., Basu, Aparna. 1998. "National Education in Bengal 1905-1912" in Bhattacharya Sabyasachi. (Ed). The Contested Terrain: Perspective on Education in India, Orient Longman Limited, New Delhi, p.61.
[15]Ibid.
[16]Sarkar, Binoy Kumar. 'Education for Industrialization', pp. 97-98, in Raina and Habib. 2004. Domesticating Modern Science A Social History of Science and Culture in Colonial India, p. 126.
[17]Binoy Kumar Sarkar. 'Education for Industrialization', pp.96-98 in Ibid
[18]Raina and Habib. 2004 "Big Science and the University in India" in Domesticating Modern Science: A Social history of Science and Culture in Colonial India, Tulika Books, New Delhi, p. 203
[19]Sarkar, Binoy Kumar. 'Education for Industrialization', cited in Raina and Habib. 2004 "Bhadralok Perception of Science. Technology and Cultural Nationalism" in Domesticating Modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi, p. 139.
[20]Bhargava, K.D. (Ed). 1968. Selection from Educational Records of the Government of India Volume IV, Technical Education in India 1886-1907, p. 46.

Cawnpore.[21] The proposal to have a whole institute at Roorkee was rejected on the ground that its distance from the centre of industrial work would interfere with the prosecution of the problems that have to come under examination in such an institution.[22] A proposal to have the whole institution including an engineering branch at Cawnpore was rejected on the grounds of the huge expenditure involved. Ultimately, it was intended that the Cawnpore institute should be intended for chemical technology. The four branches of Applied Chemistry requiring special research and treatment from the industrial point of view in this province were (1) sugar (2) leather (3) acid and alkali manufacture and (4) dyeing, bleaching, printing, colouring and finishing of manufactured goods and paper making.[23]

However, a detailed plan for the Cawnpore institute with qualifications offered and the number of faculty members, their salaries, expenditure in various heads etc was proposed by the conference. The financial assistance of total Rs 5,36,400 under recurring and non recurring heads of Rs. 2,75,000 and Rs.2,61,400 respectively was required to establish the institute in Cawnpore.[24] Although, the branches, which were proposed would serve the local requirement of industries but unfortunately the proposal was not accepted due to the lack of financial resources.

It was expected that Government would establish technical and industrial schools but not in the higher form of technical and scientific education. Curzon emphatically asserted that "technical education" did not include that more advanced form of educational activity known as 'scientific research' and which involves the application of the most highly trained faculties to scientific experiment.[25] Similarly Sir James La Touche, the Lieutenant Governor of U.P. wrote "we hardly want any development of the higher branches of engineering."[26] Thus the Nainital conference recommended among other things, two industrial schools, an experimental weaving station, a carpentry school and the introduction of practical work in general education. In 1909, the Government of Bengal at Serampore opened a weaving institute. A school of dyeing and

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[21]The Cawnpore Institute whish is discussed became the Harcourt Butler Technological Institute after the recommendation of Indian Industrial Commission 1916-18. The complete plan was already prepared in the National Conference.

[22]Bhargava, K.D. (Ed.). 1968. Selection from Educational Records of the Government of India Volume IV, Technical Education in India 1886-1907, p. 239.

[23]Ibid pp. 239-240

[24]Ibid pp .248-249.

[25]Curzon Papers, La Touche to Curzon, 31.12.1904.

[26]Bhargava, K.D. (Ed.). 1968. Selection from Educational Records Vol. IV, Technical Education in India 1886-1907, pp. 233-280.

printing was started in Kanpur, a wood working institute at Bareilly, a carpentry school in Allahabad and leather trades institute at Madras and Kanpur were established by the local government.[27]

One of the ironies of history is that war has always been an instrument of technological progress. Desmond Bernal in his '*Social Function of Science*' went to the extent of contending that almost all of the significant inventions of history had their roots in military requirement of some form military related technology or the other. He attributed this to the exigencies of war where a change of technique has all too often spelt the difference between victory and destruction. The two world wars also transformed the relationship between the colonizer and the colonized. The consequence of the First World War on British India was that the Indian government focused on[28] the problems of Indian industrial backwardness.

The war revealed the dependence of the country on external sources for many commodities. The railway system was dislocated as a result of a shortage of materials; supply of dyes, medicine and other chemicals also became scarce. The First World War exposed the basic weakness of the Indian economy. The underlying cause for this economic backwardness was the inconsistency in industrial policy of British Indian Government. The British Government had over-committed itself to a liberal education programme, at the expense of technical education.[29] This fact is well established by comparing the number of college students, 1,268 in engineering as compared to 41,956 students in arts for the year 1914-15.[30] This is also evident by viewing the following figures of technically trained personnel at different level of institutions-

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[27]Basu, Aparna. 1991. "The Indian Response to Scientific and Technical Education in Colonial Era, 1820-1920" in Kumar, Deepak. (Ed). Science and Empire Essays in Indian Context (1700-1947), Anamika Prakashan, Delhi, p. 134.

[28]Bernal, J.D. 1967. Social Function of Science, MIT Press, p.165.

[29]Sarkar, Binoy Kumar. Education for Industrialization, p. 94, in Raina and Habib. 2004 Domesticating Modern Science A Social History of Science and Culture in Colonial India, p. 133.

[30]Headrick, Daniel R. 1988, The Tentacles of Progress Technology Transfer in the Age of Imperialism, 1852-1940, OUP, New York, p. 337.

the international division of Labour according to comparative advantages.[35] The colonies were to specialize in agriculture while pure science, technology,[36] and industry were to be the preserve of Britain.

The mutualism between industry and technical institute was evident only in some industrial centers. Bombay was perhaps exceptional in this regard. Though the Victoria Jubilee Technical Institute in Bombay was a success in the introduction of modern methods, it was mainly confined to the European community and the opportunity for gaining experience was not easily accessible to Indians.[37] Furthermore, at Kala Bhawan the courses were dovetailed to meet the needs of an emerging textile industry stretching from Ahmadabad to Bombay. By 1911, it was turning out dye-chemists for most of the textile industries springing up all over India.[38] However, resources were the constraint in the way of infrastructural expansion of the institute. In Europe heavy chemical industry in nineteenth century drew largely upon academic sciences. This affected improvement in techniques[39] and large-scale processes derived from laboratory experiment. However, modern laboratories became an integral part of Kala Bhawan much later. Thus it is evident that in Europe academic institutions were fulfilling the demand of skilled manpower as well as of innovative techniques, whereas in India the institutes were catering only to the demand of skilled workforce. The four engineering colleges that functioned in Roorkee, Guindy, Sibpur and Poona did not attain the same measure of success as Victoria Jubilee Technical Institute, partly because of the reluctance of high caste Hindu students in acquiring industrial and technical skills which did not enjoy high social esteem.[40]

With the outbreak of War which disclosed the industrial backwardness of India, the government of India resolved to examine the possibility of formulating a new industrial policy and in a dispatch of 1915, to the Secretary of State, it was suggested that after the war, India will consider herself entitled to the utmost help the government can afford in order to enable her to take her rightful place as far as circumstances permit as a manufacturing nation.[41] This led to the

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[35]Sarkar, Prabirjit. 1992. p.297, in ibid. p. 221.
[36]Ibid. p.221
[37]Indian Industrial Commission, 1916, p.101.
[38]The Dawn (June,1911), p. 97 in Raina and Habib. 2004 Domesticating Modern Science: A Social History of Science and Culture in Colonial India, Tulika Books, New Delhi, p. 191.
[39]Bernal. Science and Industry, p. 33 in Ibid., p.192.
[40]Thavaraj. M.J.K.1978. "Framework of Economic Policies under British Rule". Social Scientist, Vol. 7, No. 5, p.33.
[41]Saha, 1940 (1), p. 501 in Visvanathan, Shiv. 1985. Organizing for Science: The making of an Industrial Research laboratory, OUP, New Delhi, p. 41.

levels. At Dhanbad in Bihar the Government founded the Indian School of Mines in 1926. In Bombay, the Victoria Jubilee Technical Institute, specializing in textile technology since the 1880's branched out into chemistry, plumbing and sanitary engineering.[47]

Despite the detailed investigation undertaken by the Indian Industrial Commission and the proliferation of endless reports, the colonial government did not implement any of the recommendation for industrialization and, as in the past it emphasized research and development in agriculture. The recommendations for the development of technical and industrial education were on a small scale. As Meghnad Saha remarked later, "from 1924, due to some mysterious reason, the Government of India dropped all ideas of developing the natural resources of India and concentrated purely on agricultural research and agriculture industries. What high agency was responsible for this policy was not known, but India was henceforth considered to grow potato and paddy."[48]

At the end of World War I, education was made a provincial subject under the ministries responsible to the legislative assemblies. Following this enactment a slow but steady growth of technical and industrial training is witnessed.[49] The qualitative implication of this growth must, however, be examined critically. The evidence available indicates that many of the factors that had hampered healthy development in the early years continued to exert their influence. The Interim Report of Indian Statuary Commission published in 1929 makes this clear. This report makes for rather disheartening reading. The Commission said:

"In fact the present type of High and Middle English Schools has established itself so strongly that other forms of education are opposed or mistrusted.

There is nothing corresponding to the exodus from any English secondary school either into practical life or into vocational institution.

.....the figures..... are disturbing in that they point to the lack of other and more practical forms of training than those given in the high schools.

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[47]Ibid. p. 339
[48]Saha, M.N. 1940, p. 502, cited in Visvanathan, Shiv. 1985, p. 95.
[49]Robert, Crane I. 1965. Technical Education and Economic Development in India before World War I, p.187.

The reason for the uniformity of the course in the middle English and high schools is not far to seek; it is the influence of the matriculation (exam) and all that this means to the Indian boy, both as an Intermediate qualification for (government) service and as gate to a university course.

..... In some provinces a School final exam has been set up, distinct from the matriculation examination, with the double object of providing an alternative qualification for.....government service and of widening the secondary curriculum by permitting the inclusion of vocational and pre-vocational subjects. But this innovation has been to a great extent a failure.

We cannot say how far this may be due..... to the continued insistence of government on the matriculation as a minimum qualification for almost every form of public employment. But it is this practice which maintains and strengthen the belief as matriculation as the only goal....."[50]

The report argued that much of the failure of vocational and technical training efforts in India could be ascribed to confusion over the appropriate role of practical as opposed to general education and to a failure to comprehend the appropriate relationship between the two.[51] In some provinces, the Report pointed out, technical training was regarded as a form of manual training; while in other cases industrial education was given in the higher classes of secondary schools to students who were, in most cases, bound for college and who had no interest in practical skills.

The report also took exception to the position that had been adopted by the Indian Industrial Commission in favor of control of technical education by the department of industry. In seeking to reverse the previous decision the Report argued that technical education ought to be under the education department.[52]

This is a good example of the uncertainty and vacillation governing views on the technical education in India. This was by no means the first time that one report had strongly criticized the position adopted by the previous report. Each time this happened, officials

[50]Indian Statuary Commission Interim Report ... Review of the growth of education in British India, (London H.M.S.O., 1929), pp.104-05.
[51]Ibid p.111-12.

responsible for administering the educational program grew more wary of accepting any decision as final. The tendency, therefore, was to wait and see.

The Report of the Indian Statuary Commission provided data on the number of students enrolled in technical and industrial schools and colleges in India in 1927. By 1927, there were 1,911 students enrolled in the college of engineering and an additional 1,136 enrolled in engineering schools. The enrolment compared favourably with the numbers in the institutions ten years earlier though there was a very slow growth in the enrollment of students. The following table shows the progress made in technical and industrial education in various provinces and presidencies:

Province	**1917**		**1922**		**1927**	
	Schools	**Students**	**Schools**	**Students**	**Schools**	**Students**
Madras	40	1,961	41	2,039	63	4,307
Bombay	26	1,798	31	1,829	33	2,878
Bengal	59	2,035	86	3,631	153	6,234
United Province	28	1,478	37	1,780	111	3,941
Punjab	33	2,991	25	2,399	24	3,535
Bihar & Orissa	38	1,316	32	1,543	43	2,462
Central Province	9	350	7	298	2	101
Assam	7	71	12	170	15	476
Total	240	12,000	271	13,689	444	23,934

Source: Indian Statuary Commission Interim Report (London: H.M.S.O. 1929), pp.395-97

The decade from 1917-27 witnessed a very slow growth in the number of industrial and technical schools. The number of schools did not even doubled during this period. However, United Provinces exhibited a fast growth in the technical and industrial schools, in comparison to other provinces and presidencies. Even Madras, Bombay and Bengal, which had pioneered technical education, were unable to make fast growth during this decade. Engineering education also expanded considerably Moreover, the provinces like Central Provinces, Assam, Bihar and

Orissa and Punjab witnessed a much skewed growth in technical and industrial education. The world depression hit education in India rather harshly as revenues declined and expenditures were retrenched. Despite, the problem of finance, however, the number of science and technical schools and the enrollment in them continued to grow.[53]

The number of engineering colleges in British India rose from four with 965 students in 1901-02 to eight with 2,196 students in 1936-37.[54] Certain institutions, which were regarded as 'engineering schools' in 1901-02 were, classed as 'technical schools'; hence it is not possible to compare the number of engineering schools. In 1936-37 there were fourteen schools of art in British India with 2,106 students. Some of these art schools were craft schools; thus it is obvious that the progress in art education was not satisfactory.[55]

The constant alterations in government policies adversely affected the technical education. Technical education was a contested responsibility transferred between Department of Industries and Education Department. A weak coordination among these departments hindered the overall planning for technical education. On the demand for technical education by Assam Government after World War I, The Central Advisory Board of Education responded to this in 1942 by saying 'that if overlapping and waste were to be avoided, all types of technical education, using the word in its broadest sense, should in all provinces be under the direct control of the Department of Education .....in view of the industrial developments which may be anticipated after the war....'[56]

It is clear that the policy for technical education depended on the will of government and the requirement of the manufacturing industry. As discussed in the previous chapter, Kanpur had emerged as a major centre for cotton textile and leather industry by the late 19th century, yet there was no adequate arrangement for the training of artisan and the skilled workforce. In the second decade of the twentieth century the city got its first industrial school and technological institute. The next section discuses the establishment of these institutes, their objectives, curriculum and the overall functioning of these institutes.

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[53]Crane, I. Robert. 1965. Technical Education and Economic Development in India before World War I, p.188.
[54]Ibid. p.189
[55]Ibid.
[56]Government of India, 1943, Technical Education Committee Report: Preliminary Report, by John Sargent et al, Simla p. 22.

Government Leather Institute

The increasing production of the leather industry generated a need for improved processes as well as skilled labour. The proposal to open a leather working school was discussed in a meeting held on 30th January 1915 The Director of Industries proposed that the school will confine itself to the manufacture of boots, shoes and sundry articles excluding saddler and harness, the later being considered as separate trade.[57] Although the Harness and Saddlery industry was developed in Cawnpore, the government did not propose courses for the manufacture of these products.

The school was set up on an experimental basis on the 4th January 1916 with five students. The school was started in a rented building, which was situated on road to Nawabganj opposite Allanganj. The principle subjects of instruction were:

1) Anatomy of the foot – broad principles
2) Drawing
3) Last Making
4) Improved method of measurement
5) Clicking and cutting with reference to the quality and value of different parts of hide.
6) Fitting and closing
7) Bottoming
8) Finishing
9) Costing[58]

The method of instruction followed in the school was based on sound and practical lines and proved eminently successful. The training imparted sought to cater the general requirements of local and provincial trade and specially aimed to produce hand workmen. The school was soon popular as there was a huge demand for a skilled workforce for the leather industry. The number of students rose to 43 by 1917, out of these 43 students 16 were local and rest were from

[57]Mr. Pim to Rai Bishambhar Nath Bahadur in a council meeting of 5th October 1915 in File No. 180 of 1915, Industries Department, p.4.
[58]C.R. O'Malley. Esq. Officiating Director of Industries to Secretary to Government, United Provinces. No 7595/27-5, Cawnpore, (27.11.1917) in File No. 180/1915, Industries Department, p. 20.

neighboring towns such as Saharanpur, Meerut, Aligarh, Mathura, Bareilly and Lucknow etc.[59] The students from United Provinces were provided free instruction whereas students outside the province had to pay Rs. 20 per month. The prevailing social customs prevented upper caste Hindus from enrolling in this school as evident from the social background of the students-

Number of Student	Social Background
31	Muslims
3	Leather working class
8	Christians
1	Non-Brahmin

Source[60]

This is evident that the social classes, which were already involved in the leather industry, enrolled in this school. The students belonging to wealthier classes were expected to start business of their own.[61] The number of students enrolled at the different level is given in the table below:

Number of Student	Qualification
4	Entrance standard
10	Middle standard
23	Upper middle standard
6	Lower primary standard

Source[62]

D.N. Rozdon, was appointed as the first Assistant Head Master of the school. He was a Kashmiri Brahmin and had been trader in boots and shoes for eighteen years. He was the manager of the firm Rozdon Brothers of Amritsar and had trained a number of technicians in this

[59] Ibid.
[60] Ibid.
[61] Ibid. p.20
[62] Ibid.

trade.[63] The school started with a post of Assistant Head Master acting as Head Master, three mistris and one clerk.[64] The state government was not interested in recruiting Rozdon for this post. The original scheme was to have a Head Master at an average salary of Rs. 400 to be recruited in England and an Assistant Head Master at an average salary of Rs. 150. The Director of Industries stated that he had been unable to obtain a suitable man in India and proposed that an Assistant Head Master should be appointed on lower pay than that proposed for the Head Master. Rozdon was appointed as Assistant Head Master officiating as Head Master on a salary of Rs. 250 per month.[65] A managing committee was constituted to advice and help the Head Master of the leather working school.[66]

As the demand for instruction was rising, the school management drew up a detailed scheme, which included an annual expenditure of Rs. 4,332 per annum with a staff of one clerk, one store-keeper, one head mistri, two mistris at Rs. 40 each, one mistri at Rs 25, menial servant, rent of school building and contingencies. However, the demand for a store-keeper was rejected as the Lieutenant Governor considered that the school had not yet grown to size sufficient to justify the appointment of store-keeper.[67] Moreover the school management had to approach to the government for its small expanses. Thus it is evident that financial stringencies and bureaucratic complexities restrict the expansion of the school. The annual expenditure of the school for the year 1918-19 was 1,240 as detailed below –

The expenditure on purchase of materials was Rs. 1000.

The expenditure on Scholarship was Rs. 240 per mensem for two candidate of Rs. 4, Rs 3, Rs, 2, and Rs. 1.[68]

The school had undertaken a great deal of practical work and was fully equipped in the making of boots, shoes, hold-alls, bed traps, belt, trunks, dak bags, and other miscellaneous

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[63]From A.H. Silver, Director of Industries, United Provinces to Secretary to Government, United Provinces, No. 3883/27-5, 14th August 1915, Cawnpore.
[64]Mr. Pim to Rai Bishambhar Nath Bahadur in the council meeting of 5th October 1915, p.4 in File No. 180, Industries Department.
[65]Ibid.
[66]From Officer on special duty, Civil Secretariat, United Provinces to Director of Industries, United Provinces, No. 704/XVIII-180, dated 3rd April 1918, Allahabad, p.26.
[67]Letter No. 2665/XVIII-180 from Officer on special duty, Civil Secretariat, United Provinces to Director of Industries United Provinces, dated 8th December 1917 in File No. 180, 1915, UPSA.
[68]From Office on Special duty, Civil Secretariat, United Provinces to Director of Industries, United Provinces, No. 563/XVIII-180 (Allahabad, 18 March 1918), Industries Department, p. 24.

articles which were generally supplied to government offices, and which also found a speedy sale among the general public which was taking a keen interest in the activity of the school. The government officials appreciated the work done by the students of the school. The sale of the goods produced by the school reached Rs. 1,636-2-9. The school also provided consultancy to leather goods manufacturers as and when required. [69]

Government Central Textile Institute

The Government Central Textile Institute was formed in 1937 by the amalgamation of Government school of Dyeing and Printing and the Government Textile School.

Government School of Dyeing and Printing, Cawnpore

The Government school of Dyeing and Printing begun as a small class in 1914 at Nawabganj and grew into a permanent school, offering a two year Diploma Course and one year Artisan Course in 1917. It was moved in 1923 to a new premises where a Dye house, with fixed machines, and fully equipped laboratory were installed. The courses were further extended and strengthened by adding Calico printing and colour testing.[70]

The school attracted students from all over India and Dye houses of local and other mills employed its students and many had started cottage dyeing and printing business all over the province and country. Peripatetic parties were sent out from the school to cottage dyers and printers.[71]

The school aimed at imparting instruction in the modern techniques of textile dyeing and printing. Two courses were offered specifically designed for foreman dyers and artisans or practical dyers.[72]

The Foreman Dyer Class

The course for foreman dyers was of two years duration and was conducted in English. The objective of the instruction was to impart training for responsible posts in existing concerns

[69]Ibid., p.21
[70]Golden Jubilee Souvenir (1888-1938). 1938. Upper India Chamber of Commerce, Cawnpore, p. 39.
[71]Ibid.
[72]Prospectus of The Government School of Dyeing and Printing in File No. 83/125, Department of Industries, United Provinces, 1925, p.33.

or for those who would be prepared to start businesses on their own The minimum qualification for the course was a matriculation of an Indian University or an equivalent qualification. Fifteen students were admitted each year, but with the permission of Director of Industries, the Principal could admit a few additional students. The syllabus placed emphasis on a knowledge of elementary chemistry.[73]

a. Chemistry lectures

In addition to a fundamental knowledge of chemistry, a regular course of lectures over a period of two years dealt with textile coloring. The object of these lectures was to enable the students to thoroughly understand the principles of dyeing.

b. Lectures on Textile Dyeing and Printing:

This part of the course comprised of about 30 lectures over a period of two years. The course was designed to impart a good knowledge of the principles of dyeing and printing and to prepare for the examination conducted by the City and Guilds of London Institute.

The course material imparted a thorough understanding of various fibers such as cotton, linen jute and China grass, wool and silk. In addition various industrial processes for distinguishing various fibers, and bleaching of cotton and linen, scouring and bleaching of wool, degumming and bleaching of silk were discussed and included instruction in the techniques and processes for dyeing of various fibers. This covered knowledge of the mordants, mineral colours, natural colouring matters, artificial colouring matters etc. The students were also expected to have a knowledge of a variety of equipments used in dyeing and subsequent operations like testing of dyed samples, analysis and valuation of materials used in dyeing and the process of Calico printing.[74]

The theoretical knowledge of the students was strengthened with the help of practical experience. The school was fitted with experimental plants to enable the students to carry out trials on bleaching, dyeing and printing. The practical instruction was intended to acquaint the students by means of carefully selected examples with the modes of employment of the various varieties of dyestuffs, special attention being paid to indigenous dyes. A dye house was also attached to the school to train the students in dyeing of cloth and yarn. There was also a garment-

[73]Ibid. p.34
[74]Ibid. p.35

dyeing department in which articles of clothing were re-dyed and renovated to enable the student to acquire practice in this class of work. The instruction was thoroughly practical and special attention was paid to the individual requirement of the students. The dye house equipment included semi-commercial scale plant that had the following equipment:

1. Open boiling vat with circulating arrangement;
2. Acid and chemicking cisterns;
3. Washing machines;
4. Jiggers;
5. Indigo dyeing range;
6. Finishing and dyeing range.

The student underwent apprenticeship or employment after completing the theory and practical courses successfully.[75]

Courses for Artisans

This course was intended for the benefit of the Indian hand dye industry. The duration of the course was one year and all the instruction was in the vernacular unlike the previous course. Fifteen students were enrolled each year. The objective of the course was to improve the methods of dyeing employed by Indian dyers and providing them with such additional knowledge as would be useful for them in their profession. The instruction was practical in nature and no lectures were given. Certain tutorials were conducted on specific days to discuss the learnt processes. Certificates were awarded to students who completed the course satisfactorily and who passed the final examination in practical dyeing. The minimum qualification for admission to this class was a working knowledge of Hindi, Urdu and elementary arithmetic. The minimum age for admission was sixteen.[76]

A special short course of instruction was arranged at any time of the year for people engaged in the dyeing and printing trades who desire assistance for particular applications. The

[75]Ibid. p.36
[76]Ibid.

residents of United Provinces were exempted from fees but the students from outside the Province had to pay fees.[77]

The Government Textile School

The Government Textile School was founded in 1923 out of the textile classes of the Thomson Civil Engineering College at Roorkee, and came into being at the insistence of the Board of Industries and at the request of local mill owners. The staff and equipment were strengthened from time to time to meet the requirement of modern textile manufacture. The following courses were on offer with the establishment of school from 1923:

- Diploma course of three years at the institute followed by one year of mill practice
- A part time mill apprenticeship[78]
- The textile school was designed to provide a sound technical training in cotton carding, spinning and weaving on a power machinery basis. Classes were organized along the following lines:

1. The technical class
2. The artisan class
3. The apprentice class (part time) [79]

1. The Technical Class- The courses of study were intended to train students in the theory and practice of cotton carding, spinning and weaving, so that after acquiring the necessary mill experience they could fill such posts as assistant carding, spinning or as weaving masters.[80]

The technical classes of the textile school enrolled ten students each year: five of them were nominees of the spinning and weaving mills of the United Provinces. Each mill could nominate one student and five students were selected out of these nominees and the remaining five were recommended by the Director of Industries with the assistance of the Principal with power to vary the proportion in case suitable candidates of either class were not available. The

[77]Ibid. p. 38
[78]Golden Jubilee Souvenir (1888-1938). 1938. Upper India Chamber of Commerce, Cawnpore, p. 39.
[79]Prospectus and Curriculum for The Government Textile School in File no.188/1925, p.1.
[80]Ibid.

minimum qualification for the students was matriculation or school leaving certificate examination.[81]

The students were provided stipends and scholarships on a monthly basis. Out of ten students, one scholarship of Rs. 12 per mensem and three stipend of Rs. 10[82] per mensem were allotted each year to deserving students.[83]

The course of study extended over three years. In the first and second years, the students were instructed in all the three subjects viz. (i) carding (ii) spinning and (iii) weaving. Before the completion of the second year, the students could select one of these subjects in which they would specialize during the third year of instruction. The instruction was of a practical nature. This included lectures on various subjects such as machinery and manufacturing plants of spinning and weaving mills, practical work on a semi-commercial plants installed in the school. The final certificate was awarded when the student had served an apprenticeship in a spinning and weaving mill and gained thorough practical experience of the processes carried out on a commercial scale. The Director of Industries made the selection of the approved mills in Kanpur to which students were to be apprenticed. A provisional certificate was issued on satisfactory completion of the course of study at the school and the final certificate was provided after satisfactory completion of the apprenticeship.[84]

2. **The Artisan Class-** The object of the artisan class was to offer theoretical and practical instruction to the worker in the use of the machines. The training was part time for 1.5 to 2 hours per day on three days per week. The workman was allowed to work in a mill for the remaining time. The class was divided into three sections: (i) carding (ii) spinning and (iii) weaving and preparatory processes. This course was closely linked with local mills. The mill owners were free to nominate the workman according to their need. The employers selected the workman to be trained on a specific machine. The duration of the course was three months.[85]

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[81]Prospectus and Curriculum of the Government Textile School attached with letter from C.E. Buckley, Principal Government Textile School Cawnpore to the Director of Industries, United Provinces, Cawnpore in File no 1503/P-2 (29.11.1925).
[82]The exchange value of the rupee was 1s 6d gold in 1925. Mukherjee, Aditya. 2002. Imperialism, Nationalism and the Making of the Indian Capitalist Class 1920-47, Sage Publication, Delhi, p. 81.
[83]Ibid p. 2.
[84]Ibid p.4
[85]Ibid p.5

The instruction included an explanation of each machine, its parts and adjustments, settings, change places, production defects, their causes and remedies; the influence of bad work on production and its subsequent effect on the machine itself. In other words, the "why and wherefore" of every motion and machine was the part of the course.

The apprentice classes offered theoretical instruction to apprentices working in the mills. There were three sections: (i) Spinning (ii) Weaving and (iii) Engineering. The tuition was part time for two hours per day or three days per week, and the course lasted for two years.

Harcourt Butler Technological Institute

The first two decades of the twentieth century witnessed significant changes in the field of technical education. Although there was rapid growth in technical institutes for teaching, but for research into the applications of science in industry, there was only one institute, the Indian Institute of Sciences, Bangalore founded by Late Sir J.N.Tata and followed by other institutes including the Cawnpore Technological Institute. The history of IISc Bangalore underlines the contemporary shift towards the scientific research. This shift was influenced by emergence of two innovative ideas in the late nineteenth century. First, in contributing to science prestige accrues to the nation,[86] second that the path to political independence must be paved with economic self-sufficiency, which in turns requires adequate scientific and technological base. These ideas motivated the Bengali intelligentsia as well as the leading industrialist J.N. Tata to visualize the scientific and industrial research outside the state sponsored education system.[87] The contemporary German model which was popular in world scenario inspired the Indian enterprise in their endeavor. Although, the German model of the university inspired the ideas of Bengali intelligentsia and J.N. Tata, but the model emulated was John Hopkins University, Baltimore.[88] The distinctive feature of John Hopkins University were: first, it was the first

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[86]Rene Dubos, Louis Pasteur: Free Lance of Science (De Capo Paperback, 1950), Adas, Michael. 1990. Machines as the Measure of Men: Science, Technology and Ideologies of Western Dominance, Oxford University Press, New Delhi; cited in Raina and Habib. 2004 "Big Science and the University in India" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, (Tulika Publication, New Delhi, 2004), p.203.

[87]Raina and Habib. 2004 "Big Science and the University in India" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Publication, New Delhi, p.203.

[88]Sarkar, Binoy Kumar. 'Education for Industrialization'; Subbarayappa, In Pursuit of Excellence, p.27; Raina and Habib. 2004 "Big Science and the University in India." in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Publication, New Delhi, p.204.

university of the world founded as post-graduate institution, this was what Tata's institute turned out to be and Indian Institute has continued in this way till day; second, when it was founded in 1875, John Hopkins was in the centre of a district where vast industrial development was in progress. However, P.C. Ray was of opinion that Indian science was in its premature stages and Indians students still required to be apprenticed to a researcher at an existing university, and these universities tended to be well endowed and widened in scope.[89]

Thus the Cawnpore Institute was basically viewed as a research institute, but due to local demands a teaching section was also introduced. Cawnpore Technological Institute was established in January 1920. It was decided on the recommendation of the representative committee that the institute would provide training for:

1) A Research chemist in general applied chemistry.
2) A Technical chemist in oil extraction and refining.
3) A Technical leather chemist and
4) A Technical chemist for bleaching, dyeing and finishing textile.[90]

The Institute was established in 1920 purely as a research institute with the late Dr. E.R. Watson as the research chemist to the Government of the United Provinces. In 1921, a teaching side was added to the institute with the opening of the General Applied Chemistry and Oil Technology section. Sir Spencer Harcourt Butler, Governor of United Provinces on 21st November 1921, laid the foundation stone of the building. In 1922 a leather section was added which continued to admit students until 1931 when it was finally decided as the result of the recommendation of the Mackenzie Committee to close down this section. The sugar section was added in 1926 and continued to train students in sugar technology for a period of about ten years when it was finally handed over to the Government of India on the 1st October 1936, for development into the Imperial Institute of Sugar Technology.[91] In 1928, a committee appointed by the Government of United Provinces, recommended that teaching should have precedence over research and the entire set up of the institute was adjusted to meet this objective. In 1932, an

[89]Ray. Essays and Discourses, pp. 7-10; cited in Raina and Habib. 2004 "Big Science and the University in India" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Publication, New Delhi, p.204.
[90]Richey, J.A. 1922. Progress of Education in India, 1917-22, pp.176-77.
[91]Golden Jubilee Souvenir (1888-1938). 1938. Upper India Chamber of Commerce, Cawnpore.

enquiry committee recommended establishment at the institute of a two-year course for Associateship with B.Sc. as minimum qualification for admission.[92]

The aims and objectives of the Harcourt Butler Technological Institute was to develop a centre of technical research with a view to promoting industrial development of the United Provinces, primarily, and of the country in general and to be the recruiting centre for technologically qualified students occupying positions in the superior staff of selected industries.[93] In 1938 the Institute had only two sections; (1) General research section and (2) Oil section. In the general research section no regular teaching classes were held but two advanced research workers who possessed degrees in science or agriculture were admitted annually for training in technical methods of operation and research, for the period of two years, at the end of which a diploma in 'Applied Chemical Research of the Institute was awarded.'[94]

There was a two years course in oil diploma with a further two-year course for Post Diploma Research. There were also short term courses of 6 to 8 months in oil milling soap manufacture and manufacture of paint and varnishes. By 1938, 317 completed their training at this institute in its various divisions and of these 112 had been from the sugar section.[95]

Initially two courses viz. General Chemistry and Oil Diploma was started with three seats in each branch and had full strength till 1924-25. In 1924 two more seats were added. But, by 1925 onwards, there was a decline in the enrolment of students in both these courses.[96] Following graph will illustrate the fluctuation in enrolment of students in General chemistry and Oil diploma.

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[92]Technical Education in Uttar Pradesh, 1962, pp.10-11
[93]Ibid , p.40
[94]Ibid., p.40
[95]Ibid., p.40
[96]Industries Department U/3060, 1939, File No. 486/38, A Note on the Inspection Minutes of the HON'BLE Minister of Development 1937. Based on Appendix attached to the note, p. 16

function of this Laboratory was to keep an effective control on the ghee grading station set up in various provinces of India under the Agriculture Produce (grading and marking) act 1937.[102]

The financial responsibility of the institute was borne by the government of the United Provinces. As, we know the technical and industrial institute charged no fees from the students of the United Provinces, whereas students outside the province had to pay a good amount. The Harcourt Butler Technological Institute was charging Rs 1,500 per annum from the student outside the province till 1932. This was an exorbitant amount and was under scrutiny by various departments, provincial governments and the institute. There was no unanimity among officials of departments in this regard. However, the Directorate of Industries was opposing any fees to be charged from Indian citizen for technical and industrial education. The director argued "The time does not yet seem to be ripe for charging fees- not even from non United Provinces students. Considering that in this respect India has always claimed for her student equality of treatment with British students studying in the British schools and colleges, the expediency of one province of British India charging fees from student domiciled in any other province appear to be open to question. The only practical effect of the present scale is to exclude students form outside, even when seats may be available in the school or the class concerned. Many competent authorities hold that in any satisfactory future constitution for India industries will have to be treated as an All India (federal or central) subject. The industrial education policy also should, therefore, be viewed from an All India angle." Thus it is clearly evident that the Director of Industries regarded equal opportunities for students from different provinces and the financial expenses to be incurred by the Provincial government.[103]

Although the Director of Industries recommended that no fees would be charged for students from outside the United Provinces, yet the Secretary to the Government, United Provinces undermined the recommendation and finalized the following fees for the students outside the United Provinces:

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[102] Ibid., p.41

[103] Abstract from Director of Industrial Note dated February 5, 1933 on the Policy of Technical and Industrial Education in File No. 182, July 1933, Department of Industries, UPSA.

Major course- Rupees 500 per annum per student

Minor courses- Rupees 25 per mensem per student, (for the working month).[104]

It is clearly evident that there was no uniform long term planning regarding technical education. The curriculum, student strength, courses and fees were dependent on the political will of the colonial administration.

Conclusion

European entrepreneurs in the second half of the nineteenth century initiated the industrial development of Kanpur. They brought their machine and skilled manpower with them to establish their enterprise. However, there was no formal institution for skill development, until 1914, when the Government School of Dyeing and Printing was established. The Government Leather School and Government Textile School was followed by the Government School of Dyeing and Printing. These schools catered to low grade jobs in the mills and factories and admission was secured through the mill management. There were no diploma level courses until the Harcourt Butler Technological Institute came into being. As mentioned earlier the Indian Institute of Sciences, Bangalore which was the dream project of Jamsetji Tata, was conceived in 1896, was finally established in 1909. Similarly the gestation period for HBTI was twelve years. The European industrialist of Kanpur were not interested in training Indians for the upper cadre of jobs like foreman and supervisor. Moreover these industrial schools and technological institutes provided training to small number of students which was inadequate for the industrial expansion of the city. Thus the discriminatory attitude and indifference to technical education resulted in its late and slow development.

[104]Proceeding No.2 from Secretary to Government, United Provinces to Director of Industries, United Provinces in File No. 182, July 1933, Industries Department, UPSA.

Chapter 4

The Linkage between Technical Education and Industrialization

The development of science and technology has greatly influenced the social, economic nd political affairs of nations since the industrial revolution. The industrial revolution increased he economic productivity which in turn forced the industrialized nations to search for new narkets. From the industrial revolution to the First World War different nations had undergone adical social, political and economic changes that are only partially explained by developments n science and technology. Specific socio-historical context have shaped science and technology olicy in India. Understanding the process of policy making, brings out various perspectives ased on interest, motivation and values of the key actors or groups that are involved in policy ormulation. The inter-war period, in Indian history can be considered as the preparatory phase or modern India. This notion of modernity of India was quite different from the nineteenth entury colonial project of modernizing Indians. Modernity was seen to be linked in the colonial roject as well as in much of Indian resistance to that project to an attempt to impose western alues on Indian society. Thus there were lively debate from the middle of the nineteenth century o the first decade of twentieth century regarding the relevance of science and scientific practice.[1] hese required immediacy in the period surrounding the Swadeshi movement and the orresponding demand for national education.[2] The objectives of this movement seem to be remised on the idea that the assimilation of technology and 'western' science will pave the way or national programme of industrialization. For India to industrialize, using applied science, here had to be structural incentives to invest and innovate. But these could not come from within' as 'within' had lost its sovereignty. The native Indian bourgeoisie could not produce eavy capital goods on a weak and dependent technological base.[3] However, the Indian nation

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Zachariah, Benjamin. 2001. "Uses of Scientific Argument: The Case of 'Development' in India, c 1930-1950", Economic Political Weekly, Vol.36, No. 39, pp. 3689-3702.

Ashish, Nandy. Alternative Sciences; Sarkar, Sumit. 1973. The Swadeshi Movement in Bengal 1903-08, Raina and Habib. 2004. "Bhadralok Perception of Science, Technology and Colonial Nationalism"; Raina and Habib. 2004. "Unfolding of an Engagement: the Dawn on Science, Technical Educational and Industrialization in India". in Domesticating Modern Science A Social History of Science and Culture in Modern India. Tulika Books, New Delhi.

Ray, R.K. 1979. Industrialization in India 1914-47. OUP, New Delhi, pp.3-4.

could rise to economic prosperity by critically assimilating the achievements of 'western natural science' and technology.[4]

The period 1914-1939 witnessed significant events viz. in year 1914 the First Indian Science Congress was organized, in 1918 the Indian Industrial Commission recommended the expansion of technical education for the advancement of Indian industries, in 1920's and 1930's emergence of Gandhian technological alternative and in 1937 formation of National Planning Committee aiming for planned reconstruction and development of the country. All these mega events shaped the scientific and technological development of the nation that further influenced industrial advancement. The political leadership and e contemporary government policy, political leadership and eminent scientist played a key role in all these events. This chapter will investigate how the cotton-textile industry was developed and how far it was dependent on foreign technology? A close look of the handloom weavers and how they were effected by cotton-textile industry will be taken up. Finally, the linkage of technical education to the industrial development of Kanpur would be discussed.

Cotton-textile Industry and Technical Education in Western India

The Indian cotton-textile industry was a flourishing industry in the late nineteenth century. It was the first western-style industry on the sub-continent and was developed mostly by Indian entrepreneurs; it competed successfully, without tariff protection, with the powerful industry of Lancashire; and it managed to adapt western methods to Indian Labor conditions.[5] There were the significant features of the cotton-textile industry that had been pioneered in Western India. The first successful cotton-textile mill, Bombay Spinning and Weaving Company, was established by the merchant and financier Cowasjee Nanabhoy Devar in 1854. Devar obtained ideas from Messrs Platt Brothers and Company of Oldham, manufacturers of textile machinery. Devar had the technical assistance from an engineer William Whitehead, and four other Lancashire technician employed for supervising, the departments of carding, spinning and weaving.[6] By 1914, Bombay had 95 cotton-textile mills with 34 mills controlled by

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[4]Raina and Habib. 2004. "Bhadralok Perception of Science, Technology and Colonial Nationalism." Domesticating Modern Science A Social History of Science and Culture in Colonial India. Tulika Books, New Delhi, pp. 106, 114.

[5]Headrick, R. Daniel. 1988. The Tentacles of Progress: Technology Transfer in the Age of Imperialism 1850-1940, OUP, New York, p. 361.

[6]Mehta, S.D. 1954. The Cotton Mills of India 1854-1954, Bombay, p. 100.

Parsees, 27 by Hindus, 15 by Europeans, 10 by Muslims and 5 by Jews.[7] The carding, spinning and weaving section of these mills were supported by weaving masters and other technicians from Lancashire. As discussed in the previous chapters that the mills established in Kanpur by Europeans were also dependent on Lancashire technicians. These men did not adapt easily to the life of India. Writes S.D. Mehta, historian of the industry:

"The difficulty of language was unusually great, not only in relation to the workers but frequently also in relation to the employers and other members of the latter's office.....He (the English worker) was not always readily accepted, being a man of relatively poor education and means, and devoid as he was of sophisticated manners by other classes of highbrow Englishmen who had set themselves up into a caste of Super-Brahmins".[8]

Besides, these technicians were attracted by higher salaries ranging between Rs. 250-450 per month plus allowances for housing, fuel and servants. Their contract stipulated that they should train Indians; for example, "the said John Smith shall impart all information; practical or theoretical, in all branches of his duties and to the best of his ability, to all native apprentice and jobbers, and to the workpeople under his charge without additional fee."[9] These Lancashire technicians, however, were not schooled but apprenticed, and considered their skills to be trade secrets which they were not reluctant to pass on. Even Indian Mill owners did not press them to share their knowledge because of what Mehta calls:

"the halo that surrounded the mechanical genius of the European. It was almost universally accepted that the Englishman had natural aptitude for the mechanical arts, and was fitted, as such, to occupy all the higher posts.....The rest of the Indians, according to ideas current then, did not possess any such aptitude, and therefore were discouraged from taking to these occupations."[10]

Moreover, the historian of industries also found that the educated class showed indifference towards factory work and were unable to pose strong competition to Lancashire man. The reason according to Mehta was caste prejudice. 'The condition of work, involving as they did contact with classes of men who gad been socially stratified for differently for ages,

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[7]Morris, David Morris. 1983. "The Growth of Large Scale Industries to 1947", in Kumar, Dharma. (Ed). The Cambridge Economic History of India, Vol. 2: c. 1757-c. 1970, Cambridge, pp. 580-8.
[8]Mehta, S.D. 1954. The Cotton Mills of India 1854-1954, Bombay, p. 101.
[9]Rutnagur, S.M. 1927. Bombay industries: The Cotton Mills, Bombay, p. 291.
[10]Mehta, S.D. 1954. The Cotton Mills of India 1854-1954, Bombay, p. 103.

would have been unwelcome as it would have been abrupt'.[11] Ratnagur adds: "The life in a cotton mill or a workshop was looked upon as inferior, and humiliating for the sons of the better class families and it was only when a youngster lagged behind in a school or college that he was relegated to a mill or factory." Some young Indians did apprentice themselves to skilled workers; they obtained these apprenticeships through family or friends and often paid 2,000 to 3,000 rupees for the privilege of learning one of the textile trade.[12] It was not until 1880s, when the first Indians who had learned textile technology in school came on the scene, that the Lancashiremen began to give way to Indian cadres. Another feature that was evident in the mills and factories was the discrimination in remuneration for Indian and European personnel, which kept out the better Indian students from these trades.[13]

The Indian cotton-textile mills were completely dependent on English machinery. British machine exporters and their agents not only supplied the machinery but they themselves started new mills and were often contracted out as managing agents. Greaves Cotton and Company, Bradbury Brady and Company were mills established by machine exporters. The purchase of equipment benefited the agent rather than the mills. A break through in this stereotype came with J.N. Tata, who went to England to learn textile machinery. He returned to India in 1874 and founded Central India Spinning Weaving and Manufacturing Company. He settled in Nagpur and opened Empress Mills in 1877. Tata recruited a former railway employee, Bezonji Dadabhai Mehta as general manager and a Lancashireman, James Brooksby, as technical engineer. The technical training of Tata helped him to quickly recognize the latest development and implement them in his mills. Within two years he replaced his old machines with new updated machines and switched over to the ring spindle to replace throstles and mules. Although ring spindle was discarded by Lancashire mills owners, they were perfectly suited for Indian cotton-textile industry with its short staple cotton, unskilled labour and large demand for course yarns. These replacements proved to be worthy as it raised the profit by 20 per cent within 18 years. Moreover, these modifications were soon followed in the cotton-textile industry of India and Europe.[14]

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[11]Ibid.
[12]Rutnagur, S.M. 1927. Bombay industries: The Cotton Mills, p. 573.
[13]Mehta, S.D. 1954. The Cotton Mills of India 1854-1954, Bombay, p. 60.
[14]Sen, Sunil Kumar. 1975. The House of Tata 1839-1939, Calcutta, pp.21-22; Saklatvala, B.S. and Khosla K.1970. Jamsetji Tata, New Delhi, pp. 16-30, Wacha Dimsha Edulji. 1915. The Life and Work of J. N. Tata, 2nd ed., Madras.

The Bombay cotton-textile industrialists move ahead by establishing a technical institute to train the workforce. With funds donated by the wealthy mill owners, Sir Dinshaw Petit and Sir Jamsetjee Jeejeebhoy, and the Municipality of Bombay, Nowrosjee Wadia, a mill manager with an engineering background started 'The Victoria Jubilee Technical Institute' in 1889. At first it taught textile technology and mechanical engineering; later it added courses in electrical engineering and industrial chemistry. It was the first technical school in India with a curriculum designed to train both mangers and skilled workers. In the initial years the faculty was predominantly from England. Though it admitted seventy-five students every year the impact was slow in coming.[15] For a long time mill owners believed that apprenticeship on the job was better than schooling. Only after World War I did mill owners find "practical man" too slow in adapting to new techniques and they began demanding diploma level qualification for their technicians.[16] However, till that time more ambitious men who aspired for higher education went to England to study. In England they had to face difficulty in acquiring practical training. The Report of the Committee on Indian Students in England 1921-22, headed by Lord Lytton states:

In engineering, the metallurgical and the manufacture of machinery .....there should be little difficulty in normal times in securing the practical training required, but in other industries, such as textile, chemical and allied trades, leather and glass making, the difficulties are much greater and employers contend that the necessity of guarding their trade secrets, and fear of trade competition would prevent them from admitting Indian student in their work even if they had places for work to do.[17]

Gradually apprentice and graduates of the VJTI replaced the foreigners. By 1895, 58 per cent of the managers, engineers and carding, spinning and weaving masters in the Bombay mills

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pp. 28-35; Reginald, Harris Frank. 1958. Jamsetji Nasserwanji Tata, A Chronicle of His Life, 2nd ed., Bombay, pp.14-35; Mehta, S.D. 1954. The Cotton Mills of India 1854-1954, Bombay, 43-44.

[15]Headrick, R. Daniel. 1988. The Tentacles of Progress Technology Transfer in the Age of Imperialism 1850-1940, OUP, New York, p. 364.

[16]Chonkar, M. Ramkrishna. 1908.Twenty years of Technical Education in Bombay, Being a Record of Twenty Years Progress of the Victoria Jubilee Technical Institute, Bombay, 1887-1907, Bombay; Joshi, P.N. 1954. "Training Technical Personnel for the Textile Industry of India: The Role of the Victoria Jubilee Technical Institute, Bombay" in The Indian Textile Journal, Special Souvenir Number, Bombay, pp. 562-65; Morris, David Morris. 1983. "The Growth of Large Scale Industry to 1947", in Kumar, Dharma. (Ed). The Cambridge Economic History of India, p. 583, Indian Industrial Commission Report, 1916-18, pp. 27-28, 105-6 in Ibid.

[17]Narullan and Naik. 1943. A History of Education in India, 1st ed., p. 609.

were Indians. The trend continued and the proportion of Europeans declined to 25.4 percent by 1925 and 16.4 percent in 1941.[18]

Another pioneering effort in industrial training was implemented in the native state of Baroda, by the enlightened ruler Sayyaji Rao Gaekwad. Baroda was situated along the industrializing axis of Western India Bombay, Surat and Ahmedabad. Gaekwad had the foresight and realized the importance of industrial training for the economic prosperity of the state. His vision materialized in the form of the Kala Bhawan in June 1890, which was established with the assistance of Tribhuvandas Kalayandas Gajjar, a graduate in chemistry from Elphinstone College, Bombay.[19] By 1909, Kala Bhawan was offering licentiates in six schools, which included mechanical technology, dyeing and chemical technology, weaving technology, architecture and civil engineering, commercial technology and finally, the school of art.[20] The School of Mechanical engineering had acquired a great deal of prestige, given the fact that there was the demand of its student in the growing sphere of Indian industry.[21] In contrast to the VJTI, the school of mechanical technology had all Indians on the faculty who had graduated in engineering, a few licentiates but no doctorates.[22] Students from this school easily found openings in the industrial cities of Calcutta, Bombay, Karanchi, Kanpur, Allahabad and Amritsar.[23]

Meanwhile, the spreading cotton-textile industries required advancement in chemical technology. The chemistry course thus included the chemistry of alizarins, and course were

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[18]Rutnagur, S.M. 1927. Bombay industries: The Cotton Mills, pp. 288-94; Mehta, S.D. 1954. The Cotton Mills of India 1854-1954, Bombay, p. 58; Buchanan, Daniel Houstan. 1934. The Development of Capitalistic Enterprise in India, New York, p. 211.

[19]Raina and Habib. 2004. "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, p. 184.

[20]The Dawn, January 1911, p. 12 cited in Raina and Habib. 2004. "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, p. 185.

[21]The Dawn, January 1911, p. 12 cited in Raina and Habib. 2004. "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, p. 188.

[22]The Dawn, January 1911, p. 30, cited in Habib and Raina, 2004, "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, p. 188.

[23]Mehta, Institution Building in Princely India, p. 675, cited in Raina and Habib. 2004. "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, New Delhi, p. 189.

offered on Calico Printing, Dyeing, and Colour Manufacturing.[24].In the nineteenth century chemical technology grew up 'in the shadow of textile industry' and the gas technology used in mills provided the material for coal tar dyes.[25] The German University and the German chemical industry were to serve as exemplars for building a science-industry connection for the early generation of Indian Sciences.[26] Thus Kala Bhawan had faculty members from Germany and its laboratory was equipped with German equipments.[27] Kala Bhawan's students were well placed in the cotton-textile industries all over India.

The Indians who took over the industry had been trained by Lancashireman, sometimes in Lancashire itself. At the time when England was slipping badly on the world cotton market, India inherited not only British technology, but British technological obsolescence.[28]

India faced competition from Lancashire till 1914, but after the First World War the Indian market was flooded with Japanese goods. The reason for the victory of Japanese goods over Indians cotton industry included: better labor condition, finance and management facilities. But the heart of the matter was a growing gap in the productivity of labour in India and Japan. Before 1914, Japanese productivity was on a par with that of the better Bombay mills. It took one worker to supervise each loom. In the inter-war period Japanese productivity soared while Indian productivity stagnated. Between 1926 and 1935 the output of yarn per Japanese worker rose 63 percent, and cloth output 122 percent. By the 1930s, a Japanese worker supervised, on the average, 6 looms or 56 spindles, while an Indian worker could handle only 2 looms or 32 spindles. This clearly indicates the technical backwardness of the workforce due to inadequate facilities for technical training and dependence on foreign technicians. Further the rise in Japanese productivity was, in turn, due to technical advances by a more competitive management

[24]Chavda, "Development of Science Education", p.16. cited in Habib and Raina, 2004, "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, New Delhi, p. 188

[25]Bernal, "Science and Industry", p. 27 cited in Raina and Habib. 2004. "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, New Delhi, p. 190.

[26]Raina and Habib. 2004. "Copernicus, Columbus, Colonialism and the Role of Science in Nineteenth Century India" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, New Delhi, pp. 60-82.

[27]Raina and Habib. 2004. "Technical Content and Social Context: Locating Technical Institutes the First Two Decades in the History of kala Bhawan Baroda" in Domesticating Modern Science: A Social History of Science and Culture in Modern India, Tulika Books, New Delhi, p. 190-91.

[28]Rutnagur, S.M. 1927. Bombay industries: The Cotton Mills, pp. 205-6; "Bagchi, European and Indian Entrepreneurship," p. 256.

and highly developed machine industry. As we have seen discriminatory policies of the colonial government prevented the growth of capital good industry in India which resulted in dependence on Lancashire for machinery in cotton-textile industry. In a survey undertaken in 1930, Arno Pease discovered two mills, the Buckingham and Carnatic Mills in Madras had automatic looms. The rest of the industry especially its oldest branch in Bombay, remained wedded to Lancashire methods and machines and lost out to Japan.[29]

Thus behind the growing technological gap was India's lack of textile machine industry. As with railway equipment, India provided a large enough market, to warrant the ability to develop its own machinery but this could not be done not in open competition with British machines.[30] In peacetime, the cotton mills were better off with imported than with locally made machines. But the war, which stimulated all the Japanese industries, left the Indian mills unable to replace their aging equipment, which prevented them from taking advantage of the sudden surge in demand.[31] As Nathan Rosenberg has shown, the capital goods industry played a large part in developing technical skills and creativity, and this is precisely what labor-abundant, underdeveloped economy lacked.[32]

Technical Education in Kanpur

The situation in the mills was more or less identical with the cotton textile mills in other parts of the country. The technical cadre comprised entirely of Europeans in Kanpur mills as evident from the following statement about the working class protesting against the European overseer of Victoria Mills in 1924: "The Victoria mill worker demanding the dismissal of a European overseer resorted to a periodic interruption of work by stopping an hour before closing time everyday. The men demanded some control over management,[33] and related the strike to the management's refusal 'to allow the workers to take control over affairs by stopping and starting work when they planned."[34] Joshi describes an incident of individual resentment of workers

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[29]Pease. pp. 118, 158-39; Hubbard Ernest Gilbert. 1938. Eastern Industrialization and its Effect on the West, 2nd ed. London,, pp. 294-301; Koh, pp. 61-64, 157-61; Mehta, 164-65.

[30] Rutnagur, S.M. 1927. Bombay industries: The Cotton Mills, pp. 630-31.

[31]Ray, R.K. 1979. Industrialization in India Growth and Conflict in the Private Corporate Sector 1914-47, Delhi, pp. 63-64, 193-95.

[32]Nathan, Rosenberg. 1976. Perspective on Technology, Cambridge, pp. 148-157.

[33]Ev., U.P. Govt. , RCL, Ev. Vol. III, Part !, 1931, p. 190.

[34] Dist. Magistrate report on strike, enclosed by Director Ind. U.P. in letter dated 26.01.1924 to Secy. , Industries , GOI, III, 1-877 , 1924

against the Mill management as a revenge for atrocities in the work place.[35] Since the upper cadre of technical staff viz. foreman, supervisor etc were Europeans there was a lower demand for higher technical training in Kanpur. Moreover Indian workers were under strict supervision of European technicians and engineers. Authority within the textile mills derived very much from extra-legal rather than legal sanction. This context was quite different to the European one - there being no shift from a 'formal' to 'real' subordination of labour. The Indian labourers were completely dependent on the will of Mistris. Mills function on the basis of 'Saheb kaa hukm' (saheb's orders). The Saheb order was the sanction mistris sometimes used for making extorting the workers. There was a complaint from the Elgin Mills in 1919.[36] The continuation of pre-modern methods of management was not related to pressures from below as in Britain, where resistance from the shop floor made the initial attempts at introduction of new management techniques difficult.[37] The low level of skill required in cotton manufacture and the labour market condition made it possible to continue with old forms without big investment in supervision and management.[38] All these limitation in the Kanpur cotton textile mills restricted the development of skilled workforce required for the modernization of the industry.

The European domination of industries in Kanpur was manifest further in racial discrimination in recruitment of skilled labour. The limited requirement of skilled labour restricted the demand for higher technical education. Unlike other industrial centers, Kanpur had a very slow and steady start in technical education. Unlike Bombay and Ahmadabad, which had technical institutes from the late nineteenth century, Kanpur had its first technical school in the form of the Dyeing and Printing School in 1914.

The development of technical education was determined by the requirements of the mill and factory owners. A small proposal for opening a textile school was delayed due to the vested interests of the European business class. Although, Kanpur had proved itself in the production of cotton-textile, yet it had no provision for technical training required in this field until 1920's. A proposal to establish a textile school was proposed by UICC for the training of artisans in 1913.

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[35] Joshi, Chitra. 1985. Workers Protest Managerial Authority and Labour Organization Kanpur (1919-29), Nehru Memorial Library, New Delhi, pp. 20-21.
[36]Pratap, 27.10.1919 cited in Ibid.
[37]Price, R. "Structures of Subordination in Nineteenth Century British Industry", in Pat Thane and Crossick. (Ed). The Power of the Past, p.127.
[38]Joshi, Chitra. 1985. Workers protest Managerial Authority and Labour Organization,: Kanpur Textile Industry 1919-29, p. 24.

Although the Director of Industries was in favour of a school for foreman and jobbers, but UICC strongly opposed this proposal by arguing that:

"The school should be primarily for the training of artisans and mistris, who would be sent to the school by the mills employing them. If and when, the class succeeded the question of establishment of a class for foreman would follow, but the school should be first be for workman alone."[39]

Subsequently, the Director of Industries addressed this issue in the chamber on 6th August 1923. He stated that it had been definitely decided that school would consist of a class for foreman and another for artisans. He also suggested that something might be done to impart training to the apprentices working in the mills.[40] However the chamber was not pleased with this decision but the principal of the school proposed a course for foremen and ultimately the proposal was approved.[41]

Research Facilities in Technical Institutes:

The establishment of a technological institute in Kanpur, which remained in a state of germination for a long time was sanctioned by a government resolution of the 27th August 1913 stating that "it would essentially be a teaching college though leisure would be made for research, and it is hoped that industrial problems will be freely sent to the Principal and his staff for investigation".[42] The Upper India Chamber of Commerce was in favour of an institution for research, but opposed the large and the more costly scheme of a technological institute. It was decided then that the institute was to be for research alone, but in 1920 the question of adding a teaching side was again raised and the committee appointed to consider the matter decided in favour of this suggestion.[43] The European industrial groups of the city never wanted highly trained technician as they were recruited from Europe. They desired that the industrial problems of local industries be resolved with the aid of research to enhance their production. The Upper India Chamber of Commerce opposed the teaching side after the establishment of the institute on the ground that the expenditure was very great while there was so little scope in these provinces

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[39]Annual Report of Upper India Chamber of Commerce: 1923. 1924. UICC Cawnpore, p.20.
[40]Ibid. p.21
[41]Ibid.
[42]Report of the Economy Committee of the United Province of Agra and Oudh. 1924. Allahabad, p. 158.
[43]Ibid.

for highly trained industrial chemists[44]. Bhatt also argued that whenever Indians educators requested technical and industrial education, the British government shelved the demand saying since there were no industries to absorb skilled workers, no one would be interested in such education.[45]

The association of Indian industrialists, on the other hand were in favour of introducing the teaching side. They were also concerned about the quasi-separation of the research and instructional sides and wished to extend the scope of the institute to cover practically all branches of applied chemistry, which in its opinion could be done at less cost than was incurred at that time.[46] The argument of the UICC was that there were no industrial openings for the students in the province as no oil or leather chemist were employed in these provinces as such.[47] Contrary to this, the Economic Committee objected to this argument and asserted that the students they had interviewed were confident of starting new industries on their own.[48] Regarding the organization of HBTI the United Provinces Chamber of Commerce recommended that the institute should not have departments separated into water-tight compartments. The institute would do much better if it provided facilities for instruction in practically every branch of applied chemistry. The first two years were to be devoted to general work in applied chemistry and the third year to the study of any special subject chosen by the student. Thus chemistry became the nucleus of the curriculum on which modern industries could be erected.

The European dominance of the technical education was evident as European held most of the prestigious posts. HBTI had following principals since its inception

Dr. E.K. Watson 1921-26
Dr. Gilbert J. Stockflower 1926-28
Dr. H.D.H. Drain 1929-32
J.A.H. Duke 1932-37 (Acting Principal)
D.Y. Adhawaley 1937-47 (Acting Principal).[49]

Thus it is clearly evident that between 1921 and 1937 the Principles were European. As already mentioned, the faculty at kala Bhawan was predominantly Indian, as it was formed by a Indian industrial initiative. The UPCC was demanding a Principal of Indian origin. The chamber

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[44]Ibid. p. 159.
[45]Bhatt, Ramanbhai G. The Role of Vocational and Professional Education in the Economic Development of India 1918-51, Baroda Publishing House, Baroda, p. 123.
[46]Report of the Economy Committee of the United Province of Agra and Oudh,1924 .Allahabad, p.159.
[47]Ibid. p. 160
[48]Ibid.
[49]The photographs of the Principals are Pasted outside the Central Library of HBTI. Researcher had visited and collected the names.

urged that 'the object of the institute would be more than fulfilled if the main staff of the institute would consist of a principal who should be an eminent technological chemist assisted by half a dozen young graduate in different technological subjects. These young graduates might preferably be young Indians who had returned after a course of training in Europe'.[50] The chamber also suggested that there should be well-equipped workshop comprising a semi industrial plant. As evident Kala Bhawan had an advanced workshop which was equipped with the latest machinery from Germany. It manufactured products like engine valves, handlooms, dobby and beaming machines, and a whole range of products for the state departments. During the early years the state was still dependent on the Workshops of kala Bhawan.[51]

The Chamber proposed that, after the students have been through a three year course at the institute they should undergo another three year course of work in a laboratory. The laboratory of the institute should be divided into two main sections: first dealing with inorganic chemistry and the second with organic chemistry. During the second year the student who had selected an industry dependent upon organic chemistry would devote more time to the study of this branch of chemistry and likewise students whose interest was mainly in inorganic chemistry would spend the major portion of time in the study of inorganic chemistry during the second year.[52] Further the department for research was not to be separate. Considering this matter the UP chamber argued, "..the virtuous experts attached to the institute ought to have sufficient time to carry on researches. This was done in all the technological institutions in every part of the world, and one does not know why the research department of our technological institute is kept absolutely separate from the teaching side of it."[53]

The Indian intelligentsia presenting there views in Indian Industrial Commission were of opinion that industrial research could not be done in isolation till there was no backing from industries. The industries which were dependent on foreign machines and managers could function as teaching grounds for whole generation of entrepreneurs. Puran Singh and Madan Mohan Malaviya stressed that Japan and Germany, owed its success to initiation. The Japanese

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[50]Notes on the Technological Institute and Dyeing School (handed by the United Provinces Chamber of Commerce) to the Economy Committee of the United Provinces of Agra and Oudh in Report of the Economy Committee of the United Province of Agra and Oudh. 1924, Superintendent Government Press, Allahabad, 1924 p. 165.
[51]Raina and Habib. 2004. "Technical Content and Social Context: Locating Technical Institute The First Two Decades in the History of Kala Bhawan, Baroda (1890-1910)", in Domesticating Modern Science A Social History of Science and Culture in Colonial India in Tulika Books, New Delhi, p. 108.
[52]Ibid n. 48, p. 166.
[53]Ibid.

success in industrialization rested on the wholesale transplantation of talent from other countries. Japan did not wait for industrial research rather, model factories that were erected in many cases became teaching ground for whole generation of entrepreneurs.[54] Kanpur had the well developed cotton-textile and leather industry that could function as workshops for training and research. Puran Singh went on to observe that the industries that had survived and entrenched themselves in India were precisely those that had been established through a similar process. He cited in particular the Kanpur tanneries and the Tata Steel Works:

'The success achieved by the Cawnpore tanneries was obtained by bringing over a portion of England to India. Similarly a second Manchester has sprung up in Bombay and Swindons in miniature can be seen in railway workshops all over the country.... The iron industry was established through the famous enterprise of the Tatas, by the wholesale transplantation of some of the expert steel makers of the world. The stimulus for making steel in India on the modern gigantic scale was received from America and hence the Tatas work may be said to represent America in India'.[55]

Thus the research programme would be fruitful if there were well established industries. Puran Singh further commended that the natural reciprocity of technology and science came into full play only when industry had reached a certain stage of development and advocated as a result the development of pioneer factories rather than the organization of scientific and industrial research. Thus Kanpur industries could function as a training ground for entrepreneurs, who could establish new industries in future.

A Minister of Development was appointed in 1938 whose responsibilities included the inspection of technical and industrial schools at Kanpur. He found that the intake of students in H.B.T.I. and the Leather Working School was insufficient as per the demand of the industries. With regard to the Central Textile Institute he observed that the Dyeing and Printing section was too congested. He further added tha practical training in textile section was not up to date and was dependent on outdated machinery.[56] The response of the Department of Industries to these finding was unsatisfactory. The number of students in the Leather Working School was raised

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[54]Industrial Commission Minutes, Vol. 5, p. 788. Cited in Visvanathan, Shiv. 1985. Organizing for Science: The Making of an Industrial Research Laboratory, Oxford University Press, New Delhi, p. 81.
[55]Industrial Commission Minutes, Vol. 5, p. 786. Cited in Visvanathan, Shiv. 1985. Organizing for Science: The Making of an Industrial Research Laboratory, Oxford University Press, New Delhi, p. 81.
[56]Industries Department. Inspection notes on the Technical and Industrial Institutions at Cawnpore. 1938. File No. 486, Box No. 421, UPSA, Lucknow.

from 40 in 1937-38 to 74 in 1939-40. Congestion in Dyeing and Printing Section continued to exist because funds were not available for its extension.[57] The placement of the students was outstanding and the report presented the following figures for HBTI:

Students who had been trained between 1921-22 to 1938-39	Diploma Students	Short Courses Students
Oil Diploma Courses	77	--
Oil Short Course	--	35
General Research Diploma Courses	29	--
Leather Chemistry and Technology Diploma Courses	15	--
Total number of students trained	121	35
Fields of Employment	Diploma Students	Short Courses Students
Number of government technical services	27	5
Number working in factories and laboratories	61	11
Number otherwise engaged	11	3
Ex-students who had started their own factories or working in their own concerns	14	12
Number of students receiving further training	3	--
Total number of students employed	106	31
Number deceased	5	--
Number unemployed (this include those students who had completed their training in July 1938)	10	4
Total	121	35
Percentage of employed	91.3	88.6
Percentage of student who had either started their own concerns	12	34.5

Source: A Note on the Inspection Minutes of the HON'BLE Minister of Development in File 486, Department of Industries, 1939, UPSA, Lucknow.

[57]Industries Department, U.O. No. 2240/E-13-VI-28, Dated May 26, 1939 in File No. 486, UPSA, Lucknow

It is evident from the above table that a small number of students were trained over a long duration of eighteen years. These courses only catered to the lower grade of technical education that culminating in the award of a diploma. The employment figures in the table indicate the demand for technical skilled personnel in the provinces. Only a small proportion of these individuals started their own industries whereas the majority of them were absorbed in the pre-existing factories and mills.

In view of the high employment percentage of the students from the institute, an increase in admission was recommended by the Minister of Development:

Courses	Existing admission	Proposed admission
Oil Section		
Apprenticeship Diploma Courses	10	13
Short Oil Courses	4	8
Post Diploma Research Course	2	3
General Research Section		
Apprenticeship Diploma Courses	2	3
Post Diploma Research Courses	Does not exist	2
Short Courses in Applied Chemistry	Does not exist	2
Total	18	30

Source: A Note on the Description Minute of the HON'BLE Minister of Development in File 486, Department of Industries, 1939, UPSA, Lucknow.

The proposed increase in the intake of the institute was nominal from -18 to 30 involving a total cost of Rs.2,180. The Director of Industries was told that owing to the urgent needs of the economy it was not possible to consider this proposal. Moreover, it was also mentioned that this institution had not been selected for the training of war technician.[58] Meanwhile, on 3rd September 1939, Lord Linlithgow, the Viceroy of India, declared India at war with Germany. In India the realization of the gravity of war came much later. As the war raged, India's technical

[58]Industries Department. Letter No. U-706 dated 08.04.1941, to Director of Industries from Industries Secretary, File No.486, UPSA, Lucknow.

and industrial backwardness was badly exposed and in addition to her dependence on other countries for a large variety of goods and commodities essential not only for strategic uses but also in times of peace.[59] Commenting on the situation, the Journal 'Science and Culture' observed in its editorial in 1939:

".....the outbreak of the war has found India totally unprepared not only for defense and offence, but also for maintenance of the smooth tenor of civil life, should the war be unfortunately prolonged for three years. Already the prices have soared up and if the complications further increase, some of the essential commodities for which India depend on foreign countries may be entirely stopped. It should be borne in mind that in spite of the pious intention contained in the resolution of Government of India (of 1919 sent to the Secretary of State).... we have not developed our power resources, no steps have been taken in the manufacture of essential chemicals, metals and alloys and commodities required for the maintenance of transport and communication services. The industries for the manufacture of scientific apparatus, glass and many other essentials are either in a backward condition or do not exist at all."[60]

The need for the immediate provision of technical personnel to the war machinery and scores of industries that backed up the gigantic war effort was a matter of first and foremost concern. The introduction of sophisticated weapons and machinery including aeroplanes added urgency to the matter. This is the reason, why the government of India woke up all of a sudden and was compelled to encourage technical education. Industrialists showed interest because they, too, needed more technical hands for steeping up their production. For the average middle class Indian, a technical degree became a route to better employment.[61]

Colonial Policy and Handloom Industry

The handloom industry was adversely affected by the modern power loom of the cotton-textile mills which had developed in last five decades of nineteenth century. Handloom cloth was quite popular among the Indian population due to its durability. Thus handloom weaving was untouched by the modern technological changes and a large section of the economically

[59]Progress of Education in India 1937-47.

[60] 'The War Comes' editorial, Science and Culture, Vol. 5, Nov. 1939, p. 268, cited in Sinha, Jagdish N. 2008. Science, War and Imperialism India in Second World War, Brill, London, p. 61.

[61] Progress of Education, 1857-1947, Col I, pp. 171-174.

depressed classes were dependent on this industry for their livelihood. However, some British officials as E.W. Collin in 1890, A. Chatterjee in 1905 and J.G. Cumming in 1908 were alerted to the handloom weaver and his depressed condition.[62] Their individual efforts were not enough to make substantial improvements in the condition of weavers. Bagchi admits that the diffusion of improved method in handloom production was the responsibility of the Department of Industries. But the expense of the Department of Industries in various provinces was too small and there were too many interest to look after (including for instance, providing industrial or commercial intelligence for enquiring businessmen and carrying out research work in the industrial use of Indian materials) for them to be able to provide a good survey of the improvements adopted. Moreover as the weavers were illiterate and ignorant of the technical possibilities and the state of the market, one can hazard the guess that diffusion would be slow even if financial and demand conditions were favourable.[63] Lord Curzon took a keen interest in applied science for the improvement in agriculture production and was not convinced either of the feasibility or the utility of preserving the handloom industry.[64] The middle level officials such as J.G. Coming and E.B. Havell in Bengal and A.C. Chaterjee in the United Provinces, and some non-official bodies such as the Salvation Army or other Christian Missionaries or individuals such as P.N. De and Theogaraya Chetty, tried to introduce improved methods of weaving, warping and sizing among the weavers. Bhatt argued that the few technical and industrial schools in India did not care enough to teach improved methods for indigenous cottage industries.[65] A major portion of the small scale official effort was under a virtual moratorium after Morley's dispatch of 1910 forbidding the setting up of government pioneering factories, as

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[62] E.W. Collin [IPG Pub.]: Report on the arts and industries of Bengal, (Calcutta), Para. 28; Alfred Chatterton [IPG Pub.]: Note on Industrial Work in India (contributed to the Industrial Conference held at Benares at 30 December 1905); A. Chatterton. 1907. "Weaving in India," Hindustan Review, Vol. XV, No. 91, pp. 235-49. He was quoted by Chaterjee [IPG Pub.]: Notes, p. 22 with approval, Chatterjee admitted that handlooms manufactured at least one third (by weight) of the cloth consumed in the United Provinces around 1908. J.G. Cumming [IPG Pub.]; Review of the Industrial Position and Projects in Bengal in 1908 with Special Reference to the Industrial Survey of 1890, (Calcutta, 1908), pp. 7-10, cited in Bagchi, A.K. 1972 Private Investment in India 1900-39, Cambridge University Press, p.221.

[63] Bagchi, A.K 1972. Private investment in India 1900-39, Cambridge University Press, p. 322

[64] Havell, E.B. 'Art Administration in India'. JRSA, 4 February 1910, p. 278. For the survey of the early efforts, at the improvement of handloom weaving, see Ghosh. The advancement of Industry, pp. 6-8, 140-77.

[65] Bhatt, G. Ramanbhai. 1964. The Role of Vocational and Professional Education in the Economic Development of India (from 1918-1951), Baroda Publishing House, Baroda, p. 122.

a result of which the Salem weaving factory was closed.[66] Colonial government utilitarian philosophy prevented officials from introducing to improvements in the Indian cottage industry.

Contemporaneous Political Discourse on Industrialization

By 1914, despite all disappointment in practice, the government had accepted the application of science especially in scientific agriculture as a high priority consideration. It was clear, as Sir Albert Howard told the Royal Society in 1920, that agriculture is, and for many years yet to come must remain India's greatest industry.[67] From the middle of the nineteenth century and especially after the First World War, an independent capitalist class had emerged in India. The significant characteristic of Indian capitalist class in the twentieth century was that it was not the middlemen between the British capitalists in India and the Indian market.[68] The Indian capitalists expected the state to help overcome one of their major weaknesses: the shortage of technical personnel and the low level of indigenous technology. One of the constraints that the Government was urged to place on the foreign enterprises in India was related to the compulsory training of Indian technical personnel.[69] The role of the Government in providing a scientific workforce was evident. As Sir James Weston, Lt., Governor of the United Provinces, told the Third Indian Science Congress in Lucknow in 1916, "there is not one of us who is any way associated with work of Government of India who fails to recognize the supreme importance of adequate scientific advice and assistance in the problems which face her day by day".[70] The First World War compelled the Colonial Government to redefine its science policy with due concern for India's social and political priorities. Sir Rayleigh confessed in 1916 to an audience in London:

"Very little has been done in respect to an economic development on scientific lines: and if there was a criticism which one could bring justly against the otherwise excellent government of India by the British Raj, it is that while we have dealt pout justice impartially to the country, it

[66]Report of Indian Industrial Conference. (PP 1919, XVII), Appendix.
[67]Howard, Sir Albert Howard in India, p. 33 quoted in Russell Dionne and Roy Macleod. 2007. "Science and Policy in British India, 1858-1914 Perspectives on a Persisting Belief" in Habib and Raina (Ed). Social History of Science in Colonial India, OUP, New Delhi, p. 181.
[68]Bipan, Chandra. 2010. Nationalism and Colonialism in Modern India, Orient Blackswan, pp. 148-49.
[69]Ibid. p. 154.
[70]Report from the Third Indian Science Congress, Lucknow, 1916 quoted in op. cit. (n. 5).

has had no scientific scope at all, and the whole of the possibilities in that respect have hitherto been neglected".[71]

Dionne and Macleod illustrate Indian government's acceptance of technological interventionism had its roots in the conjecture of nineteenth century scientific and technical development in the West, natural disasters in India which demanded some sort of action and political circumstances in India which forced political interventions.[72] During and after World War I, the programme of the Indian National Congress of reviving and restoring traditional industries and crafts was not only underway but also parallel efforts for establishing a modern science and technological system were also set in motion. The aftermath of World War I and the socialist experiment in the erstwhile USSR unveiled the immense potentialities of Science for mankind in terms of economy and material progress. Moreover the global economic crisis in the form of the Great Depression (1929-33) and the subsequent crisis of the bi polar world compelled the Indian leadership to have a fresh look at each aspect of society: be it social, economic or political.[73] Thus debate regarding the potentialities of science and technology in bringing about socio-cultural transformation, by deploying science and technology in productive sectors like agriculture and industry, and cultural spheres like education, as part of the process of nation building emerged among the political, scientific and the industrial elite.

Conclusion

Even though, Kanpur, was the site for vigorous industrial development in the late nineteenth century, but no provisions were made for technical education. On the other hand Bombay and Baroda had technical institutions catering to local industries that were established through local industrial networks and associations. Calcutta had technical institutes that were established following the demand for national education. It was not until the outbreak of the First World War, when Kanpur had its first technical school. Moreover the courses were restricted to the certificate or diploma level. The access to these schools was not open to all and was under

[71]Lord Rayleigh, Presiding, The Neglect of Science: Report of Proceedings of a Conference, 31 May 1916, London, 1916, p. 20, quoted in Russell, Dionne and Roy, Macleod. 2007. "Science and Policy in British India, 1858-1914 Perspectives on a Persisting Belief" in Habib and Raina (Ed.). Social History of Science in Colonial India, OUP, p. 183.

[72]Russell, Dionne and Roy, Macleod. 2007. "Science and Policy in British India, 1858-1914 Perspectives on a Persisting Belief" in Habib and Raina (Ed). Social History of Science in Colonial India, OUP, p. 183.

[73]Mallik, Haribabu, Kulkarni. 2005. "Debates on Science and Technology in Indian Alliance Formation between the Scientific and Political Elite during the Inter-War Period," Social Scientist, Vol. 33, No. 11/12, pp. 49-7.

the control of mill management. The inadequate facilities for practical work and the small intake of students worsened the quality of technical education. These barriers restricted the modernization of industries and the spread of new industries. Ultimately Kanpur's industries witnessed became victim to the hazards of industrialization that nationalist leaders had anticipated at the onset of twentieth century. S.C. Mukherjee had expressed his fears: "Exploitation by the capitalist minority and labour organization on the gigantic scale.....which would, as the days go by, be a serious political danger".[74]

[74]The Indian Economic Problem: In The Dawn, III (8), (March, 1900), 232

Chapter 5

CONCLUSION

The relationship between industrialization and technical education after the First World War could not extricate itself of the clasp of late nineteenth century colonialism. The war led to the realization that industrialization was the responsibility of the colonial Government.

The outbreak of the First World War compelled the colonial Government to take firm policy decisions regarding industrialization and technical education. The government that had prior to suppressed Chatterton's suggestions in Madras for industrialization, was forced by the demands of international market to produce goods in its own factories. The Holland Commission was appointed to look into the matter of industrialization.

Nevertheless, the recommendations of the Holland Commission were never implemented. In fact, by 1924 there was a complete reversal regarding the commitment to industrialization. The Board of Scientific Advice established in 1902 to provide commercial and industrial intelligence was dismantled. The only other institution oriented to industry, the Indian Munitions Board, created as a separate department of the Government of India, restricted itself to the logistics of war materials and proved indifferent to the problem of scientific research or the establishment of new industries.[1] Thus the Holland Commissions did not result in reform. Meghnath Saha was to later remark, "from 1924, due to some mysterious reasons, the Government of India dropped all ideas of developing the natural resources of India and concentrated purely on agricultural research and agriculture industries. Which high power agency was responsible for this policy was not known, but India was henceforth condemned to grow potato and paddy".[2] Thus there was no major shift in industrial policy since late nineteenth century to the second decade of the twentieth century.

At regional level in Kanpur the industry was exclusively in the European hands till the First World War. The industrial community in Kanpur was engaged in the manufacture of cotton-textile and leather goods catering to military requirements and the domestic market.

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[1]Visvanathan, Shiv. 1985. Organizing for Science The Making of an Industrial Research Laboratory, OUP, New Delhi, p. 95.
[2]Ibid.

Kanpur was an important centre for material trade, but being situated in the hinterland with no port in proximity, it had no significant linkages with the external trade of the country. This peculiarity of the city, led the Upper India Chamber of Commerce to respond to interests of a homogenous domestic market as opposed to other Presidency chambers that were dominated by European trading interests. The members of the chamber were heavily dependent on Government patronage - especially on large orders for the army which were awarded to them, basically because of their British connections. When the cotton-textile industry was established in Bombay, the local business community came forward to promote the industrial training of the workforce and established VJTI, Bombay with courses in textile technology. In other cotton-textile centers such as Ahmedabad, Ranchhorelal Chhotalal Technical Institute contributed significantly to the indianization of technical cadre.[3] The industries were also supported by Kala Bhawan in the princely state of Baroda, which was an outcome of the efforts of the enlightened ruler Sayaji Rao Gaekwad. These institutions were the outcome of the native efforts. In Kanpur local business was initially indifferent to technical education, although they were actively engaged in the spread of general education. The issues of technical education were raised after the foundation of the association of Indian industrialists namely, the United Provinces Chamber of Commerce in 1914.

On the other hand Upper India Chamber of Commerce (UICC) never insisted on the establishment of a cadre training institute in Kanpur for higher cadre jobs. Moreover they opposed the teaching classes in Harcourt Butler Technological Institute, Kanpur. There was no unanimity amongst government authorities as to its mandate. Proposals for technical education became the bone of contention between Department of Industries, the local authorities and UICC. Crane has rightly phrased technical education as the 'problem child' handed over from one department to another.[4]

A major obstacle to technical education was the scarcity of financial resources. The technical institute which was proposed in 1907 was rejected due to its high cost. Whenever the proposals were made for infrastructure, faculty and other expenses they were curtailed owing to the lack of resources. Effective scientific, technical and industrial education required an

[3]Mehta, S.D. 1933. The Indian Cotton Textile Industry An Economic Analysis, The Textile Association India, Bombay, p. 58.
[4]Crane, I. Robert. 1965. "Technical Education and Economic Development in India before World War I", in Anderson, C. Arnold and Bowman, Mary Jean. (Ed.). Education and Economic Development. Duke University Commonwealth Study Center, p. 190.

expensive input of laboratory equipment and machinery for demonstration. With a limited budget it was not deemed possible to equip technical institutes and schools with adequate hardware. The result was an industrial education which relied upon text books and pictures.

A major shortcoming of technical education during this period at the all India level was there were, too few schools and low enrolments. It is hard to believe that the needs of a growing industrial establishment could have been met, even under ideal conditions, by the turnout of India's technical schools. The recurrent import of technicians from abroad makes it clear that local talent was not encouraged in sufficient quantity.[5] It is evident from the report of the committee appointed to investigate the technical education in Kanpur, that only a handful of students were trained by 1938 in HBTI. The Dyeing and Printing School and Government Textile School enrolled, only ten to fifteen students each year. It is very interesting to note that in Leather Working Schools the prescribed number of students remained about 40 as late as 1937, but urgent requirements of the Second World War raised this number to 72. Admissions to these industrial schools were through mills and factories and the schools were unable to generate an interest of local population for these skills. The contemporary social stigmas also prevented the students from higher caste to take these professions.

The technical institutes were not endowed with qualified staff. In the case of the Leather Working School a Mistri was appointed to impart technical instruction. Furthermore middle class parents were hesitant about sending their wards to schools with technical teachers of questionable qualification.[6] Crane has argued that the system was producing craftsmen and shoemakers but that could hardly be called a contribution to the modernization of Indian economy.[7] Binoy Kumat Sarkar had rightly described this system as the 'mistrification and factorification'.[8] The students who went to these industrial schools did not become an integral part of a developing modern economic system.

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[5]Ibid. p. 192.

[6]Ghosh, J.C. 1943. Technical Education Being a Guide to the Solution of the Problem of Unemployment and an Introduction to a New Conception of Indian Education and Careers, Calcutta, p. 13.

[7]Crane, I. Robert. 1965. "Technical Education and Economic Development in India before World War I", in Anderson, C. Arnold and Bowman, Mary Jean. (Ed.). Education and Economic Development, Duke University Commonwealth Study Center, p. 193.

[8]Sarkar, Binoy Kumar. 'Education for Industrialization', Calcutta, 1946 cited in Kumar, Deepak. 2000. "Science and Society in Colonial India: Exploring an Agenda" in Social Scientist, Vol. 28, No. 5/6, pp. 24-46.

The colonial bureaucracy had its own discriminatory rules that affected the recruitment of Indians with salaries and allowances commensurate with that of European technicians. Mr. Rozdon had to struggle for long time for his designation, salary and other benefits which were easily accorded to European staff. Moreover HBTI had no Indian Principal till 1937. Besides European mill owners also discriminated in the appointments of skilled workforce at the higher level.

The institutes were established in Kanpur provided certificate and diploma level training. Government Central Textile Institute and Harcourt Butler Technological Institute offering diploma level training catering to the demand of industries. With the increased emphasis on teaching of chemical engineering in later years, the institute started a special course in chemical engineering in 1954 in addition to the two year Associateship. In 1952, a committee was appointed under the chairmanship of Dr. J.C. Ghosh, to examine the question of re-organization of the institute and the establishment of a technical university at Kanpur. The Committee recommended that a technical university should be established in Kanpur by utilizing the resources of several local institutes including the Harcourt Butler Technological Institute as its nucleus.[9] In the mean time the Government of India decided to establish one of the Indian Institutes of Technology at Kanpur and the scheme of setting up of technical university was given up.[10] In 1958, HBTI was affiliated to Agra University, diplomas awarded by the institute were replaced by engineering degrees and the intake of student in chemical engineering was raised to 30. With the establishment of IIT, in Kanpur, the question of the reorganization of the HBTI again came before the state government and they set up an expert committee in December 1959, to make recommendation with regard to the future development of the institute.[11] Till date many new courses have been initiated in HBTI, but it has not been accorded the status of university.

The institutes which sprang up during the inter-war period in Kanpur were unique. The courses offered at HBTI viz. chemical research, oil chemistry and chemical technology were directly providing a skilled workforce to the industry. Oil section of the institute was one of its kind at the all India level. In 1941, after the compulsions of the Second World War that had adversely affected the foreign trade, the Director of Industries wrote, '....there is a great demand

[9]Technical Education in Uttar Pradesh, 1962, p. 11.
[10]Ibid.
[11]Ibid.

for technically trained men, as articles such as lubricating oil, refined castor oil etc. which were formerly imported form foreign countries, have to be manufactured now in India, and that not only all the students who have passed out of the HBTI have been employed but, requisition for more men have already been received'.[12] Kanpur could not make full utilization of its skilled manpower as most of its cotton-textile mills devolved due to labour unrest. Most of the students of these institutes spread all over India and were contributing significantly to industries elsewhere.

[12] Letter No. 183/E-I-VI-B4, dated May 14, 1941 from the Director of Industries U.P.

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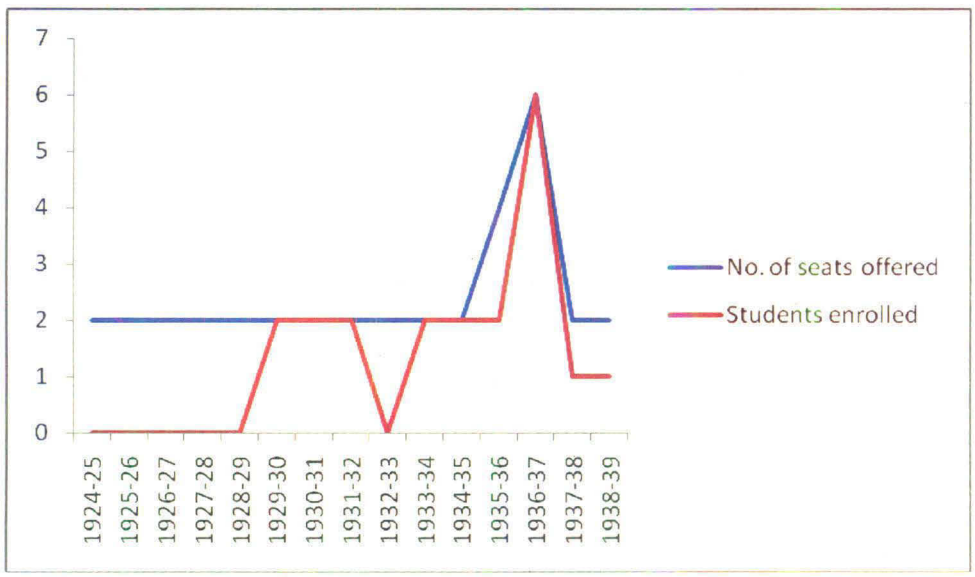
Type of School	Number of Students
Engineering colleges	1,319
School of art	1,695
Engineering and survey schools	874
Technical and industrial schools	10,037
Total	13,925

Source: Indian Industrial Commission Report 1916-18, p. 258.

Prior to the First World War, the plethora of Committees and Royal Commissions urging the government to stimulate industries had been quite deliberately ignored by the administration, the First World War brought with it awareness of new problems and issues. Immediate attention was paid to the lack of technically trained manpower, which is an auxiliary means of industrial progress, its success depends on the close cooperation between the existing business establishments and the training and educational institutions.[31] Once again the question of science policy of British Indian government was under scrutiny. The Famine Commission of 1888 had already drawn attention to the -realization that overwhelming prominence accorded to the agricultural and geophysical sciences, had entailed the relative neglect of application of science in industry particularly engineering and chemistry.[32] Despite all the state-sponsored science activity in colonial India, no attempt had been made for the development of industries in India.[33] Most of the state sponsored science and technological efforts had been oriented towards the agriculture sector, and towards the engineering colleges and technical institutes established for the training of engineers to undertake the construction of irrigation systems. The underlying motto behind these initiatives was to increase the agricultural productivity, instead of developing the industrial sector.[34] These policies recieved theoretical support from the Ricardium dictum of

[31]Thavaraj, M.J.K. 1978. "Framework of Economic Policies under British Rule", in Social Scientist, Vol. 7, No. 5, pp.13-44.
[32]Baber, Zaheer. 1995. The Science of Empire: Scientific Knowledge, Colonization and Colonial Rule in India, State University of New York Press, Albany, p. 220.
[33]Ibid.
[34]Ibid.

increase in demand from the oil industries. Post diploma course had also been introduced since 1924, but was not so popular as evident form following graph:



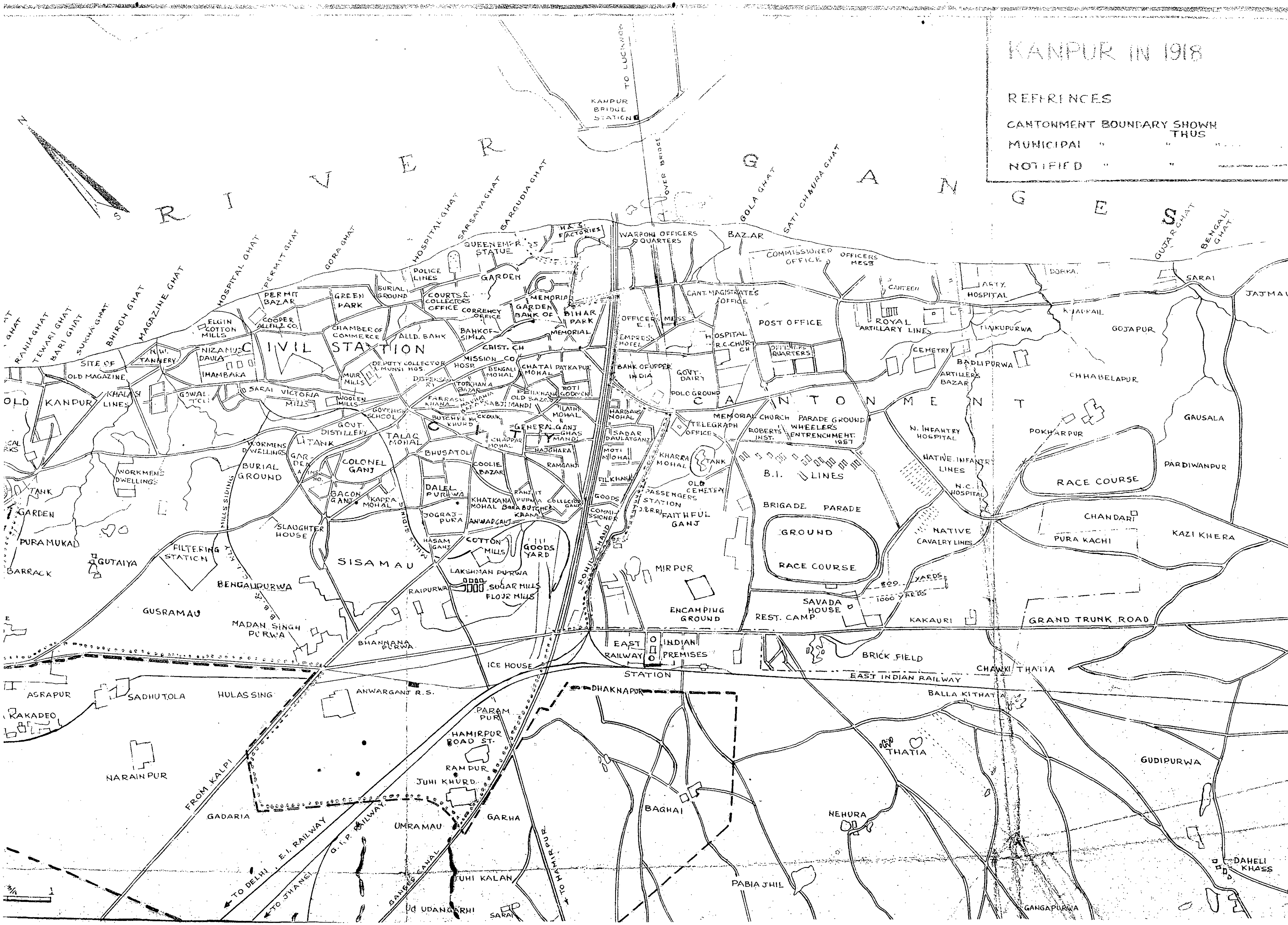
Enrolment in post-diploma course from 1921-38 in HBTI.[99]

Thus we can say that diploma students easily found employment in industries and there were few diploma students, the demand for post diploma courses was small. Moreover some time seats remain vacant in the absence of qualified students.

A large number of ex-students (about 91.7%) had either found employment or were engaged in their own business while only 8.3% remain unemployed. It had been the consistent policy of the institute to limit the number of admissions in accordance with the reasonable prospect of their absorption in industries, without imparting individual attention to students that was essential to this kind of apprenticeship.[100] The institute was equipped with up-to-date oil mill, soap making plants and varnishes and, thus provided on the spot the necessary practical training to students.[101]

A staff of six eminent scientists and experts were in charge of the institute. The central Ghee Control Laboratory of the Imperial Council of Agriculture Research had been placed under the control of one of the staff who was the oil expert to the United Provinces Government. The

[99] Ibid.
[100] Ibid., p.40
[101] Ibid., p.41


KANPUR IN 1918
REFFRINCES
CANTONMENT BOUNDARY SHOWN THUS
MUNICIPAL " "
NOTIFIED " "
RIVER GANGES
TO LUCKNOW
KANPUR BRIDGE STATION
OVER BRIDGE
GOLA GHAT
SATI CHAURA GHAT
GUJAR GHAT
BENGALI GHAT
HOSPITAL GHAT
SARSAIYA GHAT
BARGUDIA GHAT
GORA GHAT
PERMIT GHAT
MAGAZINE GHAT
BHIROH GHAT
SUKHA GHAT
BARI GHAT
TEWARI GHAT
RANIA GHAT
QUEEN EMPR.S STATUE
H.A.S. FACTORIES
WARRANT OFFICERS QUARTERS
BAZAR
COMMISSIONER OFFICE
OFFICERS MESS
POLICE LINES
GARDEN
BURIAL GROUND
COURTS & COLLECTORS OFFICE
PERMIT BAZAR
GREEN PARK
MEMORIAL GARDEN
BANK OF BIHAR
PARK
CANT. MAGISTRATES OFFICE
CANTEEN
ARTY. HOSPITAL
SARAI
JAJMAU
ELGIN COTTON MILLS
COOPER ALLEN & CO.
CHAMBER OF COMMERCE
ALLD. BANK
CURRENCY OFFICE
BANK OF SIMLA
MEMORIAL
OFFICERS MESS
EMPRESS HOTEL
HOSPITAL
R.C. CHURCH
POST OFFICE
ROYAL ARTILLARY LINES
GOJAPUR
CIVIL STATION
CRIST. CH
MISSION CO
OFFICERS QUARTERS
CEMETRY
BADLIPURWA
NIZAMUD DAULA
IMAMBARA
SITE OF OLD MAGAZINE
TANNERY
DEPUTY COLLECTOR & MUNSI HOS.
MUIR MILLS
HOSP.
BENGALI MOHAL
CHATAI MOHAL
PATKAPUR
BANK OF UPPER INDIA
GOVT. DAIRY
ARTILLERY BAZAR
CHHABELAPUR
OLD KANPUR
KHALASI LINES
GWAL TOLI
SARAI
VICTORIA MILLS
WOOLEN MILLS
POLO GROUND
CANTONMENT
GOVT. HIGH SCHOOL
GOVT. DISTILLERY
SABZI MANDI
OLD BAZAR
ROTI GODOWN
LATH MOHAL
GENERAL GANJ
CITY
HARBANS MOHAL
SADAR DAULATGANJ
MEMORIAL CHURCH
PARADE GROUND
WHEELERS ENTRENCHMENT 1857
ROBERTS INST.
TELEGRAPH OFFICE
N. INFANTRY HOSPITAL
POKHARPUR
GAUSALA
TANK
TALAG MOHAL
BHUSATOLI
CHAPPAR MOHAL
HAJCHARA
GHAS MANDI
MOTI MOHAL
KHARRA MOHAL
TANK
WORKMENS DWELLINGS
GARDEN
BURIAL GROUND
COLONEL GANJ
COOLIE BAZAR
RAMGANJ
FILKHANA
B.I. LINES
NATIVE INFANTRY LINES
RACE COURSE
PARDIWANPUR
OLD CEMETRY
N.C. HOSPITAL
BACON GANJ
KAPPA MOHAL
DALEL PURWA
KHATKANA MOHAL
BORA BUTCHER KHANA
COLLECTOR GANJ
PASSENGERS STATION
COMMISSIONER
GOODS
BRIGADE PARADE
GARDEN
PURAMUKAD
SLAUGHTER HOUSE
JOGRAJ-PURA
ANWARGANJ
FAITHFUL GANJ
GROUND
NATIVE CAVALRY LINES
CHANDARI
PURA KACHI
KAZI KHERA
GUTAIYA
BARRACK
FILTERING STATION
SISAMAU
HASAM GANJ
COTTON MILLS
GOODS YARD
MIRPUR
RACE COURSE
BENGALPURWA
LAKSHMAN PURWA
ROHILKHAND
RAIPURWA
SUGAR MILLS
FLOUR MILLS
800 YARDS
1000 YARDS
SAVADA HOUSE
GUSRAMAU
ENCAMPING GROUND
REST. CAMP
KAKAURI
GRAND TRUNK ROAD
MADAN SINGH PURWA
BHANNANA PURWA
ICE HOUSE
EAST INDIAN RAILWAY PREMISES
STATION
BRICK FIELD
CHAWKI THATIA
EAST INDIAN RAILWAY
ASRAPUR
SADHUTOLA
HULASSING
ANWARGANJ R.S.
DHAKNAPUR
BALLA KITHATIA
KAKADEO
PARAM PUR
HAMIRPUR ROAD ST.
THATIA
GUDIPURWA
NARAIN PUR
RAM PUR
JUHI KHURD
FROM KALPI
GADARIA
BAGHAI
NEHURA
E.I. RAILWAY
G.I.P. RAILWAY
UMRAMAU
GARHA
TO HAMIRPUR
DAHELI KHASS
TO DELHI
TO JHANSI
GANGES CANAL
JUHI KALAN
PABIAJHIL
UDANGARHI
SARAI
GANGAPURWA

formation of Indian Industrial Commission under the chairmanship of Thomas Henry Holland and included the following members: Alfred Chatterton, F.H. Stewart, Madan Mohan Malviya, Dorabji Tata, C.E. Low and Fazulbhoy Currimbhoy Ebrahim. Madan Mohan Malviya, an important member of the commission and the prominent national leade presented his views in a separate 'note' of dissent appended to the main report in which he attacked British prejudice against Indian achievements and potentialities in the sphere of industry and enterprise, agriculture, science and technology.[42] He asked for the Indianization of scientific services and adequate facilities for scientific and technical education and research, particularly in engineering, applied chemistry and agriculture. His demands required bold initiatives with consideration of local needs.[43]

However, the Commission tied technical education to industrialization and gave the government, the responsibility for both.[44] The new attitude of the government resulted in the establishment of a variety of institutes for industrial and technical education. Education was transferred to provisional governments responsible to elected legislatures. Five new engineering colleges were established. The Banaras Hindu University opened a department of engineering during the First World War. After the war the Bihar College of Engineering (Patna), the Maclagan College of Engineering (Lahore) and the N.E. Dinshaw Civil Engineering College (Karachi) were founded, and there was a department of Engineering at Rangoon University in Burma, then a part of India.[45] The research institute at Dehra Dun (1906) extended its research directed to industries based on forest crops.[46]

The industrial needs of the prominent industrial centers led to the establishment of specialized technical institutes. The long awaited need for a technical institute at Cawnpore materialized in the form of Harcourt Butler Technological Institute in 1920. The Tata Iron and Steel Company established the Jamshedpur Technical Institute in 1921 to train students in metallurgy, electrical and mechanical engineering, and other skills at the secondary and college

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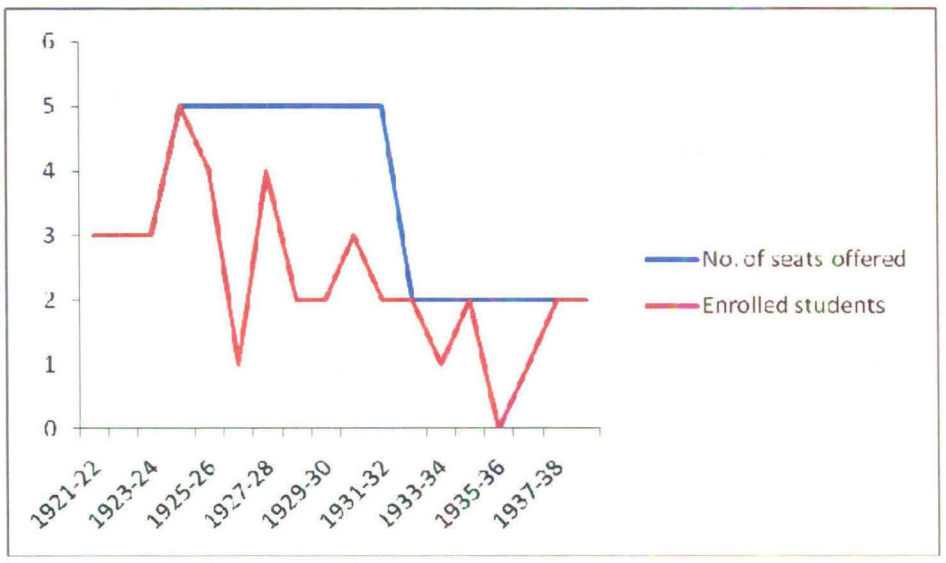
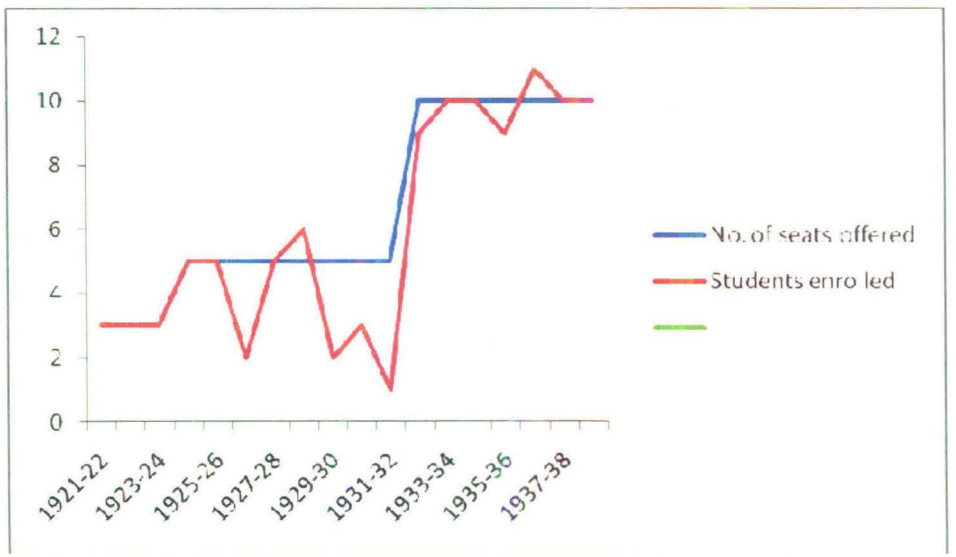
[42]Visvanathan, Shiv. 1985. Organizing for Science The Making of an Industrial Research laboratory, OUP, New Delhi, p.22.
[43]Ibid., p. 42.
[44]Headrick, Daniel R. 1988. The Tentacles of Progress Technology Transfer in the Age of Imperialism, 1850-1940, New York, p. 338.
[45]Ibid. p. 339
[46]Chaudhury, R. pp. 429-30 cited in Thavaraj M.J.K.1978. "Framework of Economic Policies Under British Rule", Social Scientist, Vol. 7, No. 5, p. 34.



Enrolment in Enrolment in General Chemistry Course from 1921-38 in HBTI[97]



Enrolment in oil chemical diploma course from 1921-38 in HBTI.[98]

Thus it is evident from the graphs that while there was a decline in enrolment in general chemistry course, there was a sharp increase in the number of students in oil chemical diploma. Moreover by 1932 the number of seats had been doubled in oil chemical diploma due to the

[97]Ibid.
[98]Ibid.