CHAPTER-II
RESOURCE MOBLIZATION

The history of the British policy towards science and technology as well as agriculture and industry in India before the World War II is a story of *ad hocism* and lack of a uniform and planned policy. The main factors influencing the official attitude were economic interests of the British Raj and the Empire and their political and military requirements. Local needs and indigenous demands counted only occasionally and that, too, only in a peripheral manner. Thus, there was little prospect of science, technology, agriculture, industry, etc. being harnessed in the long-term interests of the local population and their promotion as a pursuit of knowledge. India passed through three phases during the war: (i) The ‘Phoney’ war. It ended with the fall of France; (ii) Middle Eastern theatre. It gave boost to Indian trade and industry and the army; (iii) The Japanese aggression India began to suffer the complexities of the War.¹ Indian resources were marshaled to finance Britain’s war effort as never before.²

I
Although technology had played an important role in the rise and growth of British imperialism from the very beginning,³ a conscious effort to use science and technology as a part of official policy in this regard was a later development. Railroads, telegraphs, irrigation systems and similar projects had come into being even earlier, but they aimed essentially at meeting the practical and immediate needs of the Empire: territorial expansion, consolidation of imperial authority and economic exploitation.⁴ The colonies

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were generally treated as a natural adjunct of the Empire. Hence, any development in them was taken almost as an extension of the imperial benevolence.\textsuperscript{5} It was not until 1895 that the question of developing the colonies in a long-term perspective and on modern lines became a subject of her official concern.\textsuperscript{6} An attempt in this direction was first made in 1895 by Joseph Chamberlain when he was the Colonial Secretary (1895-1903) and continued by his successors under the Liberal Government until 1915.\textsuperscript{7} The imperial policy enunciated by Joseph Chamberlain was embodied in administrative measures in Britain, which were followed in the Punjab as well as India, too. It may be recalled that by the end of the 19\textsuperscript{th} century, the British Empire had reached its zenith in terms of territorial expansion in India and elsewhere in the world. It was now time to consolidate and control the possessions, exploit their resources and ensure that they remained a perennial source of supply, gain and strength for the Empire in the future.\textsuperscript{8} In fact, the assumption of office George Nathaniel Lord Curzon as the Viceroy of India (1899-1905) ushered in a period of enhanced official interest in scientific matters in the country. As an arch imperialist and a seasoned administrator, Lord Curzon was quick to realize the value of India’s vast resources and the advantages of her strategic position, particularly of the Punjab province in the global scheme of the British Empire.\textsuperscript{9} The landscape of the country had been surveyed, its flora and fauna studied, and most of the natural resources explored.\textsuperscript{10} For Punjabis, agriculture was the mainstay of their economy and livelihood;

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\item\textsuperscript{6} Charles William Forman, \textit{Science for Empire: Britain’s Development of the Empire through Scientific Research} (1895-1905), Ph.D. Thesis, University of Wisconsin, 1941, appears to be one of the earliest studies dealing with science and Empire, which also refers to India.
\item\textsuperscript{7} G.W. Forman, ‘\textit{Science for Empire}’, 1941, pp. 2, 11-23, and Chapters II and III.
\item\textsuperscript{9} Rajat K. Ray, \textit{Industrialization in India: Growth and Conflict in the Private Corporate Sector 1914-1947}, Delhi, 1979, p. 240.
\item\textsuperscript{10} For this and other related developments, refer to Deepak Kumar (1997) and David Arnold (2000); for specific areas, see L.L. Fermor (1976) and I.H. Burkil (1965), Marika Vicziany (1986), Ray Desmond (1992), Mathew H. Edney (1997), Richard Grove et al (1998).
\end{itemize}
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the government’s interest lay in its economic exploitation, as much in terms of taxes as of trade.\textsuperscript{11}

The important outcome of the 1857 was that service in the armed forces was thrown open to the Sikhs. The ethnic change in the constitution of the native army was given permanence by Lord Roberts, Commander-in-Chief (1885-93). Some races including the Sikhs, Gurkhas, Dogras, Rajputs and Punjabi Muslims were recognised as ‘martial’.\textsuperscript{12} Number of infantry units in the Indian army increased from the Punjab from 28 in 1862 to 54 in 1914.\textsuperscript{13} When from the World War I broke out Sikh recruitment was speeded up. The number of Sikh in the services rose from 35,000 at the beginning of 1915 to over 1 lakh by the end of the War.\textsuperscript{14} Overall the Sikhs formed about a fifth of the army in action.\textsuperscript{15} The Punjabis wanted to maintain their strong military traditions.\textsuperscript{16} The Indian army became the Chief instrument for the expansion and consolidation of the British power in Africa and Asia.\textsuperscript{17} A career in the army became an important means through which Punjabis could achieve upward mobility. The economic resources dispensed to military personnel through canal colonisation enhanced the attractions of military service for the Punjabis. Hence, the strength of the military in Punjabi society grew greater.\textsuperscript{18}

The lull in the scientific activities was ended by the outbreak of the World War I. As the War raged, it revealed many a weakness of the Britain Empire.\textsuperscript{19} It exposed India’s industrial backwardness and her dependence on others for a variety of

\begin{itemize}
\item M.S. Leigh, \textit{The Punjab and the War}, Government Printing Press, Lahore, 1922, p. 44.
\item Eric Hobsbawm, \textit{Industry and Empire}, pp. 207-224.
\end{itemize}
commodities like machines and equipment, stores and prime movers, medicines, dyes and technical skill.\textsuperscript{20} Notwithstanding the severe economic dislocation and disruption in all spheres of life, the contribution of India in general and Punjab in particular to the Imperial War effort was impressive and crucial.\textsuperscript{21} The British realized her importance in the overall War effort and not merely in the defense east of the Suez as Lord Curzon had once visualized. As an important source of manpower and munitions, they thought, India deserved to be built up as an industrial country.\textsuperscript{22} Many other factors such as the Mesopotamian disaster and the ensuing developments in Britain, the German advance in the east and apprehensions of India’s direct involvement in the War combined to effect a change in the British attitude favoring her industrialization.\textsuperscript{23}

Though Indian troops and majority of them was from the Punjab, were sent into action in all theatres of the War, their largest number was deployed in Mesopotamia. The planning of operations as well as the provisioning of the units by the General Staff and the Government of India, however, proved inadequate; and after the mission proved a disaster, the charge of operations had to be taken away from Delhi to London. Later, a Parliamentary Committee investigated the matter, as a consequence of which the Secretary of State of India, Sir Austen Chamberlain, had to step down; and his successor, Edwin Montague, had to declare a policy of granting to Indians an increased share in the government. This change in attitude could also be attributed to enhance bargaining position of the Congress after its electoral alliance with the Muslim League,\textsuperscript{24} and the persistent demands by Indians for self-rule and industrialization of the country.\textsuperscript{25}

\begin{footnotesize}
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  \item Rajat K. Ray, \textit{Industrailization in India}, p. 240.
  \item Government of India dispatch to Secretary of State for India dated 26\textsuperscript{th} November 1915.
  \item Johannes H., Voigt, \textit{India in the Second World War}, pp. 9-11.
  \item Resolutions of Indian National Congress (hereafter INC Resolutions) as nos. IX, 1914; XXI, 1915; XIV, 1918.
\end{enumerate}
\end{footnotesize}
Next to industry, agriculture appears to have attracted attention of the government most. This may be attributed to the increased demand for agricultural products during the War, the difficulty in procuring from abroad certain important agricultural products (as long-staple cotton from the USA) and the famine of 1918-1919.\textsuperscript{26} In 1916, two exclusive conferences, one at Pusa and the other at Simla, were organized by the Government of India to discuss agricultural improvement. The subject was taken up also by the Industrial Commission and its importance was underlined ‘in the most emphatic manner’.\textsuperscript{27} The government began to lose interest in the question of industrialization. The newly constituted departments of industries fared badly, and the wartime enthusiasm for industrial improvement waned before long.\textsuperscript{28} But the experiences of the War would not allow the matter pass off so easily. After all, they had vindicated the importance of India for the defense of the Empire. This, together with the impetus the War had spontaneously given to industries, kept the case of industrialization alive. Industrial exploitation of forests also gained prominence after the War. The British interest in forestry was very old;\textsuperscript{29} it increased considerably during the 1939 Wars as the import of many foreign materials became difficult when the Germans stepped up their submarine campaigns. The government, therefore, wanted to substitute them with local forest products. Forest products were needed to meet the enormous demands of the armed forces, and Indian timber was utilized in great quantity in several mid-Eastern theatres of the War.\textsuperscript{30} The government, therefore, initiated measures for R&D and Management, aimed at exploiting the forests, which continued till the end of World War II.\textsuperscript{31} However, the endeavor was marred by the shortage of staff once they were called for War duties; the economy measures and retrenchment of staff during the depression made matters worse. Transfer


\textsuperscript{29} \textit{Hundred Years of Indian Forestry 1860-1961}, Vol. I, Dehradun, 1961, pp. 72-84.

\textsuperscript{30} Ibid., pp. 79, 81.

of the subject from the Centre to the provinces further lessened the need for the
government of India to take interest in it.\textsuperscript{32}

British interest in developing transport and communications also had a long
history.\textsuperscript{33} The exposure of India’s backwardness in this sector during the World War I
revived the official interest in it once again. The initiative came right from the top. In
1920, the Secretary of State for India appointed a committee to enquire into the working
of the Indian Railways.\textsuperscript{34} Two years later another committee reported on the railway
industries.\textsuperscript{35} As a welcome development, the government also showed some interest in
developing the roads and mercantile marine sector. The Indian Mercantile Marine
Committee was appointed in 1923 upon whose recommendation a training ship called
‘Dufferin’ was established as a result in 1927. This was used for preliminary training in
marine engineering from 1935 onwards.\textsuperscript{36}

The rise in industrial production around the War and the expansion of industries
from 1920 onwards should not be attributed to any significant technological innovation.
While the increase in industrial turnover was due mainly to the maximum utilization
of production capacity under the exigencies of the War, the reason for the expansion of
industries can be found in the enhanced demand for industrial products, aggressive
nationalism and the depression. In reaction to the restrictive and discriminating policy of
the government during the War, economic nationalism surged aggressively after 1918.
Indian business houses expanded their industrial activities.\textsuperscript{37} Walchand Hirachand started
the Scindia Steam Navigation Company in 1919 and continued his fervour for economic

\textsuperscript{32} \textit{Hundred Years of Indian Forestry}, 1961, pp. 81-82.
\textsuperscript{33} J.N. Sahni, \textit{Indian Railways: One Hundred Years, 1853-1953}, New Delhi, 1953; Henry
\textsuperscript{34} \textit{Report of the Committee appointed by the Secretary of State for India to Enquire into the
Administration and Working of Indian Railway}, London, n.d.
\textsuperscript{35} \textit{Report of the Railways Industries Committee}, Delhi, 1923.
\textsuperscript{36} \textit{Progress of Education in India 1932-1937}, Vol. I, Delhi, 1940, p. 208.
\textsuperscript{37} Rajat, K. Ray, \textit{Industrialization in India}, pp. 96-113, 234-237, 276-282; A.K. Bagchi,
\textit{Private Investment}, pp. 210-211.
nationalism against the British in the years to come.\textsuperscript{38} G.D. Birla expanded his industrial activities, too.\textsuperscript{39}

\section*{II}

With the introduction of Provincial Autonomy in 1935, popular Congress ministries were formed in the majority of provinces in 1937. This placed the Congress in a new responsibility, and inspired others to come forward to work for national regeneration. A conference of its industry ministers was called in October 1938, which voiced the need for a comprehensive planning on an all-India level, and authorized the Congress President to take the necessary steps in this regard.\textsuperscript{40} Efforts were also made to promote modern industries in some of the provinces, but they failed because of official opposition and lack of resources, planning and co-ordination.\textsuperscript{41} Ultimately, all such efforts ended when the ministries resigned in 1939. However, the Congress did not lose sight of the urgency of economic recovery and reconstruction, for which it wanted a comprehensive planning on all-India basis. M.N. Saha promptly took advantage of the opportunity. In the meanwhile, he met with the Congress President, Subhas Chandra Bose, and persuaded him to appoint a committee for this purpose.\textsuperscript{42} Finally, the Congress constituted a National Planning Committee (NPC) in 1938, with the noted engineer M. Visvesvaraya as chairman. He was, however, soon replaced by Jawaharlal Nehru for the sake of expediency, and a very large number of Indian scientists, social scientists, industrialists and others joined the Committee in various capacities.\textsuperscript{43}

\begin{thebibliography}{99}
\bibitem{39} Medha Malik Kudaisya, \textit{The Life and Times of G.D. Birla}, Delhi, 2003.
\bibitem{41} ‘Report on the proposed Automobile Factory in Bombay’ (1939) in Confidential AICC File No. G-23/1940 (Kw-18, 19, 20, 21), at NMML, New Delhi; and Jawharlal Nehru, \textit{Discovery of India}, p. 411.
\end{thebibliography}
The World War II broke out in September 1939, and though far from the scene of action, India could not remain unaffected by the forces of change it unleashed across the globe. Myriad of problems of basic nature cropped up in the country; but what concerned the Government of India first and foremost were the immediate exigencies of the War. Military and strategic demands, obviously, stood at the top, and the government effort to meet them soon involved India in the overall War efforts of the British Empire and its Allies. It was in the context that science and technology assumed great importance; and, as the experiences would show later, the War exerted considerable influence both on their progress as well as the British policy governing them in India. On 3rd September 1939, Lord Linlithgow, the Viceroy of India (1936-1937, 1938-1943), declared India at War with Germany, through a Viceregal Proclamation. Unlike in the Dominions, in India this was done without consulting the members of the Central Legislature and the Council and, not less importantly, the Indian Political opinion. Under the Defense of India Rules, promulgated shortly afterwards, the government assumed sweeping powers. The Indian National Congress and others objected to the move but ultimately agreed to India’s participation in the War on the condition that freedom was granted to her as well. This was a tricky situation. So, to confuse the issue the Viceroy made what was then known as the ‘Delhi Declaration’ of 17th October 1939. The old offers of Dominion Status for India were repeated and more consultations with Indians were promised. But when this did not work, the government softened its attitude further and in order to seek the Indian support in the crisis, made the ‘August Offer’ (8th August 1940). It was a little more than a repetition of the 17th October 1939 offer which was, of course, followed by a few administrative measures aimed at satisfying the nationalist demands.44

As these moves and counter-moves were played out, the government stepped up efforts to gear up the Indian resources to deal with the exigencies of the War, not only in India but also at distant War fronts. One of the first steps taken by the government was to convene the Eastern Group Conference in 1940 in Delhi, which resulted in the formation, 

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44 Indian Annual Register, Calcutta, 1939, (Vol. II, pp. 26-228) recorded the day-to-day developments during the War. Amongst the later publications V.P. Menon, The Transfer of Power in India, Calcutta, 1957; and Johannes H. Voigt, Indian in the Second World War, New Delhi, 1987, are valuable sources of background information.
in February 1941, of the Eastern Group Supply Committee with headquarters in India.\textsuperscript{45} It did not take long to realize the immense potentialities of science, technology and military for the successful conduct of a modern war. In Britain, prompt measures were initiated, at official as well as non-official levels, towards various aspects of War production, supply and mobilization. A War Cabinet Scientific Advisory Committee was constituted in October 1940 and a British Commonwealth Science Committee the next year.\textsuperscript{46} Soon, Britain and her Allies entered into mutual consultations aimed at exploiting science for the War. Both Britain and the United States opened up Liaison offices in each other’s capital. A British Central Scientific Office was established in Washington towards the end of 1940 followed by the United States Office for Scientific Research and Development in London early the following years. As the War escalated and mutual cooperation became vital, a Mutual Aid Agreement between Britain and America was signed in February 1942.\textsuperscript{47}

Keeping in view the fast changing nature of the War and its gravity, the ambit of this collaboration had to be soon expanded to include the whole of the British Empire, the Dominions and beyond. This was essential also for safeguarding the long-term economic, political and military interests of the Empire.\textsuperscript{48} When the Japanese joined the War and the centre of the conflict shifted to the East, India assumed a pivotal position in the global strategy of the British Empire and the Allies, and her resources needed to be developed and exploited.\textsuperscript{49}

In India, realization of the value of science in the contemporary crisis came after bitter experiences. As the War raged, it badly exposed India’s technical and industrial


\textsuperscript{47} Hancock and Gowing, \textit{British War Economy}, 1949, esp. chapters 7, 8, 18.

\textsuperscript{48} \textit{Ibid.}

backwardness and her dependence on others for a large variety of goods and commodities essential not only for the wartime requirements but also in the times of peace. Not to talk of the numerous War supplies, the country was unequipped even to service and maintain the defense equipment and such basic necessities as transport and communications system. This displayed India’s utter inadequacy, in terms of quantity as well as quality, in the technical infrastructure and know-how. There were, no doubt, a number of scientific institutions and organizations in the country, but there was no integrated central control and coordination amongst them. Needless to say, there was no uniform official policy governing science and technology either. But the War compelled the authorities in India to have a fresh look at things and make the best use of science for victory. The understanding and activities in England and the Allied circles did have immediate repercussions in India. In response to the call for cooperation within the Commonwealth and amongst the Allies for the War, India opened her liaison offices in London and Washington; scientific and technical missions were exchanged and by 1942, a War Resources Committee was constituted. A range of activities followed in the years to come.

The need for immediate supply of technical personnel to the fighting machinery and scores of industries that backed up the gigantic War effort was a matter of first and foremost concern. Introduction of sophisticated weapons and machinery including the aero planes added urgency to the matter. This was the reason why the Government of India was jolted out of inaction all of a sudden and compelled to encourage technical education. Industrialists showed interest in it because they, too, needed more technical hands for stepping up their production. For the average middle class Indian, technical degrees became a route to better employment. Realizing that trained technicians were not readily available in the country, the government resorted to emergency measures. In June 1940, a War Technicians’ Training Scheme was introduced. The existing technical

51 For organizational activities, see S.C. Aggarwal, History of the Supply Department 1939-1946, New Delhi, 1947; and N.C. Sinha and P.N. Khera, Indian War Economy (Supply Industry and Finance), 1962.
Resource Mobilization

Institutions, factories and workshops (especially those attached to the ordinance factories and the railways) were pressed into service wherever possible, and a target to train 52,000 persons by 1943 was fixed. Under the plan for technical training drawn up by the Labour Department of the Government of India, about 300 training centers were developed and by 1945 as many as 80,000 men had been trained most of whom were absorbed into the army. The need was so pressing that the government did not hesitate in starting such technical training centers even at places like the College of Engineering and Technology, Bengal, at Jadavpur, which had otherwise been the citadel of the National Education, in India. Liberal allowances were given during the period of training. About a hundred special technical instructors were requisitioned from England. Under the Bevin Training Scheme, young Indians aged 20 to 30 years were trained at selected centers in England in engineering trades and in the principles of labour organization. The first batch, four batches the next year on their return, they were employed in responsible supervisory posts including in the army.

The fall of France in June 1940 and the Japanese advance towards India changed the whole strategy of the War. In the new scheme of things, India assumed greater importance than ever before. Now the battle was to be fought and won in Asia, for which India was to be used as a base both for supply and operation. The British and the Allied effort were, therefore, concentrated on India in order to develop her into a strong base, sufficiently independent in resources and powerful enough to check the Axis advance. Soon India was taken into Allied planning and measures were set afoot to develop her accordingly. Two factors required urgent attention: (i) the country required to be provided with enough facilities for servicing and maintenance of military machines and equipment; and, (ii) her industries were to be geared up to cater to the War efforts and tide over the economic crisis caused by the War. In order to ensure this, expert missions

from the Allies, the UK and the USA in particular, visited India in quick succession. This was reciprocated by the visits of Indian technical teams abroad.\textsuperscript{56}

The Ministry of Supply (Roger) Mission from Britain visited India in September 1940. But the visit of the American Technical Mission in 1942 was more important in many ways and influenced the developments in India considerably. The Mission, with Henry F. Grady as Chairman, arrived in New Delhi on 17\textsuperscript{th} April 1942 and worked in India for the next five weeks conferring with officials of various departments of the Government of India and of some of the provinces and states. It also conferred with industrial leaders, businessmen and Chambers of Commerce in New Delhi, Calcutta and Bombay. It visited government munitions factories, railway workshops, shipbuilding and ship-repair shops, and the principal industrial plants engaged in the production of War materials in and around Calcutta. It also inspected the Tata Iron and Steel Company at Jamshedpur and major industrial plants at Bombay and the Karachi port.\textsuperscript{57} The Mission emphasized the strategic importance of India to the cause of the United Nations and her great potential for industrial production of War material because of her vast natural and human resources: It believed that India was great strategic importance to the cause of the War and United Nations. On this and the allied subjects, expert committees were also constituted internally to advise the Government of India. An Industrial Utilization Committee was appointed in 1940 followed by an Industrial Research Fund the next year. A Directorate of Merchant Ship Repairs was constituted in 1942, and the same year the Grant Massie Committee was convened to advise on the procurement and production of surgical instruments. The UK Machine Tool Mission visited India in July 1944. Most of these Committees had a bearing on the introduction and expansion of new technology in the country, and suggestions of some of them led to increase facilities for technical education. In order to make available a sufficient number of technical personnel for the post-War needs, the government instituted an Overseas Scholarship Scheme towards the end of 1944. An elaborate arrangement was made in this regard and students were sent to


the UK and the USA for studies. Away from such emergency measures, technical education continued to be imparted as usual at its traditional centers, viz., universities, and schools as well as at workshops of government establishments like the ordnance factories and the railways, and at workshops of private enterprises like the one at Jamshedpur. But the state interest in these centers was limited only to such technical courses as were of immediate value for the War. Otherwise, the government was rather indifferent to the purely academic aspect of the subject. No doubt, a new Polytechnic School was started at Delhi in 1941 and new technical courses were introduced or old ones reframed at the various universities in India, but most of the academic centers concerned were starved of funds and staff during the War.

However, we cannot overlook certain positive developments. When the War started, technical education was not organized in the country, especially in the Punjab. This had been promoted until then only to meet the demands of such sectors as the railways, ordnance factories and a limited number of industries. There was no long-term government policy in the matter, and institutions of technical education suffered from a plurality of authority, absence of coordination and planning, and from the paucity of funds and resources, but the War and the enhanced indigenous demand for technical education obliged the government to promote it systematically. One of the first important steps taken in this direction was the foundation of the Association of Principals of Technical Institutions, India, in 1941. The most important step taken by the government was the appointment of the Technical Education Committee in 1943. It began with a discussion on the problem and prospects of technical education. It attributed

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60 Departmental proceedings are full of references to war-time cuts in finances to scientific institutions.


the restricted demand for technically trained hands in India to be limited and uncertain job opportunities, the practice of filling more remunerative posts with imported technicians and to the traditional dislike of the middle and upper class Indians for taking industrial occupations.\textsuperscript{63}

The concentration of Allied troops (along with the expanded Indian Army) in and around India required the supply of hundreds of items from arms and ammunition to clothing, food and medicine. The Indian army expanded in size from just over 2,5,000 in October 1939 to over 2,251,000 in July 1945. All this necessitated revamping of basic amenities like transport and communications, and health services, along, of course, with increased defense preparedness. Thus, in a situation of acute disruption in imports and dislocation of economy, self-sufficiency in production and supply was vital.\textsuperscript{64} The Government of India, therefore, moved forward, albeit belatedly, to accord priority to technical support for stepping up industrial output. Encouragement was given to a wide range of industries producing goods and articles needed for the War such as those dealing with arms and ammunition, machine tools, engineering, transport and communications, etc. In the areas where industries already existed, the government encouraged increased production; where they did not, incentive and licenses were given to start new ones.\textsuperscript{65} The direct involvement of the government was, however, confined mostly to industries catering to the defense needs. In order to boost the industrial production, the government also allowed private firms to expand and diversify. In a few cases, it collaborated with them, as with the Tatas for the production of armored vehicles, railway equipment, steel and aircraft,\textsuperscript{66} and with Walchand Hirachand for aircraft.\textsuperscript{67} The collaboration came by

\begin{thebibliography}{9}
\bibitem{63} Report of the Technical Education Committee of the Central Advisory Board of Education in India (1943-1946), Delhi, 1946, pp. 1-2.
\bibitem{65} S.C. Aggarwal, History of Supply, 1947 is a very useful source on the subject. Also see Statistics relating to India’s War Effort, Delhi, 1947.
\bibitem{66} Tata Papers: Serial No. 75, Cupboard No. 1, File Nos. 8, 14, 28, 32, 44, 42, 43, 47 (December 1938-December 1947); Serial No. 76, GOI Cardboard No. 1, File No. IV,
\end{thebibliography}
way of assurance to them for the purchase of goods produced or also by holding shares.\textsuperscript{68} Initial response of the government was rather curious, though not unexpected altogether. Austerity and economy, and not science, appeared to be their first concern. As a result, a proposal was put forward to abolish the Industrial Intelligence and Research Bureau as a measure of wartime economy. Fortunately, the Member of the Department of Commerce, Ramaswamy Mudaliar, realized the value of industrial research in wartime. He contended: ‘In wartime no economy can be too disastrous which starves industrial research and not expenditure too high which mobilizes the scientific talent of the country for the research and production of War materials’.\textsuperscript{69} As the Member of the Department, Mudaliar became the first Chairman of the Board and S.S. Bhatnagar (1894-1955), the then Head of the Punjab University Chemical Laboratories, Lahore, was appointed Director, Scientific and Industrial Research, as the next person.\textsuperscript{70} As the War gave impetus to the research activities of the Board, it was able to work out, within a year, several processes in its laboratories for industrial utilization. They included a method for the purification of Baluchistan sulfur, anti-gas cloth manufacture, dyes for uniforms, development of vegetable oil blends as fuel and lubricant, plastic packaging for army boots and ammunition, and preparation of vitamins.\textsuperscript{71}

Meanwhile, as India’s importance in the Allied strategy increased further, the question of industrialization became paramount and industrial research important.\textsuperscript{72} By this time, considerable pressure of Indian public opinion, too, had built up in this

\begin{itemize}
\item Items 33, 36, 39; Serial Nos. 92, 96, Cupboard No. 1, at TISCO Division, Bombay House, Bombay; and Verrier Elwin, \textit{The Story of Tata Steel}, Bombay, 1958, pp. 87-89.
\item See also, S. Subrammanian and P.W. Homfray, \textit{Recent Social and Economic Trends in India}, New Delhi, 1946.
\item Shiv Visvanathan, \textit{Organizing for Science}, Delhi, 1985, p. 117.
\item Commerce Department Resolution No. 148-S&T (I)/40, 27 April 1940.
\item S.S. Bhatnagar, \textit{A Brief Account of the Activities of the CSIR’}, ACC No. 361, f2-678-RU (undated), NAI.
\end{itemize}
Thus, by the middle of the War, India came to have an all-India organization of industrial research with four composite bodies dealing with different aspects of scientific and industrial research. They were the BSIR, Industrial Research Utilization Committee, CSIR, and Directory of Raw Materials. Of these, the CSIR was the supreme body. Though chronologically the youngest, the Council held ‘a unique position by the comprehensiveness of its functions and scope’. The stimulus the War provided to industrial and scientific research had some productive repercussions in the major provinces and native states. It may be recalled that the Twelfth Industries Conference held in 1940 had recommended the establishment of local research committees in the provinces and states to form a liaison with the Board of Scientific and Industrial Research. In pursuance of this suggestion, the Government of India directed the provinces and states, in early 1941, to institute such committees. Before this date, the only provinces which had research organizations of this kind were Bengal (since 1940) and Bombay (since January 1941). In response to the Central move, provincial research committees were formed in the United Provinces, Bihar, Orissa, Madras, the Central Provinces, Berar, and the Punjab during 1941-1942. Among the Indian States, constitution of similar organizations in Hyderabad, Mysore, Travancore and Baroda deserve special mention.

As the importance of industries for victory in the War became clear to the government and the needs for substitutes made industrialization unavoidable, the government was obliged to consider the question of industrial research more seriously

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74 Ibid.

75 Proceedings of the Twelfth Industries Conference, Bulletins of Indian Industries & Labour No. 71, Simla, 1941, 34.

76 Report Industrial Research 1945, pp. 110-112.
and with a long-term perspective in mind. The Committee was directed to make a survey of the existing facilities for scientific and industrial research existing in India including the Indian States (in the universities, research institutions and laboratories attached to industrial and other concerns); and plan a scheme of coordinated expansion of research activities by private firms, research institutions and states and others research establishments.

Being a mode of primary production, agriculture could not be separated from industrial activities. Needless to say, it was the mainstay of life for millions in India, besides being the greatest source of revenue for the government and an important source for the export trade. Keeping in view the fact, it was not a high priority on the official agenda until recently, the government's enhanced interest in its development, during the World War II, merits some explanation. The War, of course, was the greatest factor behind this change in the attitude. Besides the vastly increased demand for food supply to the armed forces-British Indian and Allied-in and around India, the War requirements included a variety of other agriculture and allied products, ranging from dairy products to jute, silk, wood, lac and pack animals like horse. Obviously, these demands were over and above the existing usual demands for the civilian population which had risen perceptibly over the past years. To add to the urgency in the matter, a major famine occurred in some parts of the country in the midst of the War and compelled the government to initiate administrative measures for agricultural improvement. The government focused its efforts in three directions; (i) to increase the financial resources for training, research and extension; (ii) to direct the educational and research activities towards specific War needs; and (iii) to improve the organization and planning for agricultural education, research and extension. When the War broke out, the financial

77 Transfer of Power, Vol. IV, 324; See also, Proc. Of the Industries Conferences.

78 For the list of the members of the Industrial Research Planning Committee, see Appendix IV; See also, Industrial Research 1945, pp. 1-2.

79 S.C. Aggarwal, History of Supply, 1947, esp. Chapters LIX, LX, LXII, LXV.

80 S. Subramanian, Statistical Summary of the Social & Economic Trends in India (In the Inter-War Period), Delhi, 1945, esp. pp. 1-3.

position of the Imperial Council of Agricultural Research, the apex body dealing with agricultural sciences was quite insecure and it was not able to plan and execute long-term research programmes. In order to remedy this, the Government of India passed an Agricultural Produce Cess Act in 1940 and the annual income of Rs. 14,00,000 from this cess was proposed to be spent on agricultural research schemes.\(^{82}\)

In response to the pressing demands during the crisis, scientific activities in the field of agriculture were directed primarily towards finding substitutes for the various materials whose import had been disrupted, demands increased or created on account of the War. Studies and experiments were encouraged to exploit agricultural products and by-products like biogases and molasses, for producing alcohol, paper pulp and insulating materials, industrially.\(^{83}\) Research was also carried out on several plants to find substitutes for rubber and fiber.\(^{84}\) But a greater attention was paid to forest products. The War created an enormous demand for Indian wood. It was required for a variety of purposes but especially for the extension of the railways both in India and at different theatres of the War abroad, where a huge supply was made throughout the conflict.\(^{85}\) Efforts were, therefore, made to maintain the availability of wood and to add strength and longevity to it through improved seasoning and other processes. Experiments were also conducted to use wood as a substitute for metal.\(^{86}\) Wood, along with other plants and a variety of forest products, was subjected to investigation and research to obtain chemicals or their substitutes to be used for the production of such materials as waterproof paints and varnishes and fire extinguishing substances. Similarly, as the demand for silk increased high on account of its use in the manufacture of parachutes, sericulture engaged considerable attention during this period.\(^{87}\)

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82. S&C, V, 10\(^{th}\) April 1941, p. 574.
85. *India’s Forest and the War*, Delhi, 1948; and *100 Years of Indian Forestry 1861-1961*, Vol. I, 1961, p. 83.
86. *Ibid.; Annual Report* of the FRI for the relevant years.
Besides using agro-forest resources for the War, attempts were also made to utilize ammonium nitrate and its mixtures with TNT from surplus ammunition stores as a fertilizer. However, the intentions behind the increased state interest in meteorology and locust control may not be read in isolation from the aviation requirements during air operations. Likewise, the rise of subjects like statistic and agronomy around this time was largely due to the official concern for exploiting agricultural resources commensurate with the demands of the War. Here it may not be out of place to mention that throughout the War, Indian forests were exploited on an unprecedented scale leading to their fast depletion and that of the life and ecology dependent on them. The War marked a watershed in the history of ecology and conservation in India, but the government does not appear to have taken up any significant remedial measures in this regard, except a forestation in some parts of the country. The damages caused by the War to the ecology and environment of the country, especially in the north-east and other forest tracts, are yet to be examined properly.

Meanwhile, government concern for stepping up farm production continued and was in fact heightened as the War escalated and a famine struck Eastern India in 1943. The need to provide adequate supply of food to the armed forces was an urgent necessity. As the situation worsened when the famine started showing its effects, public demand for effective remedial measures rose high. The initial official response was concerned mainly with the growing military demands and the disruption in trade and supply. A beginning towards stepping up food production had been made when the government launched the ‘Grow More Food’ campaign in 1942 and ‘Food Conferences’ became a

88 Scientific Reports of the IAR, 1944, p. 16.
89 Hundred Years of Weather Science, 1875-1975, Poona, 1976; Scientific Reports of the IARI for 1944; p. 11; the same for 1945, p. 12.
90 Annual Report IVRI, 1940-1941, p. 5.
frequent affair from that year onwards. While the food conferences endeavored to study and monitor the food situation and planned for improvement in the future, the ‘Grow More Food’ campaign aimed at stepping up actual production in the field. The campaign resulted in an increase in acreage of cultivated area as well as in the production of food grains, but it did not imply and direct attempt to promote agricultural innovation. Its objective was to increase the production of food crops only and, as far as possible, with the help of existing resources. The result was that in many cases there was not only no increase in the output (despite the increase in acreage) but the yield actually came in many others. In cases where the production went up, the increase could be attributed to favorable weather conditions or to the expanded acreage resulting from the widespread propaganda. The campaign did not address such basic issues as the improvement of the production capacity of soil or of offering incentives to the tiller. Later, at a certain stage, the government toyed with the idea of technological innovation and more relevant research in agriculture but nothing significant appears to have come out of it.

From the viewpoint of scientific advancement, the official attention and encouragement to animal husbandry and veterinary sciences was impressive. The institute dealing with animal husbandry at Bangalore and the Imperial Veterinary Research Institute (IVRI) at Mukteswar and Izatnagar in Uttar Pradesh carried out wide-ranging activities involving R&D to cater to the War needs. This included the study of diseases, development and production of vaccines, acclimatization and high-breeding. In spite of the strain caused by the War on financial and human resources, the work of the IVRI continued to be diversified. This, as also the future needs, created the necessity of additional staff. Realizing its importance, the Central Government showed keen interest in the matter and a plan for post-War reconstruction was considered essential.

93 Report of the Food grains Policy Committee 1943, Delhi, 1944, p. 20; Procs. Of the First Food Conference (December 1942), Calcutta, 1944, and subsequent proceedings.
95 W. Burns, Technological Possibilities of Agricultural Development in India: A Note, Lahore, 1944.
Gradually, a shift occurred in the nature and scope of the work of the IVRI. The fact that the government evinced interest in veterinary sciences is evident also from the volume of financial allocation for it. Despite its limited scope of work, the IVRI annually received a larger financial grant (Rs. 10.75 lac in 1944) than the Imperial Agricultural Research Institute (Rs. 8.5 lac) for the same period\(^98\) which had a far wider scope of work and activities. This may be attributed to the overriding government concern for military demands for animal food (milk, butter, meat, eggs, etc.), animals for transportation (horses and camels) and wool and leather. In order to boost dairy production, the government established an Imperial Dairy Research Institute in 1941.\(^99\) As the demand for milk for the armed forces increased tremendously, milk supply to big towns became a problem. To meet with the situation, the government decided to entrust the distribution of milk in metropolitan cities to property constituted milk marketing organizations. A Milk Marketing Adviser to the Government of India was appointed and the Chief Executive Officer of the British Milk Marketing Board, R.A. Pepperell was selected for the post. He conducted a detailed survey and made elaborate recommendations. More administrative measures followed, which, in turn, invited the attention of the provincial governments to the matter.\(^100\) As the War lingered and the food situation deteriorated, the material life of millions depending on the rural economy did not show any signs of improvement. The colonial government, now in a more compromising and yielding mood, was, therefore, compelled to pay more attention to the situation.\(^101\)

Towards the end of the War, Herbert Howard, Inspector General of Forests, Government of India, made out a note on a Post-War Forest Policy for India mainly in order to regenerate and rehabilitate the over-worked forests and improve their management. This resulted in a number of development schemes involving plantation activity, better research and service facilities.\(^102\) Reference in this regard may also be

\(^{98}\) A.V. Hill, *Scientific Research in India*, 1944; Simla, 1945, p. 23.


\(^{102}\) Herbert Howard, *Post-War Forest Policy for India*, Delhi, 1944; 100 Years of Indian Forestry, 1961, p. 83.
made to other official memoranda on subjects like agriclogical development, forestry and fisheries.\textsuperscript{103} The views and suggestions contained in these papers placed emphasis on research and training and expected the government to follow an active policy-open, wide and forward looking in perspective, and responsive to the local needs. While the authorities carried on their exercise to draw plans for the future, which they were not all sure to execute, the British scientific opinion came out with a clearer vision and support for agricultural improvement in India. A.V. Hill, for instance, declared agriculture ‘by far the most important industry and interest in India’, and pleaded for its ‘great expansion’ to supply adequate food and better nutrition for India’s vast population that was likely to increase considerably in the years to come and to provide for expansion of crops required for industry and export.\textsuperscript{104}

Medical science and health care were another area that engaged the attention of the government. The subject was a favored one right from the beginning as far as state interest in it was concerned. It was one of the most organized sectors with a highly developed service cadre, a professional association and scores of research centers scattered all over the country. Yet, medical education continued to remain in a poor state and the research centers seldom went beyond collecting data to be utilized in Britain, training to technical personnel and production of vaccines.\textsuperscript{105} The condition of public health was precarious and that of health care facilities worse. The average life expectancy of an Indian was 32.5 years, only half of that in most of the developed countries.\textsuperscript{106} In 1937, the death rate in British India was 22.4 per 1,000 and for infants or children under one year of age it was 172 per 1,000 live births. In 1941, the corresponding rates were 21.8 and 158 per 1000 respectively. As regards the health care facilities, while there was

\begin{itemize}
  \item \textsuperscript{103} Memorandum on Agric-logical Development in India, Advisory Board of the ICAR, Delhi, 1944; Baini Prasad, Post-war Development of Indian Fisheries and Memorandum, Delhi, 1944.
  \item \textsuperscript{104} A.V. Hill, Scientific Research in India, 1944, pp. 23-25, 37-38; his Radio Broadcasts: The National Purpose: Science and Technology in the Development of India, 7\textsuperscript{th} March 1944, Delhi; and Science and India, 30\textsuperscript{th} October 1944, 2170 (MSS), pp. 10ff, A.V. Hill Papers.
  \item \textsuperscript{105} Anil Kumar, Medicine and the Raj, New Delhi, 1998; Radhika Ramasubban, Public Health and Medical Research in India: Their Origin under the Impact of British Colonial Policy, Stockholm, 1982.
  \item \textsuperscript{106} S&C, V, 4, October 1939, p. 199.
\end{itemize}
one registered doctor to every 1,048 of population in Britain, this ratio was one to every 9,300 persons in India. On the scale of Western countries, India required 200 thousand qualified doctors to take care of her village population, but after 75 years of effort there were only 35 thousand doctors of whom only 15 thousand resided in the villages.\textsuperscript{107} The expenditure on public health in England and Wales was 1-0-9 d per capita per annum; in India, the different provinces spent only form \(\frac{1}{12}\)th to \(\frac{1}{120}\)th of the average of England.\textsuperscript{108} And from the point of view of public health planning, India stood where Great Britain stood 100 years ago and USA and USSR 75 and 20 years ago respectively. What was alarming was that whereas the vital statistics of health were fast improving in the developed countries, it was going downward in India. She had failed to make adequate use of scientific knowledge for improving her public health. There was not an all-India health policy and the basic principles of sound public health were violated. Medical education was backward and supply of technical personnel defective, not to mention the ever present financial handicaps. Moreover, there was lack of institutional planning and coordination amongst the departments concerned. Obviously, everything was to be done in a great measure, even if it was to be the bare minimum of facilities, to restore the health of the millions in India, for which there was a persistent local demand.\textsuperscript{109}

Smallpox, malaria and tuberculosis were endemic and a national scourge.\textsuperscript{110} It was difficult to save the fighting troops and other British from these deadly diseases. The government was particularly alarmed at this point of time by the increase in their incidence and their adverse consequences for the military operations on the eastern front along Assam and Burma, whose humid climate and jungles bred several tropical diseases.

\textsuperscript{107} S&C, IV, 8\textsuperscript{th} February 1939, p. 467; \textit{Ibid.}, V, 4, October 1939, p. 199. Also see the statistical chart in the \textit{Health Survey}, 1946, p. 43.

\textsuperscript{108} S&C, V, 4, October 1939, p. 199.

\textsuperscript{109} A.C. Ukil, \textit{Public Health and its planning in India}, S&C, VI, 9\textsuperscript{th} March 1941, p. 531, 536-539. Also see S&C: IV, 5\textsuperscript{th} November 1938, pp. 285-287; IV, 7\textsuperscript{th} January, pp. 408, 410, IV, 8\textsuperscript{th} February, pp. 466-468, 1939; VI, 9\textsuperscript{th} March 1941, pp. 535-568.

\textsuperscript{110} \textit{Health Survey}, Vol. I, 1946, pp. 10-11, 90-128. Also see S&C: S.N. Sen, \textit{War and Tuberculosis}, VIII, 12\textsuperscript{th} June 1943, 491-494; G. Ghose, \textit{Malaria in Bengal-A Scientific Problem}, IX, 11\textsuperscript{th} May 1944, pp. 495-499.
The incidence of these diseases in the civilian population increased because of shortages of drugs, lack of proper medical help, poor food supply, malnutrition and insanitation.\textsuperscript{111} The scarcity of drugs and non-availability of adequate medical assistance was, obviously, caused by disruption in imports and internal distribution, and increased consumption of medical resources by the armed forces during the War. For poor food supply nothing could be held more responsible than the official neglect in the matter. Of course, there was a terrible famine right in the middle of the War but it could have been averted or its effects minimized, had there been a sincere and timely action by the government.\textsuperscript{113} Whatever the causes or effects of these factors, the prevailing conditions exposed the extreme backwardness of the country in matters of health care and sanitation, her dependence on others for medical supplies and, above all, the appalling official indifference and narrow priorities in the matter.\textsuperscript{114} Ironically, however, both the diseases and the World War came as great equalizers. Under the stress of the conflict, the government had no option but to act. The onslaught of epidemics could not be postponed or countered by indifference or a piecemeal approach, especially when there was the extreme urgency of winning the War in which an ill and incapacitated soldier was, indeed, a dangerous proposition. The persistent and increasingly loud demands by Indians, scientists in particular, for better health care, nutrition and sanitation also forced the authorities to take action.\textsuperscript{115}

All this produced considerable effect on the minds of both the Indians as well as the British. Indians stepped up and widened their demands for better health care, nutrition and sanitation, compelling the authorities finally to come to terms with the local needs.

\textsuperscript{111} S&C: VIII, 3\textsuperscript{rd} September 1942, pp. 132-133; VIII, 7\textsuperscript{th} January 1943, pp. 491-494.
\textsuperscript{112} Famine Commission Report, 1945, esp. Part-II; also see Health Survey, 1946.
\textsuperscript{114} S&C: VIII, 2\textsuperscript{nd} August 1942, pp. 83-84; VIII, 3\textsuperscript{rd} September 1942, pp. 134-137; H. Ghose, 1943; X, 7\textsuperscript{th} January 1945.
\textsuperscript{115} Ibid., Also see S&C: V, 4\textsuperscript{th} October 1939, pp. 190-202; VI, 3\textsuperscript{rd} September 1940, pp. 123-125; and A.C. Ukil, Some Aspects of Public Health in India, Presidential Address, Indian Science Congress, January 1941.
and plan for the future on a long-term basis.\textsuperscript{116} This change in the official attitude in India was encouraged also by the developments in Britain and other developed countries of the West. In May 1943, the UN Conference on Food and Agriculture endorsed the principle that governments were responsible for introducing general and specific measures for improving the diet of the people. It suggested that the state of nutrition of the population be investigated by medical and public health workers and that crop planning, production of new varieties of seed and other such matters be decided on nutritional advice.\textsuperscript{117} The new concern for the people’s health and well-being soon found considerations at the League of Nations and its organs like the International Labor Organization (ILO). These bodies imposed on the Government of India a more formal obligation to maintain its subjects at a minimum level of health and sanitation which was occasionally monitored through inquires and international deliberations under the auspices of these world bodies.\textsuperscript{118}

These factors apart, the sheer demands of the War prompted several measures with welcome consequences. As in other fields, the first official initiative came in the form of reorganization and revamping of the medical services of the armed forces. During the War, utter inadequacy of medical cover for the expanding Indian army was strongly felt; steps were, therefore, taken on emergency basis to train medical personnel to meet the requirements. Seven medical schools were expanded and upgraded to the level of colleges and two new ones were started to produce medical graduates. Licentiates of the IMD were put through special intensive courses which brought them to a standard level in six months. Women with a reasonable knowledge of English were given three-month basic training in nursing at specially selected hospitals, who were subsequently absorbed into other hospitals to work under qualified nurses.\textsuperscript{119} Similar steps were taken

\textsuperscript{116} Transfer of Power, Vol. IV, Entry 36, pp. 66-73.


\textsuperscript{118} Ibid. Also see Annual Report of the Public Health Commissioner with the Government of India, for 1940, pp. 109-110; for 1943-1944, pp. 38-39; for 1945, p. 84; for 1946, pp. 116-117.

\textsuperscript{119} S.B. Singh, Second World War as Catalyst for Social Change in India, Delhi, 1998.
to produce radiographers, laboratory assistant, dispensers, male nursing orderlies and the like. Thus, by the end of the War India had a fairly good number of specialists who had been trained by physicians and surgeons from the UK, besides medical technicians in various categories. When discharged from military duty, many of these were employed as instructors to impart training in their areas of specialties. In the Indian military Medical Services, between 1940 and 1945, the number of personnel of different categories increased from 9,270 to 1,69,325. To treat about 5 million sick and wounded, hospital beds were increased from 11,100 to 1,97,530.\footnote{Seminar, September 1994, p. 30; also Report Health Survey, Chapter 13.}

The facilities for laboratory investigation and diagnosis of diseases were also improved. Clinical pathological services were made more up-to-date and provided with specialists and skilled technicians. The establishment of the Central Military Pathological Laboratory was an important step in this direction. In an effort to cater to the needs of the War, some of the military hospitals became amongst the best hospitals in the country and set standards for others.\footnote{Indian Information, 1\textsuperscript{st} August 1944, p. 93.} Casualties and physical injuries to soldiers during fighting operations brought into focus the importance of blood transfusion as one of the most valuable procedures of treatment for saving lives. So, an Army Blood Transfusion Service (India) was set up. The blood depots at Dehradun and Poona were equipped with modern facilities for the preparation of blood products and for the assembly and sterilization of specialized apparatus used for collection and transfusion of blood.\footnote{S.B., Singh, Second World War, 1998, pp. 133-134.} Another contribution of the War to medical science in India was the introduction of new medical specialties and the improvement and expansion of older ones. Not unexpectedly, the beginning in this regard was made in the army medical services. While physicians and surgeons were already available, more exclusive specialties were developed in branches such as anesthesia, radiology, pathology, ophthalmology, neurology and oncology. Two specialties that deserve to be especially mentioned were physiotherapy and rehabilitation, and psychiatry.\footnote{Ibid., pp. 133-135.} While the former was crucial in treating injuries to
the limb and bones of the fighting forces, the latter helped them keep in good mental health and morale. Once the War was over, these specialties were beneficially used to treat the civilian population.\textsuperscript{124} Similarly, special emphasis was placed on subjects like nutrition, for which concrete steps were taken. Efforts were made to boost the supply of milk, fruits and vegetables.\textsuperscript{125}

Transport and communications was an area which received an uneven and selective attention in the colonial period. Ships had brought the British and their European cousins to India; later they were aided by the railways to expand and consolidate the Empire. In the process, indigenous tradition of seafaring and shipbuilding was done to death. The railways spread, no doubt, but only on selective routes to facilitate the mobilization of the fighting forces and colonial trade. In the circumstances, other means of transport were badly neglected, most of all, the roads—the principal mode of mass transportation in India. As regards the telecommunications, telegraph had come to India with the railways, but its use and expansion were guided essentially by the colonial requirements. Wireless and radios came rather late and became a matter of public concern not before 1939. The railways had been an area of prime interest to the British in India, and with liberal official support it had developed unhindered until the World War I.\textsuperscript{126} However, once the strain of the global War fell on it, it could not hide its weaknesses.\textsuperscript{127} So, in order to get it out of the crisis, the government appointed, in 1920, the Indian Railway Committee under the chairmanship of Sir William Acworth, to advice on its administrative and financial management. The committee suggested major changes in the matter. It recommended, among other things, a complete separation of the Railway Budget from the General Budget of the country, a suggestion that was introduced from 1924.\textsuperscript{128} The government also accepted the broad principles enunciated by the committee

\textsuperscript{124} Indian Information, 1\textsuperscript{st} August 1944, p. 93; and 15\textsuperscript{th} January 1944, 95.
\textsuperscript{125} S.B. Singh, Second World War, pp. 136-137.
\textsuperscript{126} Ian J. Kerr, Building the Railways of the Raj, 1850-1900, Delhi, 1995; John Westwood, The Railways of India, Newton Abbot, 1974.
\textsuperscript{128} Ibid.; also see Report of the Committee appointed by the Secretary of the State for India to Enquire into the Administration and Working of Indian Railways, London n.d.
in connection with the reorganization of the railways. Yet the railways could not escape the adverse effects of the Great Depression. The government initiated remedial steps with the probe into the finances of the railways and economy measures; in addition, it voted, in 1932, a sum of Rs. 150 crores (15 million) for capital expenditure on railways for the next five years. But this could not prove of much avail.\footnote{Refer to reports of the Inchcape Committee, 1932, and the Wedgewood Committee, 1936.}

The World War II made matters worse. It imposed a severe strain on the railways. In addition to the movement of troops and supplies, civilian traffic and traffic of commercial goods also rose rapidly with the increasing industrial activities in the country. There was no alternative means that could be equally efficient. The traffic which used to be carried along the coast in modern steam or traditional sailing vessels before the War had to be diverted to the railways, not because it was faster but also because of the dangers of sea transport in times when the submarine operated ruthlessly. To add to the problem, even some of the waters close to the Indian coast were mined. Available shipping space, moreover, had to be diverted to the carriage of troops and munitions to and from the various theatres of the War. This considerably diminished the shipping space for other ordinary freights. Another alternative, the motor transport, was equally scarce. With the passage of the War, shortages of automobiles, their fuel and accessories increased on account of the disruption in supply as well as their enhanced use for the mechanized units of the armed forces.\footnote{Ibid.; also see NPC Series: \textit{Transport}, 1949, pp. 227-228.} All these factors and many more brought pressure on the railways. But the acute shortage of supplies of spares and exigencies of the War led to the postponement of maintenance and expansion activities, except in the most essential cases. Once India became the base of Allied military operations in the East after 1941, the fate of the Indian railways was doomed further even though it was a period of financial prosperity for it.\footnote{Dubey, \textit{Railways}, 1983, p. 343.} The maintenance and mobilization of the Allied forces inside the Indian subcontinent put the railways under increased stress. Its
workshops which could have been used for R&D to enhance its own unconnected with the railways and most of them for use at overseas War fronts.\textsuperscript{132}

In the circumstances, the roadways held out a better opinion for the Raj. Large-scale road building in British India had begun in 1830 when the Grand Trunk Road and other projects were under-taken and the Public Works Department came into being.\textsuperscript{133} However, in the years that followed the railways received greater official attention than the roads. Yet the importance of roads in India could not be overemphasized. The Royal Commission on Agriculture rightly drew the attention of the government to the urgency of good communications in the context of agriculture and rural improvement in the country.\textsuperscript{134} In 1927, the Government of India appointed a Road Development Committee under M.R. Jayakar to advise on the development of roads. The Committee emphasized the need of developing roads for the progress of the rural society.\textsuperscript{135} On its advice, a Central Road Fund was created in 1930. From 1930 to 1945, the mileage of surfaced roads increased from 57,000 to 70,000 an increase of 23 per cent in 15 years. In 1945 there were approximately 1,45,000 miles of earth roads in the charge of different public authorities but still in a very poor state, making up 2,15,000 miles of roads of all sorts. Not unexpectedly, there were glaring disparities between the development of roads in India and the advanced countries of the world. While 75 per cent of all traffic was carried on roads in the USA, similar to those in other developed countries, in India it was not even 10 per cent.\textsuperscript{136}

In the meanwhile, motor transport had steadily increased on Indian roads, especially in and around the towns. The War added to the number of the automobiles, particularly of the heavy vehicles. There were 5,000 army vehicles before the War but the number reached 50,000 in 1942. This tenfold increase in the number of vehicles may be attributed mainly to the establishment of the South East Asia Command in India. In 1943,

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\textsuperscript{132} \emph{Ibid.}, pp. 327-343; also NPC: \textit{Transport}, 1949, pp. 327-233.
\textsuperscript{133} NPC: \textit{Transport}, 1949, pp. 216-219.
\textsuperscript{135} \textit{Indian Road Development Committee: Report, 1927-1928}, n.p., 1928, p. 8.
\textsuperscript{136} \textit{Asiatic Review}, April, 1947, p. 152.
\end{flushright}
thousands of special chassis (in parts) were obtained from the USA and Canada under the Lend-Lease arrangement. These were assembled by Indian workmen. Thus, by January 1945, there were 2.5 lakh military vehicles in use in India.\textsuperscript{137} The need for mobility which contributed to the Allied victory in the African campaign and the urgency of mechanization of the fighting forces brought into focus the demand for various types of motor vehicles and of trained personnel to drive and maintain them. As a result, training centers and workshops were soon established in the cantonments. So, by 1945 there were 2.5 lakh motor driver-cum-mechanics in the army. Such training centers were started in every province, too.\textsuperscript{138}

Though India had a long tradition of shipping in the past, it had slowly declined during the British rule.\textsuperscript{139} However, with the rise of nationalism and increasing commercial activities around the World War I, indigenous business houses showed interest in it and the Scindia Shipping Company was established in 1919.\textsuperscript{140} However, such endeavors had to face the official indifference and discrimination. Meanwhile, circumstances forced the authorities to initiate measures to increase the shipping tonnage and provide for the repair of ships. Therefore, the Government of India appointed, in 1923, the Indian Mercantile Marine Committee to consider the claims of Indian shipping. But the government sat over the report for three years, and it was only in 1927 that one of its recommendations was executed by establishing the training ship Dufferin. As expected, the Indian shipping could not grow in the years to come. Its tonnage on the eve of the World War II was only about 0.23 per cent of the world tonnage. India carried only 25.6 per cent of the costal traffic and did not get any share in the overseas trade.\textsuperscript{141}

The World War II did not better the conditions of Indian shipping. Soon after the War commenced, all the 28 ships of 1.4 lakh GRT, belonging to 11 Indian shipping

\textsuperscript{137} Commerce, 15 January, 1944.
\textsuperscript{138} S.B. Singh, Second World War, 1998, pp. 119-120.
\textsuperscript{140} N.C. Jog, Saga of Scindia: Struggle for the Revival of Indian Shipping and Ship-Building, Bombay, 1969.
\textsuperscript{141} Kapoor, Shipping, Air and Road, 1983, pp. 348-353.
companies, were commandeered for War purposes; while foreign ships left Indian ports for better trade prospects elsewhere with the result that India’s export trade started choking her docks. About half of Indian tonnage was destroyed or lost during the War, and by 1945 it had been reduced to a low figure of 75,000 GRT only. However, the exigencies of the War obliged the government to occasionally do something to strengthen and modernize the sea transport of the country. The American Technical Mission visited the Indian ports and offered suggestions on how to develop shipping so that it could aid the Allied War effort.\(^\text{142}\)

The neglect of inland water transport was a clear example of the colonial indifference to the local welfare. Before the railways came to India, inland water transport was highly developed. The railways proved fatal to this cheap indigenous mode of transportation, although it remained popular in certain parts of south India. In Madras, the Godavari Canals were important highways for water transport, which provided a cheap and ready made of access to all markets. So was the case in eastern India. Important waterways existed in East and West Bengal. The largest sea port of the country, Calcutta-depended considerably for its trade both ways upon its waterway communications. About 25 per cent of the merchandise which flowed into Calcutta from the rest of India was water-borne of which no less than 63 per cent came from Assam alone. About 32 per cent of the exports was carried by water and of this 72 percent went to Assam. The total water-borne traffic of Calcutta amounted to approximately 45,00,000 tons of which 34 per cent was carried by inland steamers and 66 per cent by country boats. In 1945, passengers carried by the steamer service in East and West Bengal numbered 1,04,00,000.\(^\text{143}\) The NPC sub-committee on transport estimated that altogether the amount of boat traffic over government maintained channels was in the neighborhood of 250 million ton miles per annum-barely one per cent of the pre-War goods traffic by the railways. Thus, even at the end of the War, water transport formed an insignificant part of the country’s transport services.\(^\text{144}\)


\(^{143}\) NPC, \textit{Transport Services}, 1949, p. 244.

\(^{144}\) \textit{Ibid.}, pp. 244-245.
Compared to shipping and water transport, aviation received a better deal. The first flying club in the country had begun operations in 1928 and by 1933 there were seven of them. These clubs performed the dual function of promoting amateur flying as well as training professional pilots and ground engineers. After the outbreak of the War, for two years all flying clubs were used for giving elementary flying training to the candidates for the Air Force. In this way 516 persons were trained, of whom 364 were accepted for commission. As the War progressed, all civil flying was suspended and the resources of the clubs were used for defense, such as army cooperation for anti-aircraft practice and other similar activities.\textsuperscript{145} Keeping in view the fact that aeroplanes were the fastest means of transport, hence crucial for the War, the government agreed to allow the assembling of aircrafts in the country,\textsuperscript{146} airstrips were constructed and flying clubs organized.\textsuperscript{147} In 1939, there were only 12 civil aerodromes with adequate staff and facilities in the country. During the World War II, the Defense Department took over the control of all civil aerodromes and the services of all Air Traffic Controls Officers were loaned to the Air Force. By the end of the War, there were several hundred aerodromes and 2,000 yards of paved runways. Gradual transfer of aerodromes and the staff to civil aviation began in 1945.\textsuperscript{148} The enormous demand for aircrafts during the War forced the government to explore the possibility of manufacturing them with the country, but the Imperial Government in London did not respond favorably. India’s resources were considered too meager for it and the British government did not want to spare technical hands to India as they were needed at home.\textsuperscript{149} Lord Linlithgow's proposal to shift to India a couple of aircraft factories from Britain in the light of the increased enemy threat


\textsuperscript{146} \textit{Linlithgow Papers}: L.S. Amery to Linlithgow, Letter No. 22, 20 May 1940; No. 24, 5\textsuperscript{th} June 1940; No. 36, 5\textsuperscript{th} October 1940; No. 42, 3\textsuperscript{rd} December 1940; No. 30, 27\textsuperscript{th} June 1940; and No. 55, 27\textsuperscript{th} November 1940, in Letters Secretary of State, Vol. V, at India Office Library and Records (IOL&R), London.

\textsuperscript{147} \textit{Reports of the Progress of Civil Aviation in India} (Government of India, Delhi) for the war years.

\textsuperscript{148} NPC: \textit{Transport}, 1949, pp. 258-259.

\textsuperscript{149} India Office, Economic and Overseas Department to Air Ministry, 27\textsuperscript{th} March 1940, I.O. Library, L/E/8/1711; and Amery to Linlithgow, No. 693, 6 June 1940, IOL, L/PO/465.
there, met with the same fate.\textsuperscript{150} The authorities in India, therefore, had to fall back on the plan of Walchand Hirachand to form an aircraft company with public and private capital. While the official hitch was going on, Walchand formed the Hindustan Aircraft Company with a capital of Rs. 45 \textit{lakhs} at Bangalore. The Government of India and the Government of Mysore became equal partners contributing Rs. 25 \textit{lakhs} each.\textsuperscript{151} An American entrepreneur, W.D. Pawley, who had been manufacturing aircraft in China for six years, was associated with the venture.\textsuperscript{152} India’s first plane came out for a test flight in July 1941. Assembled in India, this was a Harlow, low-winged, single-engine monoplane with the same characteristics as of later-day fighters and bombers. With the advent of the system of Lend Lease in 1942, it was, however, found undesirable to have any element of private enterprise in this concern of vital importance to the conduct of the War in Asia. So, the Government of India bought out its private partners at heavy premium and took over the entire management in its own hands.\textsuperscript{153} Finally, on the recommendations of the Grady Mission, production of aircraft was completely stopped at this factory to concentrate on repairs.\textsuperscript{154}

Meanwhile, research and training facilities in aviation and aeronautics had been set up at the Indian Institution of Science at Bangalore. A post-graduate course in aeronautical engineering was introduced there in December 1942. Its Department of Aeronautics was equipped with a wind tunnel subsidized by Government of India and with apparatus for structural research. Thus, the Institute developed into a centre for basic aeronautical research in the country.\textsuperscript{155} Later, facilities for aeronautical communication service for training of operating and technical personnel were provided at the Civil Aviation Training Centre at Saharanpur in U.P. The Survey of India worked on preparing

\textsuperscript{150} Linlithgow to Amery, telegram 910-S, 7\textsuperscript{th} June, 1940, IOL, L/PO/465.
\textsuperscript{151} G.D. Khanolkar, \textit{Walchand Hirachand: Man, His Times and Achievements}, Bombay, 1969; for details, see Walchand Hirachand \textit{Papers}.
\textsuperscript{152} GOI, Department of Supply to Secretary of State for India, telegram 2394, Simla, 6 July, 1940, IOL, L/PO/465.
\textsuperscript{153} NPC: \textit{Transport}, 1949, pp. 253.
\textsuperscript{155} NPC: \textit{Transport}, 1949, pp. 254, 263.
aeronautical maps.\textsuperscript{156} Connected with aviation, meteorology came into some prominence during this period. Meteorological observation had a long history in India, which, like several other subjects, was a part of data feedback for research in the metropolis. Military operation and aviation, no doubt, added importance to it in the course of the War,\textsuperscript{157} but beyond that not much was done to promote it as a science for other purposes. Parachute was a crucial component of air flying. So at the instance of the Department of Supply of the Central Government, the possibility of producing parachutes indigenously was explored. Materials and facilities for their manufacture being available, a special factory for their fabrication was put up in the middle of 1942, which came into full production by the end of the War. A scheme with a capital cost of 18,50,000 (1.85 million) provided by the British Government was also launched in order to multiply India’s filature silk reeling capacity by changing over from the hand-reeling to machine-reeling method.\textsuperscript{158} Later, in order to look into the problems and prospects of promoting aviation in the country as an industry as well as a means of transport, the United Kingdom Aircraft Mission visited India in March 1946. It made an intensive survey, visiting the related establishments at Barackpur, Poona and Bangalore, together with the Ordinance Factories at Kanpur, Kasipur and Jabalpur. Acting on its recommendations, the Government of India decided to establish a national aircraft industry in the country, with the aim of achieving within 20 years complete self-sufficiency for building aircrafts needed for the Royal Indian Air Force as well as for civil aviation.\textsuperscript{159}

Telegraph had been an important tool of imperial control in India up to the World War I.\textsuperscript{160} The growing need for faster communication gave a boost to wireless and

\textsuperscript{156} Ibid., pp. 260-261.

\textsuperscript{157} Hundred Years of Weather Service, 1875-1975, 1976; Also see, Annual Report Meteorological Survey of India.

\textsuperscript{158} NPC: Transport, 1949, pp. 255-256.

\textsuperscript{159} Ibid., pp. 253-255.

broadcasting from the 1930s, more so during the World War II.\textsuperscript{161} But here again, though the administrative steps led to the introduction of these systems in some cases and expansion in others, R&D was the missing component of the state initiative, and the elements of local welfare entered the government policy only late. Radio witnessed unprecedented expansion as both sides of the belligerents used it as a means of propaganda and education of the people. Radio broadcasting had begun on 5\textsuperscript{th} May 1932 in India. Lionel Fielder of the BBC was appointed as India’s first Controller of Broadcasting in 1935 and the service was named All India Radio (AIR) in 1936. As the War escalated, a separate Department of Information and Broadcasting was created in 1941. Meanwhile, the number of licenses rose from 10,782 in 1933 to 92,782 (an increase of 753.40 per cent) in 1939 and to 2.5 Lakhs (an increases of 169.45 per cent) listening sets in 1945. Initially, radio sets were imported including 40,000 from the USA under the Lend Lease, but later the government initiated measures to have them produced indigenously.\textsuperscript{162} This, along with other technical needs of the War encouraged electronic industry in India.\textsuperscript{163}

III

The Indian Army in the British Empire played significant role. The Uprising of the 1857 shifted its base from the Ganga Basin and the South to the Punjab. By June 1858, the total 80,000 native troops in the Bengal Army 7,5000 were the Punjabis-the Sikhs alone numbered 23,000. Hence, the Punjab became the nursery of the Indian army to the end of the Raj.\textsuperscript{164} New ideology of ‘martial’ and ‘non-martial’ races was formulated by Lord Roberts who served as the Commander-in-Chief of the Indian army during 1885-1893.\textsuperscript{165}

\textsuperscript{161} Progress of Broadcasting in India: Report by the Controller of Broadcasting, Simla 1940; and H.R. Luthra, Indian Broadcasting, New Delhi, 1986.

\textsuperscript{162} Commerce, 6.12.1947, pp. 102-08.

\textsuperscript{163} For details, See also, S.C. Aggarwal, History of Supply (1947).

\textsuperscript{164} Rajit K. Mazumder, The Indian Army and the Making of Punjab, Perment Black, Delhi, 2003, p.11.

The martial races included: the Punjabi Muslims, Sikhs, Hindu Jats Pathans Dogras, Gujara, Futher the Rajputs, the Marathas and various other smatter groups.\textsuperscript{166} The number of infantry units in the Indian during 1862-1914 tilted in favour of the Punjabis and Gorkhas: Punjab 28 in 1862 and 54 in 1914; Gorkhas 5 in 1862 and 20 in 1914, this constituting 62.7 per cent of the total Indian Army.\textsuperscript{167} This process led towards the Punjabization of the Indian Army.\textsuperscript{168} The Sikhs Rajputs Gurkhas, Dogras and the Punjabi Muslims were recognized as ‘martial for general recruitment’.\textsuperscript{169} By 1900, slightly more than half of the combatants of the native regiments of the Indian army were recruited from the Punjab.\textsuperscript{170} In 1911, the troops from the Punjab had gone upto 65,283.\textsuperscript{171} M.S. Leigh puts the number of Punjabis in the army close to 94,701 amounting to 54 per cent of the total Indian army. He includes military men serving in imperial service troops, within the Punjab and outside in India and other regions under the British Empire.\textsuperscript{172}

The First and Second World Wars caused great surge towards recruitment in the army in India Europe and the USA which led to important changes in the world economy. Prices rose, industrial equipment was utilized to full capacity. Capitalists made enormous profits and the gap between the rich and the poor widened.\textsuperscript{173} The World War II had a generally adverse effect on India bringing price inflation and famine.\textsuperscript{174} The number of actual troops returned from the Punjab in 1881 was 43,361 which went upto 65,283 in

\begin{thebibliography}{99}
\bibitem{166} Johannes H. Voigt, \textit{India in Second World War}, p. 7.
\bibitem{167} S.P. Cohen, \textit{Indian Army: Its Contribution to the Development of a Nation}, University of California, Berkeley, 2971, pp. 32, 44, 56.
\bibitem{168} Sukhdev Singh Sohal, \textit{The Making of the Middle Classes in the Punjab (1849-1947)}, p. 19.
\bibitem{170} Tan Tai Yong, \textit{The Garrison State}, 33, p. 71.
\bibitem{171} \textit{Census of India}, 1911, Report I, p. 50.
\bibitem{172} M.S. Leigh, \textit{The Punjab and the War}, p.7.
\bibitem{173} D. Rothermund, \textit{An Economic History of India From Pre-Colonial Times to 1986}, Manohar, New Delhi, 1989, p. 118.
\end{thebibliography}
Military grants became important source of mobilisation. The Lower Bari Doab Coloby reserved an area of 103,000 acres for militarymen. On the outbreak of the World War I, and additional 75,000 acres were added in a bid to stimulate recruitment. On the eve of the World War I, The Punjabis accounted for 64 per cent of all cavalryman in the Indian army, 84 per cent in the artillery and 45 per cent in the infantry. The army exerted an unusually dominant influence in the social, economic and political development of the Punjab. In 1914, the Indian Army consisted of 270,854 men and 45,660 auxiliary troops. The number swelled to 1,161,489 men in November 1918. By far the largest number of recruits i.e. 447,000 men were enlisted in the Punjab, the favoured recruiting province. At the beginning of 1915, there were over 1 lakh Punjabis and of whom 86,967 were combatants in the India Army. Out of the total 683, 149 combatant troops recruited in India between August 1914 and November 1918, about 349,688 came from the Punjab which was about 60 per cent. Recruitment of soldiers in India was accelerated from the annual average of 15,000 a year to 300,000 a year. By 1918, India had given 8,00,000 combat troops and 4,00,000 non-combatants. India paid £150 million to the British and India troops. Indian troops were sent into action in all theatres of war: about 5,89,000 were in Mesopotamian: 1,13,000 in France; 1,16,000 men in Egypt, 47,000 in East Africa 29,000 men in the Persian Gulf region, 20,000 men in Aden while 4000 men in Gallipoli and 5000 men to Saloniki. The Punjab raised money through was investments and donations to the time of Rs. 92, 118, 664.
I, one man in eight was mobilized in the Punjab, whereas the all-India average was one in 150. By November 1918, there was 400,000 of the total of 563,091 soldiers from the Punjab. In addition, there were 97,188 non-combatants such as craftsmen, porters, sweepers from the Punjab in the Army.\textsuperscript{184} Total number of soldiers who served in the army during the World War I was 4,98,569.\textsuperscript{185} The whole administration machinery was geared towards recruitment. The Punjab excelled in the task.\textsuperscript{186} Financially, India made a gift to the British British Government of £100 million sterling and a further one of £45 million in 1918. In 1917, a war loan of £35.5 million could be raised and in 1918, again a loan of £38 million India’s expenditure in favour of the Empire amounted to £200 million.\textsuperscript{187} During the course of the War, 75 new castes were included for the purpose of recruitment in the British Army. Out of these 75 castes 22 were from the Punjab majority of were cultivators.\textsuperscript{188} The war remittances benefited the peasants as it brought large extra sums into the Punjab. The best of the fighting districts received more than enough money in the form of money order remittances to pay the land for the year.\textsuperscript{189} The end of the World War I led to large scale demobilization. In 1935, over 1.36 Lakh pensioners in the Punjab received Rs. 1,65,26,000 through the Post Office while the land several in 1936 was Rs. 5,34,38,017. Thus, pensions equaled to a third of the total land revenue.\textsuperscript{190} In 1939, the number of retired pensioners in the Punjab was 1,27,566.\textsuperscript{191} Despite this, predominance of the Punjabis in the Indian army continued. In 1880, the Punjabis percentage was 18.8 which is 39.4 in and reached 45 per cent in 1925.\textsuperscript{192} This was

\begin{itemize}
  \item \textsuperscript{184} Mridula Mukherjee, \textit{The Colonializing Agriculture : The Myth of Punjab Exceptionalism}, \textit{Sage}, New Delhi, 2005, 148-149.
  \item \textsuperscript{185} M.S. Leigh, \textit{The Punjab and the War}, pp. 44-45
  \item \textsuperscript{186} Michael O’Dwyer, \textit{India as I Knew It}, London, 1925, pp. 214-19.
  \item \textsuperscript{187} Johannes H. Voigt, \textit{India in the Second World War}, p. 10.
  \item \textsuperscript{188} Edward Maclagan, “The British Empire at War: India’s Response”, \textit{The Asiatic Review}, October 1939, Vol. XXX, No. 124, p. 630.
  \item \textsuperscript{189} M.S. Leigh, \textit{The Punjab and the War}, p. 15.
  \item \textsuperscript{190} Rajat K. Mazumder, \textit{The Indian Army and the Making of the Punjab}, p. 28.
  \item \textsuperscript{191} Sukhdev Singh Sohal, \textit{The Making of the Middle Classes in The Punjab (1849-1947)}, p. 134.
  \item \textsuperscript{192} Rajat K. Mazumder, \textit{The Indian Army and the Making of Punjab}, p. 18.
\end{itemize}
significant as the population of the Punjab was less than 10 per cent of the British India. Income and world exposure, demand for imported sugar, tea, fruit and vegetables, clothes increased.

The World War II led to a new phase in the history of British rule in India. During the World War II, the Punjab bore the main burden of providing cannon fodder for the various theatres of the War, supplying more than one third of all military manpower. Throughout the War, the civil bureaucracy operated, seamlessly with the military establishment squeezing every village for manpower for the War. The landlords and the peasantry in rural Punjab saw the War as an opportunity to increase employment and raise prices of agricultural products. The Punjab Premier, Sikander Hayat Khan, the ‘Soldier Premier’ confidently assured the Punjab Governor Henry Craik that the Punjab could supply half a million recruits for the Indian Army within weeks. The ‘garrison state’ was mobilized in support of Britain’s war effort against the Axis Powers. General Sir Robert Cassells, the Commander-in-Chief, India, pursuing his subterranean path had by the end of Sept. 25, 1939, added some 34,000 men to the army to whom 18,000 or 19,000 without the knowledge of Sir H.D. Graik, had come from the Punjab. Military service offered the opportunity of an improved standard of living to the recruit and his relatives. The non-martial classes of Punjab’s central congested districts were as eager to enlist during the early stages of the War as the martial classes of Rawalpindi and Jhelum. For from the official propaganda was the sight of soldiers on leave in clean new clothes, their pockets stuffed with rupees. Initial response in the Punjab were ‘enthusiastic’. The Deputy Commissioner of Attock district of the west Punjab reported

193 Statistical Abstract for British India, 1931-32, Table No. 1, pp. 2-3.
195 Rajat K. Mazumder, The Indian Army and the Making of the Punjab, p. 28.
196 Tan Tai Yong, The Garrison State, 281-283. See also, Ian Talbot, Punjab and the Raj (1849-1947), 143.
197 Tan Tai Yong, The Garrison State, p. 281.
‘keen interest in the possibility of recruitment.’

In the beginning of May 1940, the greens signal was given in London for expanding the Indian Army. New Delhi was prepared to begin without delay the setting up of six divisions and equipping them with 3000 vehicles. Meanwhile, the Commander of India, General Robert Cassell was replaced by General Claude Auchinleck in January 1941. New stimulus was added to the Army.

In the first two years of the War, mobilization and militarization were effected with impressive results. Large sums of money flowed into the Punjab villages from recruits revealed that during April 1943- November 1944 over Rs. 20,000 were sent each month by army recruits to their relatives. Land from the canal colonies was frequently granted as a reward for services to the war effort. In 1943, the Government reserved 200 squares of land to reward army recruiters. It became a lucrative occupation for some landlords.

The Army recruiters had observed that the ebb and flow of recruits from the villages were determined more by local conditions such as floods, diseases, availability of manpower and harvesting seasons.

In the middle of August 1941, recruitment attained a record figure of 50,000 per month. There was a heavy rush for enlistment. Recruitment was opened to ‘non-martial castes’. It included the Mazhbis and Ramdasia Sikhs, Christians and Ahmadiyas. Even physical standards were relaxed. General Claude Auchinleck considered such a policy opportune, both militarily and politically. The personnel of the Indian Army doubled from 166,377 in 1940 to 326,497 in 1941 and further doubled to 651,655 men in 1942. By October 1941, the figure reached 7.5 lakh.

202 Ibid., p. 65.
203 R.S. Nakra, *Punjab Villages in the Ludhiana District During the War*, p. 284.
207 The Khalsa, Lahore, September 28, 1941.
It was claimed that there were long waiting lists. Every one in the army was a volunteer, not a conscript.\textsuperscript{209} Within two years of the War, the Indian Army had quadrupled in size from about 200,000 in 1939 to 865,200 by the end of 1941, with the bulk of the new recruits coming from the Punjab.\textsuperscript{210} Throughout the interwar years (1919-39), the Punjabi element within the Indian Army never dropped below three-fifth of its total strength.\textsuperscript{211} The Punjab continued to be the main supplier of soldiers throughout the War, accounting for about 36 per cent of all soldiers recruited from India.\textsuperscript{212} However, the demographic profile of the army changed. The Punjabi Muslims could maintain their ratio in the total strength: 43,291 men in 1940 and 165,497 in 1942. The share of the Sikhs fell noticeably: 24,723 in 1940 and 72,059 in 1942. The largest decreased was in the case of the Jat Sikhs: 18,465 in 1940 and 42,087 in 1942.\textsuperscript{213} The British Government in India busied itself in raising ‘an enormous Indian army: two and half million Indians volunteered to serve in the focus.\textsuperscript{214} During the War and towards the end of the British rule, the British imperial control was intensified considerably and the economic exploitation of India increased manifold.\textsuperscript{215} Furthermore, the British Government was of necessity, compelled to assume practically complete responsibility for running of the economic system. Over every sector of the National Economy, the state extended its hand controlling land and capital were, in effect conscripted.\textsuperscript{216} In the early 1942, it was boasted that India could raise an army of 5 lakh.\textsuperscript{217} By the end of the year, an Indian army of one million was in

\begin{itemize}
\item \textsuperscript{209} The Khalsa, Lahore, October 5, 1941.
\item \textsuperscript{210} Tan Tai Yong, The Garrison State, 284.
\item \textsuperscript{211} Tan Tai Yong, The Garrison State, 293.
\item \textsuperscript{212} Ian Talbot, Punjab and the Raj (1849-1947), 1988, 45-46.
\item \textsuperscript{213} Johannes H. Voigt, India in the Second World War, p. 66.
\item \textsuperscript{215} Sucheta Mahajan, Independence and Partition, 26-27.
\item \textsuperscript{216} Arthur Birnie, An Economic History of the British Isles, Methnen, London, 1945, 355.
\item \textsuperscript{217} The Khalsa, Lahore, January 25, 1942.
\end{itemize}
being and volunteers were coming in at the monthly role of 50,000. Moreover, the claim of the swollen India army was ‘mistake’ in relation to the World conflict.\textsuperscript{218}

In the late 1942, there appeared signs of War-weariness. Onwards, recruitment was the lowest since 1939. From 1942, onwards it was common sight in the major recruiting areas of the North-West Punjab to see only women and children at work in the fields, all of men of military age having enlisted in the army. In the Rawalpindi district two men out of every five of military age enlisted. No less than 1420 persons sent three or more sons to the armed services.\textsuperscript{219} With reliance on the Sikhs becoming increasingly questionable the weight of recruitment shifted to other martial classes, particularly the Punjabi Muslim from the Salt Range Tract of the Punjab. Muslims in the districts of western Punjab showed a marked readiness to enlist and had been largely uninfluenced by any form of anti-war activities.\textsuperscript{220} Between 1940 and 1942, the number of Muslim recruits from the Punjab quadrupled: 43,291 in 1940 and 165,497 in 1942.\textsuperscript{221} Indian Army expanded fast: 150,000 in 1939 to 1 million in 1942 and increasing by 50,000 month.\textsuperscript{222} The Punjab Governor, Sir B.J. Glancy visited three districts in late 1942. He saw a dearth of young men or most of them had gone off to the army. In the most heavily recruited districts- Rawalpindi, Jhelum and Attock, the percentage of total male population who were enrolled into the army reached 15 per cent. The balance of the communal representations in the military tilted in favour of the Muslims of Western Punjab. By 1943, the Punjabi Muslims and Pathans accounted for 25 per cent of the annual intake in the army, while the Sikhs and Hindu Jats accounted for roughly 7 and 5 per cent respectively.\textsuperscript{223} The number of deserters increased. The Japanese captured Singapore in February 1942. From May 1942 to January 1943, the number of deserters more than doubled. In January 1943, there were still some sixty armed deserters at large.\textsuperscript{224}

\begin{footnotesize}
\begin{enumerate}
\item Tan Tai Yong, \textit{The Garrison State}, p. 290.
\item Johannes H. Voigt, \textit{India in the Second World War}, p. 65.
\item Dharmjit Singh, \textit{Lord Linlithgow in India (1936-1943)}, p. 399.
\item Tan Tai Yong, \textit{The Garrison State}, pp. 290-91.
\end{enumerate}
\end{footnotesize}
May 1942 to January 1943, the number of deserters more than doubled. In January 1943, there were still some sixty armed deserters at large. Food requisitioning policy also created unrest among the soldiers. The Government undertook a series of counter propaganda campaigns through the soldiers boards and other official channels. The demobilized soldiers caused massive unemployment. By the end of 1946, less than 20 per cent of the ex-servicemen registered with employment exchange had found work. The speedy end of the War surprised the Unionists. They had no rehabilitation scheme. The Government offered returning soldiers ‘a meager bonus of Rs. 4 per head and 50,000 acres of land for half a million soldiers in the Punjab’. Consequently, the Muslim League recruited ex-servicemen in its organization and gained major inroads in the recruiting areas of Rawalpindi and Jhelum. Recruitment was extended to non-martial castes. Coercion began to be used to sustain the supply of recruits. The Revenue officials ordered the patva ris to ‘to produce a certain quota of recruits and threatened with suspension if they failed to meet it. Anti-recruitment meetings organized by the Congress and other political parties rarely escaped the notice of the police and their informers. Their speakers were usually promptly arrested and convicted wherever they threatened to impact the local population.

The World War II turned out to be ‘enormously destructive’. In fact, it was a large edition of World War I, indeed a ‘total War’. It led to ‘total mobilization of manpower and economic resources’. The Government trained 3000 War technicians in about 18

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228 *Eastern Times*, 29.9. 1945.
231 Ibid., 146
233 *The Khalsa, Lahore*, May 3, 1942.
234 Ibid, 476.
centres. They belonged to all the classes of communities.\textsuperscript{235} The Punjab mobilized once again to support Britain in a major world conflagration. The Punjab Premier Sikander Hayat Khan issued a statement calling on the people of the Punjab to ‘maintain their splendid traditions as the sword arm of India by supporting the imperial War efforts’. In all, about 800,000 combatants were recruited from the Punjab.\textsuperscript{236} During the War about a million Punjabis served in the army.\textsuperscript{237} Overall, the mobilization reached 20 Lakh.\textsuperscript{238} Industrial production for War purposes immensely increased. Indian industry supplied about ninety per cent of the military equipment of the Indian army guns, shells, small arms, ammunition, armored cars, uniforms, boots, etc. Thus, in Administration, in Military Service, in War production, the Indian War effort had been as great as the limiting condition had permitted.\textsuperscript{239} The war economy brought in ‘galloping inflation’. The inflationary pressure emanated largely from the massive expansion in public expenditure. Between 1939 and 1945 nearly Rs. 3.5 billion were spent on defence purposes in India. The money supply in India rose from Rs. 3 billion in 1939 to Rs. 22 billion in 1945. The mints worked harder.\textsuperscript{240}

By September 1941, donations in Punjab War Fund reached to £224,000. The amount gave two fighter squadrons to the Royal Air Force.\textsuperscript{241} By the end of 1941, a total of Rs. 55 million had already been collected, the amount surpassing the total donated for the entire during of the World War-II.\textsuperscript{242} The War Purposes Fund and allied charities amounted to Rs. 80,424 within the first fortnight of October 1941. Gurgaon district got

\textsuperscript{235} The Khalsa, Lahore, May 3, 1942.

\textsuperscript{236} Tan Tai Yong, The Garrison State, p. 301.

\textsuperscript{237} Ian Talbot, Punjab and the Raj (1849-1947), 45-46.

\textsuperscript{238} The number of non in the Indian Army had reached 2,049,203 men on July 1, 1945: Johannes H., Voigt, India in the Second World War, pp. 214, 277, See also Percival Spear, The Oxford History of Modern India (1740-1975), p. 379.

\textsuperscript{239} R. Coupland, The Cripps Mission, 6.

\textsuperscript{240} Sugata Bose and Ayesha Jalal, Modern South Asia, p. 129.

\textsuperscript{241} The Khalsa, September 28, 1941.

\textsuperscript{242} Tan Tai Yong, The Garrison State, p. 284.
first position in matter of Defence Bonds with investments amounting to Rs. 6 lakh.\textsuperscript{243} Contribution to the Viceroy’s War Purposes Fund amounted to more than £1,350,000 and nearly £18 million had been contributed to Indian defence loans. Viceroy’s War Fund had reached Rs. 4 crore in May 1941 and the total subscription to All India Defence loans amounted to nearly Rs. 55.5 crore.\textsuperscript{244} By the end of 1941, the total amount of Punjab War Fund stood about Rs. 73.7 Lakh. The total investments stood at Rs. 5.24 crore. A sum of Rs. 45.6 lakh had been remitted to the Central War Fund.\textsuperscript{245} On February 15, 1942, the War Fund collections totaled Rs. 88.6 Lakh. However, the total of investments in War loans in the Punjab stood at Rs. 6.6 crore, Amritsar district invested the biggest amount of Rs. 4,13,248. The Lyallpur distt. donated the largest sum of Rs. 85,335.\textsuperscript{246} The Punjab contributed massively in the War Fund. By June 30, 1942, it reached about Rs. 1 Crore. The total investment in War loans was Rs. 6.8 crore. The Viceroy’s War Fund had reached about Rs. 7 Crore.\textsuperscript{247} The Khalsa Defence of India League exhorted the people to contribute to various war purposes funds liberally.\textsuperscript{248} India’s defence expenditure increased from Rs. 495 million in 1939-40 to Rs. 3913 million in 1945-46. \textit{The Eastern Economist} in its issue of March 8, 1946 reported that India had paid in at least $900 million to the Empire Dollar Pool until October 1946.\textsuperscript{249} Winston S. Churchill felt that ‘India was doing nothing’ on the war front.\textsuperscript{250} However, Lord Linlithgow disagreed with Churchill.\textsuperscript{251}

The World War II ended in Europe in May 1945. It left Britain heavily impoverished.\textsuperscript{252} However, it brought about a drastic change in India. The people were in

\textsuperscript{243} \textit{The Khalsa}, Lahore, November 9, 1941.
\textsuperscript{244} Dharamjit Singh, \textit{Lord Lintithgow in India (1936-43)}, pp. 189-206.
\textsuperscript{245} \textit{The Khalsa}, Lahore, January 18, 1942.
\textsuperscript{246} \textit{The Khalsa}, Lahore, March 22, 1942
\textsuperscript{247} \textit{The Khalsa}, Lahore, July 26, 1942
\textsuperscript{248} \textit{The Khalsa} Lahore, August 2, 1942
\textsuperscript{249} R. Palme Dutt, \textit{India To-Day}, 181.
\textsuperscript{251} Dharamjit Singh, \textit{Lord Linlithgow in India (1936-43)}, p. 181.
\textsuperscript{252} Arthur Birnie, \textit{An Economic History of the British Isles}, 356
a discontented mood because of inflation, food, shortages, closure of War related industries and unemployment caused by demobilization. As a result of the War, there was increase in the export of Indian agricultural and industrial products to Britain. Consequently, the Indian debt had been liquidated during the War. Thus, Britain became indebted to India in 1945 to the tune of more than £33,000 million.\textsuperscript{253} India emerged in 1945 as her largest single sterling creditor. India’s balances amounted to approximately £1.300 million. Hence, India had ceased to be an imperial asset.\textsuperscript{254} It was one-fifth of Britain’s GNP.\textsuperscript{255} The London Government had agreed to foot the bill for the use of Indian forces in the defence of the empire. Since the treasury in London was short of cash, a mechanism was devised by which India would pay here in and now and be reimbursed after the end of the War. Part of the total War expenditure would be recoverable as sterling credits for India accumulated in the Bank of England.\textsuperscript{256} In fact, the Government of India spent Rs. 17,400 million on behalf of the UK between 1939 and 1946. On 31st March 1939, the Government of India’s sterling debt amounted to almost Rs. 4,700 million; not only was it practically wiped out on 31\textsuperscript{st} March 1946, but the Reserve Bank of India had accumulated foreign assets mainly in sterling of over Rs. 17,000 million.\textsuperscript{257} Between 1939 and 1945 nearly Rs. 3.5 billion were spent on defence purposes.\textsuperscript{258} In other words, about Rs. 17.40 billion of India’s defence expenditure from 1939-46 (almost exactly half of the total of Rs. 34.83 billion) was recoverable from Britain.\textsuperscript{259} Consequently, Britain owed a large debt of £1.3 billion to the colonial Government of India. Throughout the colonial era, India had owed a large debt to British. The imperial

\textsuperscript{253} P. N. Chopra, \textit{A New Advanced History of India}, 629.

\textsuperscript{254} P.J. Cain and A.G. Hopkins, \textit{British Imperialism: Crisis and Deconstruction (1914-1990)}, 196.


\textsuperscript{256} Sugata Bose, and Ayesha Jalal, \textit{Modern South Asia}, p. 129.


\textsuperscript{258} Sugata Bose, and Ayesha Jalal, \textit{Modern South Asia}, p. 129.

\textsuperscript{259} B. R. Tomlinson, \textit{The Economy of Modern India}, 160-61.
war charged the financial history of the British rule.\textsuperscript{260} The entire sum was kept out of reach of the Indian people during the War.\textsuperscript{261}

The Viceroy, Lord Archibald Wavell said, ‘Our time in India is limited and our power to control events almost gone’.\textsuperscript{262} Britain emerged from the War as ‘the world’s largest debtor’.\textsuperscript{263} In a letter dated 24 October 1944, to Winston Churchill, Lord Wavell pointed out that it would be impossible to hold India by force after the War.\textsuperscript{264} Winston Churchill always considered Britain’s growing indebtedness as a technical failure and nothing to do with the decline of the Empire.\textsuperscript{265} He considered that contracts were fixed in India extravagant rates. Thus ‘sterling balances’ were piled up.\textsuperscript{266} Between 1940-1946, the total number of ICS officials fell from 1201 to 939. By 1945, War-weariness was acute and long absences from home were telling on morale. Economic worries has set in because of inflation.\textsuperscript{267} The Civil Service, army and police had lost their morale.\textsuperscript{268} By the end of the War, there was a loss of purpose at the very center of the imperial system. After 1939, majority of the ICS were themselves Indians.\textsuperscript{269} Meanwhile, the British economy slowly declined. The War brought about serious depletion of the economy.\textsuperscript{270} In order to meet the wartime requirements, plant and equipment were used very intensively, resulting in heavy wear and tear. The result was serious erosion of physical assets. The British left a seriously depleted economy.\textsuperscript{271} The British policy

\begin{itemize}
\item \textsuperscript{260} Sugata Bose and Ayesha Jalal, \textit{Modern South Asia}, p. 130.
\item \textsuperscript{261} R. Palme Dutt, \textit{India To-Day}, 180
\item \textsuperscript{262} P. N. Chopra, \textit{A New Advanced History of India}, 630.
\item \textsuperscript{263} P.J. Jain and A.G. Hopkins, \textit{British Imperialism: Crisis and Deconstruction (1914-1990)}, 312.
\item \textsuperscript{264} Sumit Sarkar, \textit{Modern India (1885-1947)}, 404.
\item \textsuperscript{265} Johannes H. Voigt, \textit{India in the Second World War}, p. 175.
\item \textsuperscript{267} P.N. Chopra, \textit{A New Advanced History of India}, 629.
\item \textsuperscript{268} Bipan Chandra, \textit{India’s Struggle for Independence}, 489.
\item \textsuperscript{269} P.K. Jain and A.G. Hopkins, \textit{British Imperialism: Crisis and Deconstruction (1914-1990)}, 195.
\item \textsuperscript{270} Keith Forman, \textit{Mastering Modern World History}, 485.
\item \textsuperscript{271} K. S. Gill, \textit{Evolution of Indian Economy}, 66.
\end{itemize}
during the War was ‘directed to prevent any industrialization of India’. The end of the War entailed large scale demobilization of men from the armed forces, factory workers and clerks. The Indian forces of the regular units of the Indian Army numbering 2,049,203 men on July 1945 (including approximately 250,000 British Soldiers and officers were reduced to 507,422 men i.e. to about a quarter, by July 1, 1947. The Number of British troops also suffered major decline: from the greatest number of 249,686 in October 1945, the number of British troops in India shrunk to 29,972 men in July 1947. The proportion of British and Indian officers charged considerably. On October 1, 1939, there had been 4028 British and 396 Indian considerably. On October 1, 1939, there had been 34,590 British and 8,340 Indian officers. Officers on September 1, 1945, there were 34,590 British and 8,340 Indian officers. So, in 1939, for one Indian there were 10.1 British officers and in 1945, there were only 4.1.

After the summer 1945, large number of demobilized soldiers began to return to the province causing massive unemployment. Furthermore, the Unionist Party’s political interests were sacrificed to the requirements of raising army recruits and exporting food grains from the Punjab. The end of War was greeted in India with a sigh of relief. The colony reeled under the heavy yoke of War effort. The World War II provided one more graphic picture of ruthless exploitation of resources and people of India by England and the India monopolist on the other. India paid for her participation in the War with the loss of 24,388 dead, 11,754 missing and 64,354 wounded as an estimated two million of dead by starvation. As the War came to an end in Europe, India continued to pass through economic difficulties. Food shortages, inflation, black market continued to haunt the people in the Punjab affecting the daily lives of the people.

272 R. Palme Dutt, *India To-Day*, 173.
275 Ibid., p. 278.
277 Bipan Chandra, *India’s Struggle for Independence*, 473. See also, P.N. Chopra, *A New Advanced History of India*, 629.
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