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ABSTRACT

CHINA'S INTERNAL TRANSPORT PROBLEM: THE CASE OF THE RAILWAYS' FIRST CENTURY, 1866-1966

by Chuen-tyi Chow

Transportation improvements, including the reduction in shipping costs, increased speed of delivery, and improvements in the nature and quality of service, strongly influence the economic and social progress of nations. By carrying more goods in less time and at a cheaper rate, railways often prove more important to developing nations than do other methods of transport.

In geographically extensive and overpopulated mainland China, railways were selected to stimulate economic improvement as early as 1866. After a one-hundred-year effort, however, Chinese railways are still in a primary stage of economic development. When the increase in railway mileage in China is compared to population growth, the inadequacy of rail coverage is very apparent. The gaps in rail service magnify transport problems that are already intractable. It is the purpose of this dissertation to clarify, through an analysis of fourteen railway periods, the primary factors in the development of the Chinese railway system.

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Historical Inv

An historical overview and economic-geographic analysis have been combined in this study with archival research and personal interviews. Primary materials in the Chinese language include sources from Taiwan, Hong Kong, and mainland China. Materials from the latter source were obtained through agencies in Hong Kong. Data on the Communist railway system originating in Taiwan were primarily from the National Security Bureau which regularly sends agents to mainland China to collect information for use by the Nationalist government. These materials, not available to the general public, were of considerable value in assessing the questions of why and how the Communists built and administered their railways. The informants interviewed were all individuals knowledgeable of mainland Chinese railways. These retired railway engineers and administrative officials are now living in the United States, Taiwan, and Hong Kong.

The study demonstrates the following:

1. The entire period of Chinese railway development is characterized by government participation and an ever-changing and evolving railway pattern.

2. Changes in national purpose and circumstances resulted in fourteen distinct spatial railway patterns in the century since 1866.

3. The correlation of geographic conditions, colonial interests, political considerations, strategic

concerns, availability of capital, foreign trade ventures, and domestic economic activities relate to each of the fourteen railway periods.

4. The spatial pattern provides external expression of economic policies, which at times were misdirected, leading to an unequal distribution of railways in China.

5. The century-old railway system's primary stage of development was characterized prior to 1949 by continuous political and military interruption. Errors of design, location, management, technology, and investment resulted in high-cost railway operations, low volume of traffic, poor service, inadequate network connections, low index of mobility, and contributed to the low market value of commodities carried. These factors prevented the Chinese railway system from becoming a viable national transport system.

6. In a capital-poor country like China, procurement of railway capital is always difficult. Most of the railways were built, however, for political and strategic purposes rather than for economic reasons, and therefore profit and loss considerations did not enter into the development planning. Passenger traffic is more significant than freight traffic inasmuch as the lines were constructed primarily to connect political, strategic, and urban centers.

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7. From a centennial viewpoint, the railways of China can best be evaluated when approached with an understanding of their peculiar politico-economic pattern. Only through appropriate restructuring and economic re-emphasis of the railway function--as a major contributing element in the national economy--can the railway system take its proper place in the total development scheme of China.

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By

Chuen-tyi Chow

A THESIS

Submitted to
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Department of Geography

1972

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C. T. C.

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CHAPTER I

TRANSPORTATION AS AN ECONOMIC FUNCTION AND THE IMPORTANCE OF RAILWAY TRANSPORTATION IN ASIAN COUNTRIES

The twentieth-century revolution in transport has made the world aware of the relationship of immobility and poverty. It is sometimes difficult to realize that transport in the more developed parts of the world was once no better, and frequently much worse, than it is in most underdeveloped countries today. Air transport has reduced earth time-distances to less than a tenth their previous size, and the jet era has reduced such distance factors again by half. It was little more than a century ago that the railway introduced cheap and rapid overland transport, and only in the past thirty to forty years that mud roads have given way to all-weather pavements for motorized transport.

Appropriate transport facilities frequently have proven that they are the key to a country's economic development. Indeed, one can observe many instances where a critical lack of transport facilities has prevented a country from achieving its economic goals. On the other hand, some countries that have impressive facilities also seem to be going nowhere. Transportation affords unparalleled opportunity to make mistakes, including

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errors of location, technology, design, administration, and choice.[1] Transportation is, therefore, an essential but not an exclusive condition for economic development.[2]

Using the above criteria, mainland China is a lesser developed country with a dense population and an extensive national area. China has attempted to develop its system of transportation for slightly more than a century,[3] but the railways, as developed, did not play the role that was expected of them as part of the total Chinese economic scheme. The characteristics of China's railway pattern, therefore, are worthy of analysis. For this purpose, it is necessary to examine the function of transport, the economic significance of railways, the recent trends of railway transportation, and the role of railways in the overall economic development of Asia.

Economic Function of Transportation

Meaning of Transportation

From an economic point of view, there are two types of transportation.[4] The first is economic

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[1] Wilfred Owen, Strategy for Mobility (Washington, D.C.: The Brookings Institution, 1964), p. 19.

[2] Ibid., p. 18; also see Gary Fromm, ed., Transport Investment and Economic Development (Washington, D.C.: The Brookings Institution, 1965), pp. 1, 5-6.

[3] Edwin T. Haefele, ed., Transport and National Goal (Washington, D.C.: The Brookings Institution, 1969), pp. 88-89.

[4] John W. Alexander, Economic Geography (Englewood Cliffs: Prentice Hall, 1964), p. 46.

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transportation, dealing with the movement of goods for the purpose of economic profit. The second is noneconomic transportation, and it deals with the movements for purposes other than economic profit (i.e., political, strategic, etc.).

The purpose of transportation is basically to reduce distances. The essential elements in this definition of transportation are: distance, speed and time, cost, safety, and carrying capacity. These are the factors by which comparative economic values can be determined. In turn, the differences in economic value are based on such variables in transportation as type of carrier, facilities, equipment, management, service, schedule arrangement, and the selected goods to be moved. The natural environment which may affect the construction and maintenance of the transportation system must also be considered.

Transportation and Economic Progress

Man's economic activity depends mainly upon transportation. Not only does man develop and operate systems of transportation; man also determines the service features of transportation, for better or worse. Since man's economic activities differ from region to region, his patterns of transportation, viewed geographically, will

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also differ. A country's transportation system includes the interlocking network of highways, railways, seaways, airlines, inland waterways, and pipelines as well as simple animal and human pathways. Although they are mutually dependent upon each other, usually one form of transport is dominant. The world's economy also depends on the interplay of all transportation systems.[5]

In economic geography, transportation is an important geographic element--a spatial variable by which regions can be delineated and their characteristics studied, and in terms of which relationships can be analyzed, such as relationships among route location, traffic flow, and other phenomena. In addition, organized transportation is a geographic factor--an influence on the location of other economic activities; for without a means of transport there would be no commercial coal mining, no production of surplus grains, and no commercial lumbering. Without economic transportation, in fact, the world's economy would remain at a subsistence level and regional specialization yielding exchangeable surpluses would be impossible.[6]

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[5]Marvin L. Fair and Ernest W. Williams, Jr., Economics of Transportation (New York: Harper Brothers Publishers, 1950), p. 12.

[6]Edward L. Ullman, "The Role of Transportation and the Bases for Interaction," Man's Role in Changing the Face of the Earth, ed. W. L. Thomas (University of Chicago Press, 1956), pp. 862-877.

There is no doubt that the services performed in moving goods, people, and services from one place to another are true forms of production because goods that are moved from places of surplus to places of deficiency normally have their value increased in that movement, and in this case, as in others, transportation which increases the value of goods may be identified as a form of production.[7] These increases in value, these creations of "place utility" represent production activities just as truly as do the increases of "form utility" by the farmer or manufacturer, or "time utility" by the warehouse man. Transportation, therefore, is recognized universally as a productive activity.

Determinants of Transport Cost

Given the various modes of air, land, and water transport it is not always apparent which method provides the most economical means of moving goods. To be sure, some shipments even may use more than one mode of travel. Use of a particular form of transportation is determined not only by its availability, but also by its cost considerations. Though transport costs display great

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[7] John B. Lansing, Transportation and Economic Policy (New York: Free Press, 1966), p. 13. Also see H. H. McCarty, A Preface to Economic Geography (Englewood Cliffs: Prentice-Hall, 1966), p. 155.

variation, depending on place, time, and type of transport, certain common factors can be identified. These include: value of commodity to be shipped, size of shipment, distance to be covered, form of transport, regional constraints, terminal handling, and transshipment.[8] These seven determinants have a bearing not only upon the exchange of goods, but directly influence production. There is, however, a direct relationship between cost and speed, flexibility, and serviceability of the form of transport. As a normal rule, air transport of commodities is the highest in cost, as well as the most rapid and flexible. Motor carriers are considerably less costly, but of necessity slower and otherwise constrained. Similarly, inland water carriers, ocean carriers, and pipelines reflect rates directly related to their serviceability, speed, and flexibility.

Many other points bear on the comparison of costs for different types of transport, the many commodities exhibit physical limits which prevent competition of transport modes. Also, the advantage of a given form of transport may be lost when seemingly unrelated circumstances change (i.e., interest rates, level of employment, etc.).

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[8] Richard M. Highsmith, Jr. and Ray M. Northam, World Economic Activities, a Geographic Analysis (New York: Harcourt, Brace & World, Inc., 1968), pp. 436-441.

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Furthermore, reduction in size of the shipment increases the cost for certain forms of transport. Thus, in general, the motor carrier has an advantage in the movement of small shipments for relatively short distances while the railway has lower unit costs for long-distance shipments of larger size. The interrelationship of distance, the size of the shipment, and the form of transport is noteworthy.

Choice of Transport Technology

Developing countries have access to new technology that may enable them to break away from the slow evolutionary process of transport improvement and thereby to reduce the time and resources needed to overcome time-space barriers. In choosing an appropriate transport technology countries should be guided by consideration of the following: trends in transport methodology; comparative transport costs; impact of transport costs on production and other distribution costs; the net effects of the several methods of transport on the development of a transportation infrastructure; and potential transport innovations that may alter the cost and quality of transportation systems in the forseeable future.[9] All of

[9]Wilfred Owen, op. cit., p. 86.

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these factors need to be weighed in arriving at choices of transport methods in order to promote maximum economic progress. The economic circumstances of a country also must be fully understood before the choice is finalized. Otherwise, one can quickly learn that transport affords unparalleled opportunity to make mistakes, including errors of location, technology, design, timing, or the mistake of investing in transport at all.

Function of Transport

The function of transportation is to move goods and people. Goods may be classified into three categories: industrial, agricultural, and consumer. The uneven distribution of natural resources makes it necessary to connect such resources to the needs of production. Since commercial agricultural lands are almost always distant from the populated areas, transportation is necessary for the supply of foods. In addition, the distance between production centers and markets emphasizes the need for transportation capabilities.[10]

Appropriate transport facilities are the key to economic development. Without transport, supply and demand factors are restricted by the high cost of moving,

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[10] R. E. Caves, Trade and Economic Structure (Cambridge: Harvard University Press, 1960), p. 3.

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and by the law of supply and demand. Improvement in living conditions is dependent on the ability of people to communicate and on their capacity to trade. Many studies emphasize factors other than transportation as being the primary elements necessary for economic development, including improved agriculture, industrialization, the supply of capital, standards of education, and the availability of a management system. The paucity of development literature on the role of transport can be explained in part by the failure to recognize that no matter whether agriculture, industry, power, capital, or human resources are stressed, the development of each is partly dependent for its success on mobility and accessibility.[11]

Transportation, then, is a necessary, but not a sufficient condition, for economic development. No country where there is a critical lack of transport facilities is advancing rapidly. Some countries that have fairly impressive transport facilities also seem to be marking time. It is apparent from figures of traffic carried and the levels of national income, that the volume of transport operations is closely related to economic progress. Where a nation's economy is underdeveloped,

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[11] M. Beckmann, Studies in the Economics of Transportation (New Haven: Yale University Press, 1956), pp. 5-12.

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there will be a low volume of movement and thus the economic system appears retarded.[12] The question to be answered then is not whether transport is important or more important than something else; but rather, under what circumstances and upon what basis transportation is an ingredient for economic progress.

If there is to be a set of clear guidelines concerning the role of transportation in development policy, these guidelines must begin with an understanding that the function of transportation is quite different from other economic activities. The importance of transportation is derived from its service function for other activities. It is not a separate sector of the economy, but is intricately linked to all other sectors within a given economy.[13]

Economic Significance of Railway Transportation

In the history of the world, land transport by means of human porters, pack animals, and animal-drawn vehicles has been significant. In some of the less developed areas of the world, such means of transport

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[12]Edward J. Taaffe , Richard L. Morrill, and Peter R. Gould, "Transport Expansion in Underdeveloped Countries: a Comparative Analysis," Geographical Review, LIII, 4 (October, 1963), 503.

[13]Wilfred Owen, op. cit., p. 20.

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still account for the greatest share of commodity movement.[14] Economic advancement, however, requires the development of systems of land transport beyond the capacity of the human or animal carrier, since these forms do not lend themselves to rapid, reliable transport of great volumes. Thus, mechanized land transportation is a prerequisite for all economically developing societies.[15]

Railways have been an important form of mechanized land transport since their earliest establishment.[16] A century ago railways were established as major carriers. Railways today remain the world's prime mover of commodity tonnages.[17] The existence of railways is influenced primarily by the location of points or regions to be joined and the nature of the intervening surface.[18] Landforms in particular influence the direction and layout of railway lines.

Economic development can be said to be the growth of the aggregate output of a country, or the growth of

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[14] G. Fromm, op. cit., pp. 18-21.

[15] M. Fabre, A History of Land Transportation (New York: Hawthorne, 1963), p. 33.

[16] G. B. Daggett, Principles of Inland Transportation (New York: Harper, 1955), p. 6.

[17] R. S. Thoman, The Geography of Economic Activity, an Introductory World Survey (New York: McGraw-Hill, 1962), p. 111.

[18] R. M. Highsmith, Jr. and Ray M. Northan, op. cit., p. 431.

the output.[19] The relationship of railways to economic development is a close one, for it is not only highly significant in transporting goods and raw materials, but the construction, maintenance, and operation of railway lines also reflect the economic growth of a nation.[20] In general, countries with low standards of living have low standards of transport.[21] Science, technology, and education are essential components for the development and operation of effective and efficient transportation systems, including railways. Once a society has achieved these "essentials" for maintaining effective transport systems, it will have entered into the "industrial age"; occupations will no longer emphasize agricultural pursuits, but will tend towards manufacturing and service fields.

Industry is the key word in the relationship between the economic development of a nation and its railways. Countries with little or no industry--or little or no potential for industry--will have few railways. If railways merely serve mining operations in countries rich

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[19] "Economic Development," Encyclopedia Britannica (Chicago, 1965), Vol. V, p. 358.

[20] G. Fromm, op. cit., p. 31. Also see George W. Wilson, B. R. Bergmann, L. V. Hirsch and M. S. Klein, The Impact of Highway Investment on Development (Washington, D.C.: The Brookings Institution, 1966), p. 194.

[21] Mark Jefferson, "The Civilizing Rails," Economic Geography, IV, 3 (July, 1928), 505-518.

in natural resources, they will be connected only to cities that export the mined products and will serve few other purposes. Also, industry is necessary in the construction of the railway links, for the manufactured products that go into railway construction are associated with heavy and light industry. Accordingly, costs are high for a nation when railway builders must import these items.[22] Railways, therefore, reflect the rate of economic development of a nation.[23]

After the industrial revolution got underway, railway transportation formed one of the most outstanding landmarks of economic-geographic significance on the face of the earth. The primary reasons for supremacy of rail transport were the economic advantages of high capacity, long-distance, reliable (i.e., all-weather, few breakdowns, etc.) movement--all factors necessary for industrial expansion.

In examining the distribution and significance of railways in an economy, one can use various types of measures. One such measure--total mileage of track--is a nearly meaningless measure since it does not take into

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[22]J. R. Meyer, The Economics of Competition in the Transportation Industries (Cambridge, 1959), p. 67.

[23]J. F. Stover, American Railroads (University of Chicago Press, 1961), p. 5.

account the area of the nation under consideration or how intensely the existing trackage is used. A more meaningful measure is the density of railway trackage.[24] Railways can also be considered in relation to population or on the basis of the volume of traffic or movement per mile of line. This last measure is of particular importance since it provides a statement of the comparative importance of railways.

The characteristics of railways in developed and underdeveloped countries are different from each other.[25] The total length of railway lines of the world is somewhat greater than it was before World War II. The mileage and freight traffic of railways in developed countries generally has decreased, but railway expansion has increased in most developing countries who use the train for short- and long-distance travel more than do the developed countries.[26] The causes of the declining significance of rail traffic in developed countries may be sought by considering the place of railways in the total market as defined by the characteristics of the service (i.e., need,

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[24] R. M. Highsmith, Jr. and R. M. Northan, op. cit., p. 431.

[25] G. Fromm, op. cit., pp. 73-80.

[26] A. Hazlewood, Rail and Road in East Africa: Transport Co-ordination in Underdeveloped Countries (Oxford University Press, 1964), pp. 1-8.

price, comfort, availability, and comparative human acceptance).[27]

Given the lack of competitive transport systems, rail passenger traffic in underdeveloped countries is increasing as well as is the freight traffic.[28] More than half of the railway lines of the United States today no longer carry passenger trains.[29] Broadly speaking, the freight traffic in developed countries is comprised of manufactured parts and products; whereas mineral and agricultural products dominate in underdeveloped countries. Cost considerations frequently cause manufacturing centers to be built near to resources in developed countries. By contrast, the transportation of primary resources continues to reflect long-distance moves in the developing countries --a movement frequently dependent upon railways.

Today, not only is there a relative decrease in railways (i.e., little new railway construction) in developed countries, but the function of railways is changing as well from one of collecting raw materials for factories to one of distributing manufactured products. In the

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[27]J. B. Lansing, op. cit., pp. 383-384.

[28]E. J. Taaffe, R. L. Morrill, and P. R. Gould, op. cit., pp. 505-518.

[29]Robert William Fogel, Railroads and American Economic Growth (Baltimore: The Johns Hopkins Press, 1964), pp. 1-16.

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developing nations the collective function dominates the distributive function. In the United States, Japan, and other developed countries there is need to link production centers to ports of entry for the import of raw materials. In the underdeveloped nations the railways focus on the port of export by contrast. Indeed, many railways in the developing countries appear to be independent of one another. In contrast to the developed countries, the railways in developing countries will probably continue to expand in the forseeable future. This is not to suggest that these railways may not need to be subsidized as they may be the only form of transportation and therefore for some purposes not the least-cost type. This is especially true of the planned economy typical of a Communist country.[30]

The Recent Trends of Railway Transportation

Similar trends in transport prevail throughout the world. In nearly all countries truck transport dominates short-haul and bulk shipments. For low-value bulk commodities that move in large volumes, water

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[30]K. J. Kansky, Structure of Transportation Networks (University of Chicago Press, 1963), pp. 41-64. Also see R. S. Thoman, op. cit., p. 115.

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transport and railways still provide the principal methods of getting things moved.[31] Other trends that are becoming general throughout the world include the long-distance movement of passengers by airplane and a reliance on pipeline transport for the movement of gas and oil. Such new developments alter the interpretation of traditional transport methods.

Three types of transport patterns have emerged from these trends. One is characteristic of the economically advanced countries--United States and Western Europe; another is found in lesser developed countries such as Japan, Soviet Union, India, and China; a third is typical of the less populated, underdeveloped countries. In some respects, these patterns reflect different stages in an evolutionary process. In others, geography, population, and income levels provide the basis for the particular approach to meeting transport needs.[32]

Trends in the United States illustrate the transport matrix emerging in an affluent society. Freight traffic in 1960 was double that in 1940. Every method of

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[31] E. L. Ullman, American Commodity Flow: Geographical Interpretation of Rail and Water Traffic Based on Principles of Spatial Interchange (Seattle: University of Washington Press, 1957), pp. 24-30. Also see G. W. Wilson, B. R. Bergmann, L. V. Hirsch, and M. S. Klein, op. cit., p. 194.

[32] W. Owen, op. cit., p. 87.

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transportation shared in this growth; but some methods expanded more rapidly than others. Rail transport increased by 53 percent and water transport by 89 percent. More dramatic was the 286-percent increase in pipeline traffic and the 383-percent increase in truck transport. As a result of different rates of growth, the railways' share of total freight movements dropped from 61 percent in 1940 to 44 percent in 1960. Similarly, while pipelines and trucks accounted for 20 percent of total ton-miles in 1940, by 1960 they were handling 40 percent of the traffic. Water carriers showed a steady growth, but at the end of the two decades accounted for nearly the same share of traffic as at the beginning. Technological changes in passenger travel resulted in even greater shifts in American transport methods. The automobile greatly expanded total travel volume, and in 1963 accounted for nearly nine out of every ten passenger-miles. The volume of travel in public carriers also continued to rise, with a doubling of traffic between 1940 and 1960. The railways did not share in the expansion, however. Train travel declined steadily, and the railway share of the passenger business dropped from 64 percent to 28 percent. Bus travel in 1960 was above the 1940 level but below that of 1950 and was still declining. Air transport was the major factor in the expansion of passenger traffic. The volume

of air travel was thirty-four times higher in 1960 than it was in 1950.[33] Trends of Canada[34] and the Western European countries were similar to those in the United States and included a general increase in passenger and freight traffic by all methods, the rapid growth of motor truck transport relative to rail, the stable position of water transport in the total picture, and the rapid shift of energy resources to pipelines. The outstanding differences included a continuing rise in rail passenger travel in places of high population densities, and limited dependence on air travel where good rail service over intermediate distances eliminated the time advantage of air travel between city centers.

The Soviet Union[35] and Japan placed much greater reliance on railways for both passenger and freight traffic, and they began to shift towards road, air, and pipeline transport much later than did the West. The Soviet

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[33]Data for 1940 and 1950 on freight traffic from Interstate Commerce Commission, Bureau of Transport Economics and Statistics, "Intercity Ton-Mile 1939-1959," Statement No. 6103 (1961); 1960 data from Interstate Commerce Commission, Annual Report, 1960. For passenger traffic: Interstate Commerce Commission, Annual Report, 1940, 1950, 1960. Also see G. Fromm, op. cit., pp. 74-75.

[34]Roy I. Wolfe, "Transportation and Politics: the Example of Canada," Annals, LII, 2 (June, 1962), 188-190.

[35]George Kish, "Railroad Passenger Transport in the Soviet Union," The Geographical Review, LIII, 3 (July, 1963), 371-372.

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rail system carried 77 percent of intercity freight, and Japan's system was largely railway-oriented.[36] The freight orientation of these countries reflected their industrialization. In other cases, the less developed countries with dense populations and extensive areas remained rail-oriented. In most developing countries railway construction dominated the picture. China, as a lesser developed country, was of special significance since it had different characteristics of railway construction.

In the third category of countries (i.e., Brazil, Burma, Thailand, in tropical lands with low population densities) the low level of economic activity has placed more importance on roads than on railways. These transport trends are reflected, in part, in present and proposed investment decisions of these countries.[37]

The Role of Railways in Asian Economic Development

Accessibility is a very important factor in analyzing economics. Anything beyond subsistence livelihood urgently requires trade and transportation. Vast areas

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[36] In 1960, railways shared 47 percent of Japan's total freight traffic. According to U.N. Economic Bulletin for Asia and the Far East, XI, 3 (December, 1960), 6-7.

[37] G. Fromm, op. cit., p. 2.

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in Asia lie more than ten miles from railway track.[38] The coherence and strength of a continent are necessarily dependent upon its individual internal accessibility, but most of the Asian countries are inaccessible in terms of rail transportation. In recent years, the growth of transport capacity in the developing countries has been much more rapid than in the rest of the world. In the decade of the fifties, rail freight traffic increased 223 percent in Asia, compared to 27 percent in Western Europe.[39] Plainly the above statistics oversimplify the accessibility situation since nation-to-nation differences do exist in Asia.

If one compares Indian railways with American or European systems the trains are few and slow. By contrast, if one compares them with the railways of the rest of the underdeveloped countries in Asia, the trains are many and frequent. Equipment is often old fashioned and schedules are slow, but the Indian railways put a remarkable amount of traffic through, considering the amount of track. The heaviest concentration of lines lies between Calcutta and Delhi. From Delhi, main lines run south to

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[38]There were no points farther than ten miles from railway in Western European countries even as early as 1928. M. Jefferson, op. cit., p. 217.

[39]W. Owen, op. cit., p. 93; also see United Nations, Statistics Yearbook, 1961, p. 332.

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Bombay on the west or to Madras on the east, and another goes northwest to Pakistan. A line runs down the east coast from Calcutta to Madras, and from Bombay a route crosses the Deccan to Madras, and from Madras there are tracks south to Ceylon or west to Kerala. The major routes are standard gauge, but there are also narrow-gauge and meter-gauge lines. New lines of track are built on standard gauge; diesel engines and in some places electric engines are replacing steam locomotives, although the latter are still dominant.[40]

Economically, both India and China are lesser developed countries in Asia and both of them are industrializing, but their railway patterns are quite different. Both railway systems were built during the colonial period, but Indian systems were built entirely under British direction, whereas the Chinese systems were built with British, French, German, Russian, Dutch, American, Belgian, and Japanese assistance. The British-built railways formed a unified pattern in India serving British economic interests, but the eight powers responsible for the Chinese railways built their railways to serve their individual colonial purposes, and thus left China with a fragmented

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[40]Walter C. Neale, India: the Search for Unity, Democracy, and Progress (New York: D. Van Nostrand Co., Inc., 1965), pp. 77-79.

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railway pattern. Many transshipment points resulted from gauge differences in the pre-Communist period of railway construction and operation before 1949.

Historically, the function of the railways in both India and China were the same--facilitating trade for the colonizing nations and financiers. In India, railways were built by British interests in an effort to extend trade from the coastal areas into the subcontinent.[41] In China, the colonial powers built railways in exchange for concessions, for trade and to establish themselves politically. The British also built railways in China to maintain their stronghold in the Far East.[42] In India, nationalization of railways began about 1875, but in China, the Imperial Government, although it began to exercise control over its railways at the turn of the century,[43] did not nationalize its railways as such.

The function of contemporary railroads in India facilitates movement of people and freight and especially the movement of grains and other foods throughout the

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[41] Walter M. W. Splawn, Government Ownership and Operation of Railroads (New York: The Macmillan Co., 1928), p. 240; also see Wilfred Owen, Distance and Development Transport and Communication in India (Washington, D.C.: The Brookings Institution, 1968), pp. 1-5.

[42] E-tu Zen Sun, Chinese Railways and British Interests (New York: King's Crown Press, 1954), p. 4.

[43] Ibid., p. 10.

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country.[44] The function of China's railways has changed from one emphasis to another under different political regimes. In general, the welfare of Chinese people has not seemed to be the direct concern of Chinese governments. Each government primarily has stressed its economic well-being to the exclusion of other considerations. For example, industrialization is being emphasized in Communist China today. Under the present government railways have the expressed function of carrying steel, armaments, iron or minerals.[45] And, of course, the money obtained through the use and sale of these products has not been distributed among the people of China, but rather has been allocated for military and political purposes.

China and the Soviet Union are the major Communist countries in Asia, and both of them have emphasized railways in their economic development. Nevertheless, the role of railways in these two Communist countries differs. In a large portion of its national territory in Asia, the entire emphasis of Soviet transport policy has been to extract as much service as possible by importing a minimal capital investment into a single transportation system,

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[44]Peter T. Bauer, India Economic Policy and Development (New York: Praeger, 1962), p. 5; also see K. P. Bhatnagar, Transport in Modern India (Kanpur, 1955), pp. 61-73.

[45]Choh-Ming Li, Industrial Development in Communist China (New York: Frederick A. Praeger, 1964), pp. 3-7.

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the railways.[46] There is a necessary relationship in long-run economic planning between decisions concerning the location of industrial activity and decisions as they relate to transportation. Broadly speaking, it was the objective of the economic planners in the Soviet Union to increase regional self-sufficiency by using railways as the main tool.[47] China's economic policy is concerned with connecting seven newly-formed Economic Cooperation Regions using railways as the major instrument. Six commodity groups--coal, petroleum, forest products, mineral building materials, ferrous metals, and ores--account for almost three fourths of rail ton-mileage in the Soviet Union,[48] whereas in China, steel, armaments, and minerals predominate. Among the important lines completed in Soviet Asia, the primary emphasis of present rail construction is the Turkestan-Siberian route between Siberia and Central Asia. The new railways in this area are designed to relieve the traffic pressure on the Trans-Siberian

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[46]Holland Hunter, Soviet Transport Experience: Its Lessons for Other Countries (Washington, D.C.: The Brookings Institution, 1968), pp. 5-21.

[47]Holland Hunter, Soviet Transportation Policy (Cambridge: Harvard University Press, 1957), pp. 124-133.

[48]Robert C. Kingsburg and Robert N. Taffee, An Atlas of Soviet Affairs (New York: Frederick A. Praeger, 1965), pp. 62-64.

route.[49] The recent construction of Chinese railways has not been primarily for the purpose of relieving present pressures as is the case with the new Soviet railways. The Communist government invented a relatively well-developed rail pattern from the Czarist regime. By comparison, the present regime in China had to begin their development of railways from a more primitive pattern.

From the economic point of view, Communist China in 1952[50] was comparable to the Meiji Period (1868-1912) in Japan and to contemporary India--perhaps somewhat ahead of the former and slightly behind the latter, but she lagged considerably behind the Japan of the early 1950's and the Soviet Union on the eve of her first Five-Year Plan.[51]

Among the Asian countries, Japan, India, and the Soviet Union can be used as yardsticks for comparing transport development in China (Table 1). From the economic and historical point of view, Japan serves as an

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[49] H. Hunter, Soviet Transport Experience: Its Lessons for Other Countries, op. cit., pp. 22-30; also Roy I. Wolfe, Transportation and Politics (Princeton: D. Van Nostrand Co., 1963), p. 71.

[50] Alexander Eckstein, "Conditions and Prospects for Economic Growth in Communist China," World Politics, VII, 2 (January, 1955), 258.

[51] H. Hunter, Soviet Transportation Policy, op. cit., pp. 272-282.

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Source:

TABLE 1

RAILWAY MILEAGE PER 100,000 PERSONS IN SELECTED COUNTRIES

Group I		Group II		Group III	
Country	Miles	Country	Miles	Country	Miles
Australia	404	Switzerland	78	Japan	12
Canada	378	France	64	India	11
U.S.A.	261	Germany	57	Thailand	9
New Zealand	254	United Kingdom	52	China	2
		Spain	48		
		Italy	31		
		Soviet Union	28		

Source: International Union of Railways, International Railway Statistics, Year 1961 (Paris: General Secretariat, International Union of Railways, 1962).

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example of a country which started the process of industrialization with the aid of railways in roughly the same way as China did after 1949. India, on the other hand, started from roughly the same base and at the same time as China, but had fallen far behind in its industrialization. The Soviet Union, using a more or less similar development model as China, started from a more advanced base and is by now much more advanced than is China.[52] Railway transportation played the major role in their economic development, but the function or characteristics of the railway systems differ from each other by virtue of differences in their individual economic circumstances.

In general, the Asian countries including India, Japan, the Soviet Union, and China have placed major emphasis upon railway transport, but at different stages in their economic development. The Soviet Union and Japan placed much greater initial emphasis and reliance on railways for both passenger and freight traffic, only later shifting to road, air, and pipeline transport. India, with a well-built railway network inherited from the colonial period, continued to accommodate heavy volumes of passenger traffic, including substantial numbers of

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[52] G. Fromm, op. cit., p. 78.

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urban commuters. The advanced stage of the Indian rail system, however, is only now approaching what might be called a mature stage of industrial development. Among the Asian nations, China, despite its one hundred years of railway experience, can be considered to be in a primary stage of economic development. The railway stage is started, but the shifting to highways and airways is far behind (Table 2). The major characteristic of Chinese railways is their continually changing pattern. The changing characteristics of China's railways correlate to the capital formation, colonialism, political, strategic, foreign trade, geographic and domestic economy factors. The unevenly distributed spatial pattern provides external expression of such characteristics (Map 1). Moreover, the spatial pattern does not adequately represent China's economic position. An uneconomical transport system was the most important economic consequence of the influences operative in China.

Summary

In summarization, there may be two categories of transportation--economic and noneconomic. The primary purpose of transportation is to shorten distance (i.e., time, miles, or cost). The essential elements of transportation, therefore, are speed, cost, safety, and capacity. Because of increasing the value of goods through

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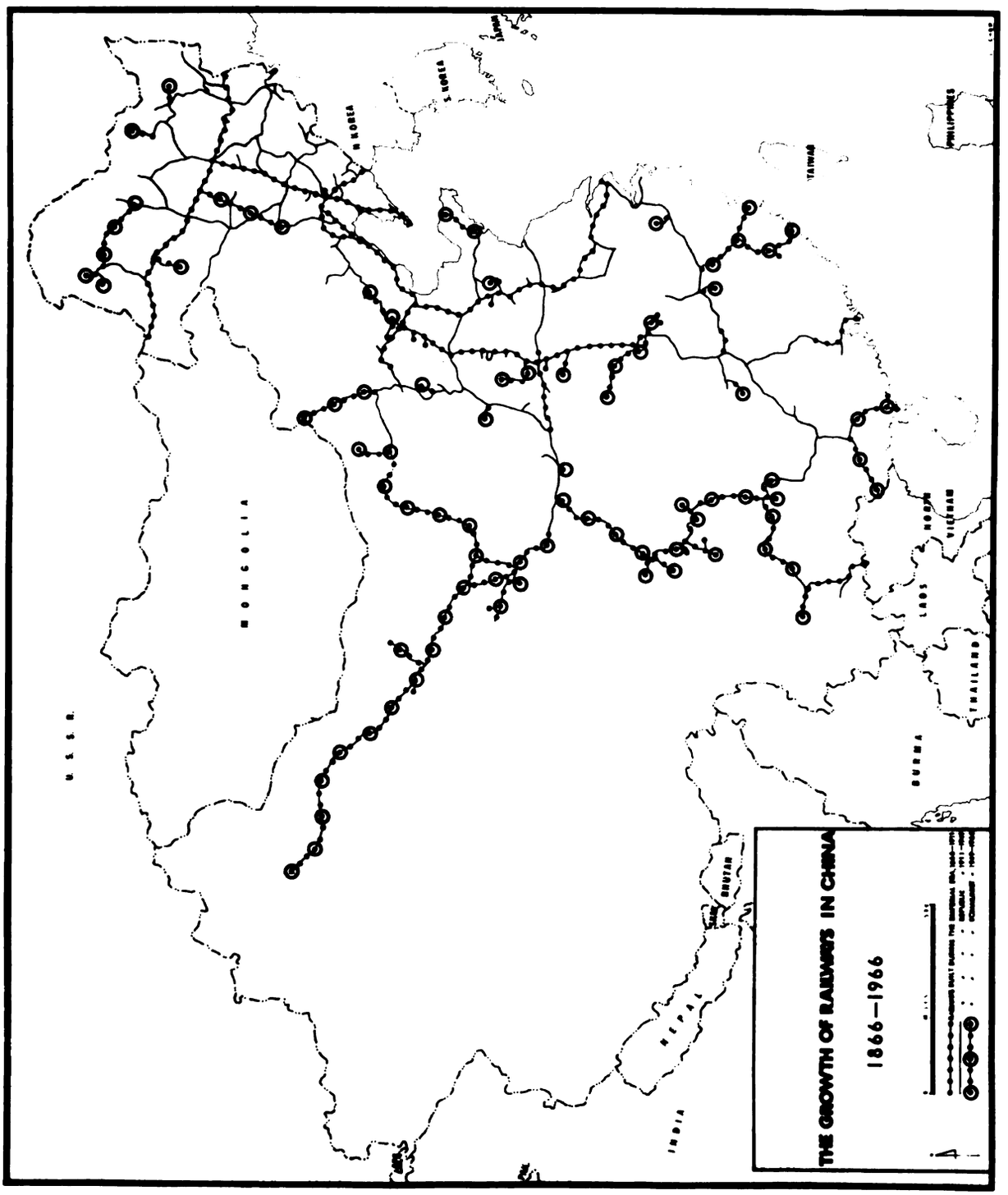
TABLE 2

COMPARISON OF FREIGHT VOLUME BETWEEN THE FIRST FIVE-YEAR PLAN AND THE REHABILITATION PERIOD IN CHINA

(1952 and 1957)

Transport Form	Goods Carried (10,000 tons)		Passengers Carried (10,000 persons)	
	1957	% Increase from 1952	1957	% Increase from 1952
Railway	24,550.00	85.9	24,700.00	51.3
Highway	6,749.30	225.8	11,414.60	159.1
Inland Waterway (besides junks)	3,686.40	294.6	5,604.00	93.8
Coastal Seaway	1,146.10	195.1	147.00	110.0
Civil Air Line	0.56	175.0	5.44	145.6

Source: National Security Bureau, Report on Railway Constructions in Mainland China, Taipei, 1957, p. 23.


THE GROWTH OF RAILWAYS IN CHINA
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S. KOREA
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shipment, the form of transportation included is a true form of production. The transport system of a country embodies many modes of transportation. Although they are mutually dependent upon each other, usually one type is strongly dominant. Choice of a particular form of transportation is determined not only by its availability but by its cost as well. The major determinants of transport cost are: commodity value, size of shipment, distance, region, form of transport, terminal handling, and transshipment. The function of transportation is to move goods and people, but is quite different from other economic activities. Its importance is derived from goals other than those it is designed to service. It is not a separate sector of the economy, but is intricately linked to sectors of a nation's economy.

Railway transportation has both advantages and disadvantages. However, it can promote economic development by carrying a greater amount of goods in less time at a cheap rate. As a form of mechanized movement railroads are closely related to the economic development of a nation. While differences will undoubtedly persist in nation-to-nation economic comparisons, railways will provide a common opportunity for effectively developing countries according to their individual economic and social circumstances.

In Asia, India, Japan, the Soviet Union, and China, transport is railway-oriented; but each country demonstrates a different stage of economic development. In the extensive and overpopulated area of China, railways have been chosen as a basic ingredient in achieving economic improvement. However, after a century of development commencing in 1866, Chinese railways today remain in a primary stage of development. The unusual characteristics of railway development in China, often contrasted with other Asian countries, provides the primary focus for this study.

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CHAPTER II

THE CHANGING CHARACTERISTICS OF CHINA'S RAILWAY PATTERN

A changing pattern is the major characteristic of China's railways. The spatial expression of the rail network developed to meet the changing needs of the nation.[1]

From 1865 to 1911 China supplied resources to several colonial powers and became a market for finished European products. Railway construction thus served colonial purposes. After the Republic was established in 1911, China became politically aware of its economic position and attempted to develop railways to serve its national and economic needs. This program was delayed by both the First and Second World Wars. The Communist regime was established in 1949, at which time the railway policy attempted to develop interregional transport[2] to connect the Communist Asian Bloc countries. Viewed historically, strongly conflicting attitudes toward railway building developed when foreign control ran counter to Chinese ideas of economic self-improvement.

Fourteen periods of rail development are discernible during the one-hundred-year period, 1866-1966.

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[1]Generally, the reasons were not economic ones.

[2]The Ministry of Railways had divided administration of the Chinese railway system into six major areas in 1953 based on the six economic regions in China.

Each of these periods has an identifiable set of characteristics which differentiate it from others. The periods can be grouped into three separate eras as follows:

The Imperial Era, 1866-1911

1. Conservative Period, 1866-1894
2. Scramble for Concessions Period, 1895-1905
3. Self-strengthening Period, 1906-1910
4. Nationalization Period, 1910-1911

The Republic Era, 1911-1949

5. Dr. Sun Yat-sen's Planning Period, 1911-1914
6. Penetration of Japanese Capital Period, 1915-1920
7. New Four-power Consortium Period, 1921-1926
8. The National Government Control Period, 1927-1935
9. The Sino-Japanese War Period, 1936-1945
10. The Post-war Period, 1945-1949

The Communist Era, 1949-1966

11. The Rehabilitation Period, 1949-1952
12. The First Five-year Plan Period, 1953-1957
13. The Second Five-year Plan Period, 1958-1962
14. The Economic Recovery Period, 1963-1966

The Characteristics of the Imperial Era, 1866-1911

This era marks the beginning of railway development in China. Aspirations of foreign mercantile interests and a desire of Chinese literati and officials to use railways as a means of strengthening China in the late nineteenth century, were some of the factors that gave impetus to railway construction. Following the turn of the century certain sections of the Chinese gentry also began to take an initiative in promoting railway construction.

Most of the railways of this era were owned by foreign interests and their construction was financed by foreign capital. With foreigners monopolizing the highest positions, the Chinese people did not gain the advantages possible if the investment had been a national involvement. It has been contended that more unification in China was destroyed than was created during this forty-five-year period of railway construction. The disruption of traditional economic patterns without substitution of adequate new ones was a primary characteristic of this period.

Carts, porters, pack animals, and inland waterways carried the greatest volume of goods before the railway was introduced to China.[3] In an economy as "enclosed," "pre-industrial,"[4] and "intensively subsistent" as was China from 1866 to 1894, railway transportation was needed to promote economic expansion. However, in a capital-poor country as was nineteenth-century China, the heavy capital investment necessary for railways was a major obstacle to

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[3]Rhoads Murphey, "China's Transport Problem, and Communist Planning," Economic Geography, XXXII, 1 (January, 1956), 19-21.

[4]Fei Hsiao-tung, the famous anthropologist in China, described the old Chinese agricultural conditions and practices as a "closed economy" or "economy of scarcity." It might also be called an economy of struggle for physical survival.

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the development of transportation. Not to be overlooked is the significant political reason for railway construction during this period.[5] In addition to the lines constructed by the foreigners, many Chinese-owned lines were built for political and strategic purposes rather than economic needs.

This era can be characterized as one of passive, foreign controlled, poorly designed, and politically interrupted railway construction. Four periods are discernible by their distinctive characteristics. These include Conservative Period (1866-1894), Scramble for Concessions Period (1895-1905), Self-strengthening Period (1906-1910), and the Nationalization Period (1910-1911).

The Conservative Period, 1866-1894

The introduction of railways to China tended to emphasize the differing psychological reactions of the colonizer and the resident population. From the Western point of view, the refusal by the Chinese to encourage railway construction was considered to be an unreasonable and unrealistic attitude. From the Chinese point of view, however, rail construction required a new psychological commitment which involved the acceptance of a new and incomprehensible way of life--a way of life entirely

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[5]J. K. Fairbank, China and United States Policy (Cambridge: Harvard University Press, 1960), pp. 206-215.

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different from and counter to that of the colonizer. Considering the psychology of nineteenth-century China, it is not difficult to understand that there should have been such strong opposition to railway construction. As was the case elsewhere, such concern was explainable. Watermen on the Thames in Shakespeare's London fought the coming of the coaches; portagers on the Sault Ste. Marie River fought the builders of the first canal; canalers fought the railway; railwaymen are fighting the highway; shipping interests are fighting the jet plane. Those with vested interests in older techniques are bound to fight the introduction of new ones.[6]

Four different reactions to railway construction represented by four different groups of Chinese people are apparent. The railway construction during the Conservative Period suffered as the result of these widely divergent psychological bases. The first and largest group numerically were the common people. Their traditional position ran counter to acceptance of any new ideas or development. Basically they opposed railway construction in China on the basis of equating mechanical civilizations with imminent bad fortune.[7] The mind of the

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[6]Roy I. Wolfe, Transportation and Politics (Princeton: D. Van Nostrand Co., 1963), pp. 82-83.

[7]One of the messages from memorandums about railways submitted to the Imperial Court is quoted from Ching Shih Kao: "Foreigners are mostly of Roman Catholic or

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common man was fettered by superstition. It was not uncommon to regard interference with ancestral tombs in the form of railway tracks as an offense against the "Feng-shui," that is, the good fortune of their ancestral spirits. Like home-loving peasantry everywhere, these nineteenth-century Chinese were unwilling to suffer the expropriation of their farms and homesteads for railway purposes. The unprecedented speed of the locomotive was feared as a source of danger to pedestrians and cattle as well. In retrospect it is clear that the attitude of the common people was the result of their isolation, lack of education and their inability to project the future of railways in terms of overall national economic potential as the most practical means of affecting that potential.[8]

Protestant faith and are ignorant of the spirits and gods whose abodes are in the mountains and gorges. Where the projected lives are interrupted by rivers and streams the foreigners would sink huge blocks of stone and iron into the bottom of the river and build iron bridges over the top, paying no heed to the abodes of the nymphs, mermaid, and spirits. The blasting of scenic mountains and the interference with beautiful streams disturbs not only the peaceful occupation of the people but also the tranquility of the gods and spirits. It would only be natural that such action should cause misfortune to the people and provoke the wrath of the gods in the form of droughts, floods, plaque, and pestilence." Chang Kia-ngau, op. cit., p.2.

[8]According to Ching Shih Kao, one of the memorandums is quoted here: "Since our military strength is inferior to that of the foreigners, it will be only logical for us to make the best use of strategic positions like mountain barriers to strengthen our lines of defense, a principle that has been followed by Chinese strategists

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The government was divided into three additional groups of officials who held different opinions about railway construction. These groups included the Emperor and his family, the Imperial Court (high-ranking Manchu advisors in the palace whom the Manchu ruler trusted more), and the progressive statesmen.

The Emperor and his family's decisions depended somewhat upon the suggestions of the Imperial Court and the progressive statesmen. The Emperors involved in this era of railway construction are Emperor T'ung-chih (1862-1874), Emperor Kuang-hsu (1875-1908), and Emperor Hsuan-t'ung (1909-1911). The influences from Empress Dowager Tz'u-hsi on the Emperors were significant since 1862. Thus for a period of thirty years the titular rulers of China were children, and the actual ruler was a woman.

The Imperial Court, on the other hand, having experienced years of acute diplomatic friction with foreign powers, were justifiably apprehensive over the ulterior motives of the foreigners who, more or less arrogantly, insisted on the adoption of various railway projects. Conservative by nature and more cautious than ever in consequence of their bitter experiences, Court officials

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from time immemorial. The introduction of the railway will deprive China of this natural advantage, for the railways will reduce all natural strategic positions to thoroughfares for locomotives and wagons. Such a step may be likened to removing the doors and leveling down the fences of our own home, leaving its interior to the mercy of marauding robbers. It would therefore be folly to deprive our nation of its invulnerable position and thus to tempt the enemy to further attack by providing him with railway facilities." Ibid.

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determined to do nothing and allow nothing to be done which might lead to additional foreign complications. They were Manchus and had no educational background in science, technology, and international understanding. Nevertheless, they were representative of the group of high officials who held power during the Manchu regime.

The progressive statesmen were Chinese elevated administratively from their provinces. These men were appointed by the Emperors to assume high positions in the central government for two reasons. First, the Manchu rulers wished to use a few high-ranking Chinese officials in the central government in order to control the mass of the Chinese people. Second, the statesmen had a better educational background and were needed by the Manchu rulers to solve the diplomatic problems in the changing world. Some progressive statesmen such as Li Hung-chang (1823-1901), Tso Tsung-t'ang (1812-1885), Chang Chih-tung (1837-1909), and Liu Ming-ch'uan (1844-1908) all recognized the inevitability and desirability of the modernization of China and were strong advocates of railway construction. Li, in his Memorial on Coastal Defense, stressed the importance of national defense, ascribing primary importance to the railways in this matter.[9] Tso proposed the building of a railway from Peking to the Yangtze valley along the

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[9]Li Hung-chang's opinion on railways can be found in: Li Wen Chung Kung Chuan Chi, Vol. 11, p. 27; Vol. 12, pp. 2, 25; Vol. 13, p. 8; Vol. 14, p. 24; Vol. 17, pp. 12, 53; Vol. 24, pp. 22, 26.

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Grand Canal as a matter of military necessity, and on his deathbed memorialized the Emperor on the pressing danger of foreign aggression and the importance of railways as one of the means of national defense to stop that aggression in China.[9a]

Thus, three groups of officials formed an attitudinal balance-board during the Manchu Dynasty. The Emperor sat at the pivotal position. The Imperial Court officials served as one plank, striving to influence the Emperor, but they were conservative in attitude. The Chinese progressive statesmen served as the other plank, attempting to influence the Emperor with their radical point of view. The efforts of these statesmen gradually swayed the Court, and public opinion of the common people was diverted from the theoretical issue of the advisability of railway construction to the practical question of actually beginning construction on the first railway.

Accordingly, efforts by Westerners to introduce railways to China were abetted by one set of Chinese officials, yet hindered by another. From the beginning, officials of the central government looked to railways to strengthen not only the country, but also their own hold on vested interests in China. Later in this period, they thought of railways merely in military and political rather than in economic terms, going so far as to place the

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[9a]Chang Kia-ngau, China's Struggle for Railroad Development (New York: The John Day Co., 1943), p. 25.

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administration of national railways in the hands of the Bureau of Naval Affairs.[9b] The balancing movement of the four groups created the basis for the characteristics in railway construction during this twenty-nine-year period.

Scramble for Concessions Period, 1895-1905

While the Peking Court continued to resist the oncoming tide of alien influences, the leaders of Japan were eager to accept new foreign ideas and in particular to remodel the Japanese army and navy along Western lines. China assumed itself to be developing along similar lines. However, in 1894 a clash over Korea revealed that she had only been playing at military modernization. China was defeated by her small neighbor, and under the conditions of the Treaty of Shimoneseki, acknowledged the independence of Korea, ceded Taiwan and the Liaotung Peninsula to Japan, and, in addition, was forced to pay a heavy indemnity.

The result was a conviction in foreign diplomatic circles that the Manchu government was incapable of blocking their independent exploitations in China. France had become entrenched in Southeast Asia in the annexation of Annam in 1885. Russia, utilizing the Trans-Siberian Railway, pushed forward on the Manchurian border.[10]

[9b]Zen Sun, E-tu, "Railway Development in China," Far Eastern Quarterly, XIV (1955), 183.

[10]Robert N. Taaffe, "Transportation and Regional Specialization: the Example of Soviet Central Asia," Annals, LII, 1 (March, 1962), 80-98.

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England wished to control the Yangtze Valley,[11] as France desired Yunnan Province, and Russia the area of Manchuria. Germany, a very latecomer and all the more anxious to make up for lost time, sought to control Shantung Province. To balance the gifts to Germany and Russia, England secured the Lease of Weihaiwei, France obtained Kwangchow, Germany secured Tsingtao, and Russia was given Dairen.

These Leased Territories differed from the earlier settlements and were more in the nature of colonies. These were the days when the cry of "the white man's burden" was at its maximum.[12] High-minded men were persuaded that the benefits of their material civilization must be an unmitigated blessing to "the colored races." Southern Asia as well as Africa suffered the benefits of such thinking.[13] China did not escape from this movement. Agents of railway and mining corporations flocked to Peking. Through the acquisition of railway and mining concessions, spheres of economic influence could be established and the question of political control could be left to that convenient time when one's competitor was not

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[11]Zen Sun, E-tu, Chinese Railways and British Interest 1898-1911 (New York: Kings Crown Press, 1954), pp. 7-11.

[12]R. I. Wolfe, op. cit., pp. 70-91.

[13]Ibid.

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China was in no position to advance herself in this period; she had conceded railway rights to every soliciting power. The foreign concessionaires were allowed to complete construction and begin operating their railways. Most of the main line railways in China were built at this time by foreign engineers with foreign capital and Chinese workmen. The contemplated mining development did not occur because the Manchu dynasty fell out of power before the railways were completed and the country was thrown into administrative confusion. British coal mines at Kailan and Japanese coal and iron mines in Manchuria were the most noteworthy exceptions. The Treaty of Shimonoseki in 1895 conceded to Japan the right to build factories in the Treaty ports. This right was conferred on the British by a treaty in 1902. Cotton and flour mills were opened by both the Japanese and British in Shanghai and Tientsin.

In 1902 England allied herself with Japan. Both nations feared Russia's advance into Manchuria, where she controlled the newly built Chinese Eastern Railway. In 1904 the inevitable war between Japan and Russia began. Russia was defeated, leaving Japan by the Treaty of Portsmouth heir to Russian interests in South Manchuria.

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Russia's loss was a momentary gain for China, for the colonial powers insisted that the agreement which America had sponsored in 1898 for an open-door policy in trade should be applied to South Manchuria. To this suggestion Japan submitted unwillingly; yet by so doing, the Concessions Period drew to a close.

On the part of the Chinese, Chang Chih-tung, the Governor of Kwangtung and Kwangsi, played a major role in railway construction during the Concession Period. The new Imperial Railway Administration Bureau was created by his order in 1896 and Sheng Hsuan-huai (1861-1920) was appointed as the director-general. This organization controlled rail construction from 1896 to 1905. Chinese capital for railway construction was most difficult to obtain and foreign loans were needed. Because of the input of foreign capital, the construction was dominated by foreign interests and foreign control. China, accordingly, lost her rights even for the railways constructed for her own purposes.

This period commenced in 1895, the same year that China was defeated by Japan, and ended in 1905 at the termination of the Imperial Railway Administration. The period marked a high point in Chinese railway history,[14]

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[14]Hung-hsun Lin, History of Chinese Railways (Taipei: World Press, 1963), pp. 5-9.

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and was characterized by the great international scramble for concessions. Much was done during this period to shape the network of China's future railway system and numerous agreements for railway construction were concluded with different powers.

In the face of the great disparity in military strength between China and the colonial powers, the Chinese were forced to give in, suffering in silent indignation. The sporadic attacks of the Chinese upon individual foreigners, culminating in the Boxer Movement, must be regarded as spontaneous demonstrations of popular protest against foreign intrusion. During this period China suffered both from internal strife and external aggression. While China benefited from the mutual jealousy among the colonial powers, which spared her the fate of being partitioned and completely subjugated, the colonial powers dealt Chinese national sovereignty a severe blow.

The Self-strengthening Period, 1906-1910

During the early twentieth century, the colonial transportation system in China and elsewhere became an expression for local national development. This interest was firmly founded in economic accomplishments, and it expressed itself as a national desire to achieve self-sufficiency in transportation. When no such foundation existed, the nation turned for help to other, richer

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nations to acquire transportation facilities. If China, when turning to others for help, had full regard for its economic needs, then it could place itself on the road to self-control. If, however, China's new acquisitions were totally unrelated to its economic needs and not justified in other real needs, such as strategic ones, they then proved to be merely an empty gesture, made in the interests of an illusory prestige, and in the end led to harm. At the same time, there was strong discontent within many colonies regarding the system of European political domination. Revolutions had already occurred against European-based colonialism as a political and economic force. The reaction in China was a part of this movement, and the provincial officials formed the nucleus of this discontent.

Between 1906 and 1910, China began to move once again towards self-strengthening. This period served as the basis for self-strengthening of her railway development.[15] The economic and political aggressions of the imperialist powers inspired the Chinese people. Their former conservative manner towards rail construction was modified radically. The provincial gentry tried to organize the manpower and collect capital for the purpose

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[15]This is the period of self-strengthening in railway construction from 1906, the year after the Imperial Railway Administration Bureau closed until 1910, the year the nationalization of railways was on the move. The opinions during the cultural "self-strengthening" period (1860-1894) did have some influence on this period in railway construction.

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of railway development which would compete with established colonial lines. The government tried to control the colonial lines whenever it was possible, but such efforts were unsuccessful throughout this period.

One of the advocates of railway building for self-strengthening was Hsueh Fu-ch'eng.[16] He suggested to the government that the building of railways would accomplish three things beneficial to the country: trade would be increased, the transportation of tribute rice would be made easy, and troop movements would be facilitated.[17] Ma Chien-chung,[18] another railway advocate, included the exploitation of mineral resources as one of the benefits to be derived from the railways. K'ang Yu-wei (1858-1927) declared that the strength of a country was in direct proportion to the ratio of steam power against man and horse power, and he believed that the railway, the steamship, and the electric wire were the three things that

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[16]Hsueh Fu-ch'eng (1838-94) was the Chinese ambassador to Great Britain. He published the essay, "On the Introduction of Railways into China," in 1880.

[17]Feng-tien Chao, "Economic Thought During the Last Fifty Years of Ching Period," Yenching Journal of Chinese Studies, Monograph Series No. 18 (Peking, 1939), p. 151.

[18]Ma Chien-chung (1842-1904) was the Chinese ambassador to Korea. His opinion on railway construction was mainly for mineral exploitation. See Feng-tien Chao, "Economic Thought During the Last Fifty Years of the Ching Period," Yenching Journal of Chinese Studies, Monograph Series No. 18 (Peking, 1939), pp. 155-156.

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would most radically change the world.[19] Chang Chih-tung defined the railway as the one developmental aspect that could "open the doors to greater development in the interests of agriculture, industry, commerce, and military matters,"[20] that is, in the interests of all segments of the national life. During this period, many arguments such as these were aimed at persuading China to accept the railway as a means of strengthening China vis-a-vis the Western powers and as a contribution to China's future political stability.

During the period of the scramble for concessions, the Chinese people were watching with increasing concern the colonial powers' rapid encroachment on China's national integrity and sovereignty, and they were concerned both with the avidity of the Concessionaires and at the helplessness of the Old Imperial Regime. This self-strengthening effort, born of spontaneous aspirations on the part of the Chinese people to develop the railway systems of the various provinces, was strategically significant at that time. The lines proposed by the gentry of these provinces served as a valuable guide to railway construction by the government after a few years had passed.

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[19]See Kang Yu-wei, On National Salvation Through Material Development (Shanghai, 1919), p. 59.

[20]Feng-tien Chao, op. cit., pp. 1-75.

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The capital required for the construction of a comprehensive railway system was enormous and far beyond the ability of provincial finances during this period.[21] With the exception of Kwangtung, which was able to raise considerable capital among its prosperous emigrants in foreign countries, and of Kiangsu and Chekiang, which benefited from their large foreign trade, no other province had the means of carrying out even a substantial part of its plans. As a result, little was accomplished by popular subscription in comparison with the methods undertaken by the government. The difference in achievement was great, and the failure of private enterprise to raise sufficient capital to meet the expense of railway development presaged the subsequent nationalization of railways in China. The descriptive characteristics of the following period were structured in the Self-strengthening Period.

The Nationalization Period, 1910-1911

This period was characterized by Imperial government control of the railways in China. The nationalization of railways was a direct result of four circumstances. First, since many lines were proposed by the provinces,

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[21]Chang Kia-ngau, China's Struggle for Railroad Development (New York: The John Day Co., 1943), pp. 41-42.

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the political status of each individual province was gradually changed into one of semi-independent control. The Imperial government felt that they would soon lose control of China. To prevent this political, centrifugal possibility, the Imperial government decided to create a policy for nationalizing all the railways. Second, from the experiences of provincial railway construction, the Imperial government felt that it could build railways without foreign aid. It was believed that the planning, construction, operation, and administration of railways under one authority would benefit national interests. Third, an anti-Manchu movement was expanding over the country, and it was very difficult to maintain order because of distance factors and inadequate transportation. A centrally controlled railway system was necessary for military purposes. Finally, given the financial problems of railway construction in all provinces except in Kwang-tung, Kiangsu, and Chekiang, an opportunity for the central government to annex these railways with national capital was created.

A quick decision was necessary, and the Imperial government made it. In 1911, Sheng Hsuan-huai, Director-General of the Board of Posts and Communications, was ordered by the Imperial government to memorialize the throne, to nationalize all railway enterprises, and to

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take over all private and provincial lines for the purpose of speeding railway development. His petition was granted by an Imperial edict. Henceforth, the trunk lines and railway companies in the country were all placed under the state control. Branch lines might still be constructed by the provinces according to their financial ability but all previous permits for the building of trunk lines were canceled.[22]

When the new policy of railway nationalization was made known, the people raised a storm of opposition. Popular indignation was once more aroused to an extraordinary extent. It was especially intense in Szechwan province, and the coincidence of the outbreak of the revolution in Hupeh province had encouraged the people of Szechwan. To suppress the movement, the Imperial government sent its well-eqipped soldiers under the command of General Tun Fang to Szechwan, but the general

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[22]The first railway thus taken over by the Imperial government was the Canton-Hankow Railway which the local gentry of Kwangtung, Hunan, and Hupeh had failed to complete after five years of controversy. The Imperial government again solicited foreign financial assistance and began in 1909 to negotiate with French, German, American, and British bankers for a loan of 5,000,000. The proceeds of the loan were to cover the completion of the unfinished 560 miles of Canton-Hankow Railway, and the construction of a railway from Kwangshui, a station on the Peking-Hankow Railway, to Ichang, a river port on the northern bank of the Yangtze about 370 miles west of Hankow. The loan was known as the famous Hukuang Loan. According to Chang Kia-ngau, op. cit., p. 44.

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was assassinated on his way and the Viceroy of Szechwan met the same fate. On September 10, 1911, the people of Szechwan declared themselves independent from the Manchu regime and in sympathy with the revolutionary cause. On October 10, Prince Regent Chun proclaimed on behalf of the young Emperor his abdication from the throne. The abdication of the Manchus marked the close of another period of Chinese railway construction.

The Nationalization Period lasted only one year in China's railway history, but it gave great influence to railway policy in the years to follow.

The Characteristics of the Republic Era, 1911-1949

In general, the Republic Era in China demonstrated a changed role for the colonial railways. China, of necessity, assumed increasing control as the Western powers gradually withdrew because of the two world wars. Strategic and economic considerations caused the railways to fall under the direct control of the Chinese military. The era was marked by fluctuating consistency and embryonic change in railway construction. Railway projects were well planned, but the investment of capital in railways presented a serious problem. China was forced to rely on inputs of foreign capital. Regrettably, the Japanese capital investment was infiltrated by political enforcement,

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and, while the foreign capital from other sources placed fewer restrictions on China, it did not provide a "free hand" for China's railway construction. This created a most confusing situation during this era. Accordingly, military and political interruptions related to railway construction distinguished this thirty-eight-year period.

After the new Republic regime was established, it became imperative that China should consolidate once again politically, culturally, and economically. The significance of railway development for achieving this goal was recognized from the start.

Politically, the Chinese people have maintained throughout the ages an indivisible identity, internecine wars have been fought and dynasties have changed, but the people have survived all vicissitudes. Not only were they able to withstand periods of alien rule, but also to assimilate and absorb the intruders. An explanation of this power of survival is to be found in their intolerance of tyranny and oppression. They rose in arms against foreign aggression and exploitation in the Boxer Movement. The Chinese Revolution in 1911 was again directed against injustice. Dr. Sun Yat-Sen maintained that the final objective of China's revolution was the attainment of liberty and independence, without which neither peace in China nor peace in the world could be

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achieved and made secure.[23] With regard to China's struggle against Japan, Chiang Kai-shek likewise pronounced that China's aims were dependent upon freedom and independence.[24] This aspiration, born of spontaneity, surged forward in a persistent and unyielding momentum toward a crowning accomplishment, that of rebuilding a free and independent nation. However, political unity can only prosper if an atmosphere of active cultural and economic intercourse is achieved throughout a nation. It was to these purposes that new plans for railway transportation were directed.[25] Indeed, an independent and unobstructed development for China served as the primary goal of Chinese railway expansion during the Republican era.

Culturally, the Chinese people have been blessed with a common written language and a tradition largely based on Confucian ethics. Local differences of dialect have always existed, but the benefit of a common written language has preserved to a remarkable degree the cultural homogeneity of the country. The introduction of Western ideas in the past century, however, has inevitably

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[23]Sun Yat-sen, Three Principles (Shanghai: 1922), pp. 1-5.

[24]Chiang Kai-shek, China's Destiny (Chungking, 1942), pp. 1-3.

[25]Sun Yat-sen, The International Development of China (London: Hutchinson & Co., 1921), pp. 9-13.

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disturbed an otherwise tranquil and harmonious state of cultural identity. The coastal provinces were modernized much faster than the interior, so much so that the country as a whole has suffered from great variations in regional development.[26] Only where sufficient means of transportation and communication were available could modern ideas spread at an even pace. The introduction of locomotives and steam engines into the interior brought the people into closer contact with the machinery of modern civilization. The new administration felt, therefore, that in order to preserve China's indigenous culture and to heighten its values, to smooth out regional differences of cultural development, and at the same time to absorb the best elements of Western civilization, no better means could be found than large-scale development of railways.[27]

Economically, China has enjoyed a unity and age-long stability of her own, particularly in the field of agriculture. But she has suffered from a slow rate of economic progress due to the lack of modern technological equipment. Transportation by railways could solve China's

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[26]John King Fairbank, Trade and Diplomacy on the China Coast (Cambridge: Harvard University Press, 1965), pp. 3-22.

[27]Chang Kia-ngau, op. cit., p. 8.

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problems in the economic field even more readily than those in the political and cultural fields. Only by using railways can heavy equipment necessary for industrial enterprises be carried over long distances. The movement of tools and equipment would be followed by necessary labor relocation from one locality to another, possibly resulting in a more equitable distribution of population and wealth throughout China. The vastness of the country can only be mastered and made useful by the introduction of more railways. Dr. Sun Yat-sen had stated succinctly at the beginning of this era, "Transportation is the key to industries and the railroad is the key to transportation."[28]

The planners of the new Republican regime attempted to achieve a stronger unification of China's body politic, a greater homogeneity of her culture, and a more thorough economic development. In this way the leadership thought China would at last grow to full political maturity and would be able to preserve the freedom and independence for which she had sacrificed so much in the wars. It appeared almost self-evident that the development of a comprehensive network of railways was the key to making China a competitive partner in the world community given her rich natural endowments, know-how, and population.

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[28]Sun Yat-sen, The International Development of China, op. cit., p. 98.

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Dr. Sun Yat-sen's Planning Period, 1911-1914

The Republic was born in October of 1911, but the political situation remained unstable. Dr. Sun Yat-sen, the founder of the Republic, was pushed from his temporary position as president by several political factions. He was then appointed to the position of Director-General of National Railways, with carte blanche authority to plan railway construction on a national scale. At the time of his appointment, in 1912, the National Railway Corporation was created to carry out his programs. With the exception of matters concerning the railways already built or in the course of construction and projected lines for which draft agreements had previously been drawn up by the Ministry of Communications, the National Railway Corporation had full power to contract loans and execute projects.

Railway construction was considered to be the major aspect of the national economic program. Some lines were established in the beginning solely for the purpose of immediate development of the totally undeveloped regions.[29] (Map 2) There had been no conflicts of opinions regarding railway construction among the common people, provincial

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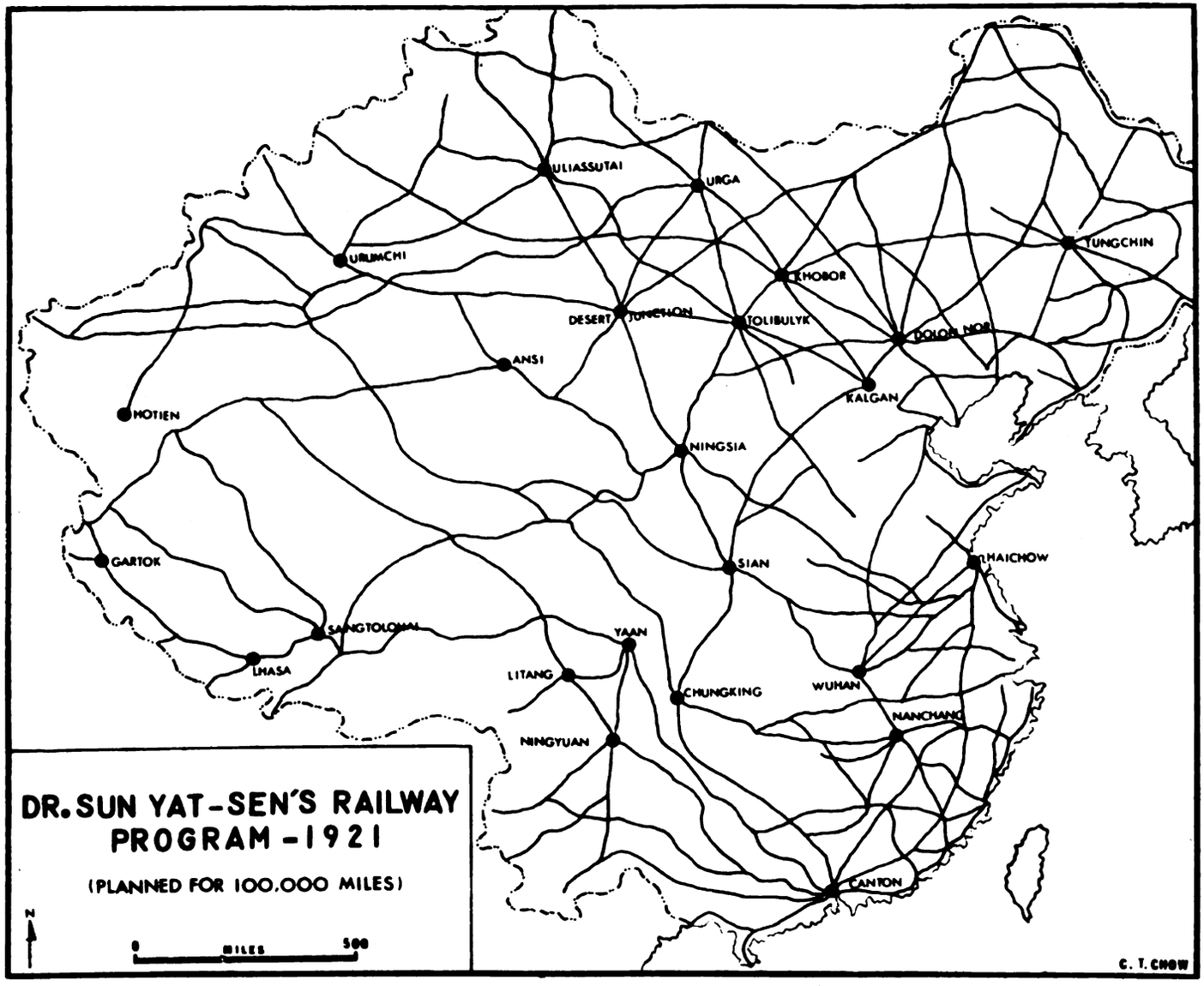
[29]Such undeveloped regions as Outer Mongolia, Inner Mongolia, Sinkiang, Chinghai, and Tibet.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officials, and the central government as was the case during the previous era. As soon as China had been unified after a long period of civil war, Dr. Sun Yat-sen set up three goals for the new Republic: first, that the people might, and should, fully contribute their specialties for betterment of the country. Second, that lands might, and should, be fully used to the advantage of the country. Finally, that goods might, and should, be freely moved within the country.[30] The railway plan was designed to play the major role for approaching these goals. However, the planning goals were set too high. The result was that very little railway construction occurred during this period. His program called for the construction of 100,000 miles of railways at the cost of CN$6,000,000,000. (See Appendix I.)

In his plan he proposed that the railway business in China should be a state enterprise. The development of railways should be carried out by an international organization in harmony with the principle of the Open Door. The old order of rival spheres of influence, struggles for concessions, and selfish exploitation of China by foreigners should end, while foreigners should be encouraged to invest capital in Chinese railways on the

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[30]For the details see Sun Yat-sen, The International Development of China, op. cit., pp. 9-13, 158-161.

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basis of full respect for China's national sovereignty and integrity. On the basis of such principles, the capital-supplying powers were expected to agree to joint action and to a unified policy of investment, forming an international organization and charging international experts with the formulation of plans and standards in order to prevent waste and facilitate development work.[31]

Dr. Sun was eager to secure the confidence of the Chinese people for this plan of international development of China's railway system. He recalled the old days when foreign bankers disregarded the will of the Chinese people and thought that they could do everything with the approval of the Manchu government alone. Unfortunately for the foreign bankers, they found that the contracts concluded with the Manchu government by means of bribery and threats were blocked by the people. Had the foreigners through fair dealings first secured the confidence of the Chinese people, many of the difficulties would have been avoided. As soon as the people were won over to this scheme of international railway development, Dr. Sun argued, it would be relatively easy to take the next step

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[31]He suggested inviting foreign investment in China's railway construction through cooperation. He said that "the goal of material civilization is not private profit but public profit, and the shortest route to it is not competition but co-operation." Ibid., p. 161.

and open negotiations for construction contracts. As the basis for such contracts he suggested the agreement he himself had concluded with the Pauling Company of London for the construction of the Canton-Chungking Railway. In this agreement the management of the railway was vested in the hands of a Chinese managing director. The proceeds of the loan were to be deposited in the Bank of China. Chinese materials were to be preferred, provided price and quality were suitable. These factors would insure the administrative integrity of China's railways.[32]

Although Dr. Sun's plan was not carried out during 1912, it had the effect of providing a sound foundation for the program, aiming at unification of all construction work and for control of the railways by the government. But for his leadership and tireless enthusiasm the people would not have realized as soon and as completely as they did the magnitude of China's transportation problems and the urgency of large-scale railway construction, which demands centralized government planning.

As a consequence of Dr. Sun's leadership, the private owners of railways in Hunan, Kiangsu, and Honan voluntarily surrendered their lines to the government. In the following years the private railway owners of

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[32]Chang Kia-ngau, op. cit., p. 48.

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Szechwan, Anhwei, Chekiang, Shansi, and Hupeh followed suit. Thus, one may consider this movement toward nationalization of Chinese railways as one of the immediate results of Dr. Sun's railway program.

Another result of Dr. Sun's program was the revival of foreign investments in Chinese railways after the founding of the Republic. Several important railway agreements were concluded during this period of three years: the Lunghai Railway contract with Belgian interests involving a loan of £4,000,000 (see Appendix I); the Tatung-Chengtu Railway contract with French and Belgian interests for £10,000,000, of which £770,217 was in French francs and £5,789,518 in Belgian securities, had been advanced; and the Pukow-Sinyang Railway Contract with British interests for £3,000,000, of which £2,000,000 had previously been advanced. National control of the railways, and the formation of emphasis upon railway building for domestic economic uses was the primary characteristic of this period.[33]

The Japanese Capital Penetration Period, 1915-1920

World War I forms the backdrop for this period. The basic pattern and composition of world trade was not

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[33] Ibid., p. 53.

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altered drastically by the war. Western Europe remained the primary trade focus, with other areas more or less continuing in the roles established for them before World War I, with the exception of the rising importance of Japan in international trade.[34]

Europe declined slightly in relative world position in exports, and rather definitely in imports, during this period between 1915 and 1920--with the United States, Canada, and Japan rising in almost direct proportion to Europe's decline. The slight adjustments in trading partners and commodities meant a relative rise in the importance of North Atlantic and North Pacific trading routes.[35] China became one of Japan's raw material supply regions as well as the market for Japan's finished products. Japan's interests in building railways in China climaxed during the period. This period in the development of China's railway system was, therefore, characterized by the penetration of Japanese capital.

In the years when the European powers fought a life-and-death struggle, Japan was reaping economic profits on an unprecedented scale. Her foreign trade surplus

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[34]Richard S. Thoman and Edgar C. Conkling, Geography of International Trade (Englewood Cliffs: Prentice Hall, 1967), pp. 1-4.

[35]Ibid., p. 5.

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amounted to Yen 1,170,000,000. (See Appendix I.) Other surpluses of her international balance of payments amounted to Yen 862,000,000, making a total of Yen 2,032,000,000. Of this sum she invested directly or indirectly in allied countries, including China, some Yen 1,200,000,000.[36] To exploit the concessions she obtained under the "Twenty-one Demands"[37] it was necessary for her to invest more heavily in China,[38] so that her endeavors at economic penetration and political strangulation could work hand in hand. For this reason the "Nishihara Loans"[39] were extended to China between the years 1917 and 1920. The proceeds of many of these loans, ostensibly made for industrial purposes, were spent by the Chinese government at the time to carry on the military contest being waged with the southern provinces. It was indeed the intention of the Japanese to fan the flames of civil war, as well as to gain more specific advantages through her liberal loan support of the new regime for railway construction.

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[36]The rest was principally distributed in industrial investment in Japan proper.

[37]Seven demands on the construction of railways in China.

[38]During these years Japanese investment in China totaled Yen 120,000,000.

[39]Also called Szepingkai-Chengkiatun Railway Loan. In addition to the railway items, this loan also covered numerous other credits given to the Chinese government for various purposes.

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Japanese investments in Chinese railways were entirely motivated by political considerations, with the primary objective of annexing Manchuria and Mongolia. Upon the outbreak of the First World War Japan turned her attention to the province of Shantung. Because of the proximity of Fukien to Taiwan, Japan included this province in her sphere of influence as well. From Fukien Japan soon extended her grasping hands to the neighboring provinces of Chekiang and Kiangsu.

The slenderness of her own economic resources initially hampered Japan's efforts to develop railways in China while her evident aspiration to gain full political control of Manchuria and Mongolia made it possible for her to obtain foreign capital with which to attain her own goals in any part of China. This accounts for Japan's failure to make considerable investments in Chinese railways and for her slow pace in comparison with the European powers before the First World War.

During the war, when the financial strength of the powers was sapped by the deadly struggle, Japan gathered all the economic resources at her command in a determined effort to gain a predominant position in China. This attempt was made through the "Nishihara Loans." The aim of forcing these loans on China was political strangulation

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and not economic cooperation, so that positive economic results of these large loans were negligible.[40]

The New Four-power Consortium Period, 1921-1926

Political instability appeared in the early stage of the new Republic, and it became progressively more serious in the 1920's. The provincial governors gradually became more powerful by developing local resources and improving local transportation. The opportunity to increase local powers was actually given by the central government which was suffering heavily from the diplomatic and military conflicts with Japan. The central government was so occupied with international problems that it lost its internal control. The provincial governors, recognizing this weakness, gained more authority by enlarging their military forces and thus established themselves as warlords.

The central government sensed the situation and tried to prevent it. The first consideration in solving

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[40]China's total obligations to Japan with regard to all these railways in Manchuria, Mongolia, Shantung, and Suiyuan were Yen 104,970,000 and CN$10,000,000. These included the Szepingkai-Chengkiatun Railway Loan of Yen 5,000,000; the Chengkiatun Taonan Railway Loan of Yen 45,000,000; the HsinmintunMukden Railway Loan of Yen 320,000; the Kirin-Changchun Railway Loan of Yen 6,650,000; the Shantung Railway Loan of Yen 20,000,000; the Peking-Suiyuan Railway Loan of Yen 6,000,000; and the Kirin-Hweining Railway Loan of CN$10,000,000.According to: Chang Kia-ngau, op. cit.,p. 62.

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the problem was to gain communication access to the provinces by building railways. Unfortunately, the regime was short of development capital and a four-power consortium was therefore formed to fill this need. The characteristic significance of this period was that foreign capital for the political establishment of China's railway construction was obtained. Before the formation of the New Four-power Consortium in 1921, many attempts had been made by foreign governments to control China's foreign credit by means of an international consortium. None had succeeded in doing so.[41]

In May, 1919, representatives of banking groups of Great Britain, France, Japan, and the United States held a conference in Paris for the purpose of organizing the "New Consortium" and adopted a number of resolutions. The objectives of the "New Consortium" were to concentrate efforts on future undertakings, to place these undertakings on a proper working basis, and to induce the enterprises

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[41]As early as 1905, British and French banking interests formed the Chinese Central Railway Company to undertake railway construction in the Yangtze basin. The Americans were invited to join but were not inclined to accede. By 1909 a German syndicate obtained representation, making a Tripartite Group. In the same year an American group demanded participation, and the Hukuang Loan of May 20, 1911, was concluded with a group of British, French, German, and American banks, the so-called Quadruple Group. This group asserted its sole right to provide all loans to the government of China; but this assertion was never recognized by China.

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already in existence to gradually join and pool their resources in an international investment venture. In the meantime, the existence of the "New Consortium" was to have the desired effect of restraining Japan from individual action.[42]

The agreement establishing the New Four-power Consortium was signed on October 15, 1920. Despite the assurances of the Consortium as to its purposes, the Chinese people entertained serious doubts whether China would truly benefit from its operations. They feared international control of their railways and of the monopoly created by the Consortium in lending money to the Chinese government,[43] for if China should desire a loan, she would be obliged to resort to, and to accept, the terms of the Consortium. The inclusion in the Consortium of Japan, which had forced on China the Twenty-one Demands of 1915,

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[42]This indicated the extent of the Western powers' apprehension concerning Japan's further advance in China, an advance which was bound to be at the expense of the interests of the other powers. It was for the purpose of preventing a Japanese monopoly in China and eventually in East Asia as a whole that the British supported such an international organization for the control of foreign railway interests in China. The Japanese were aware that the proposals were aiming at their special rights and interests and spared no effort to stir up opposition against the plan.

[43]Japanese-controlled newspapers in Peking raised a storm of opposition. The Chinese, under the impression that there was no distinction between international control of railway investment and international partition of China, also raised objections against such a plan.

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aroused serious apprehension. Mr. Liang Shih-yi, the head of the Bank of Communications, called a conference of all leading Chinese banks at Peking to organize the China Finance Corporation for the purpose of underwriting all government and industrial loans in competition with the New Consortium. The Banker's Association at Peking also called its members to frequent consultations to discuss ways and means to meet the situation.

It was evident that the limited strength of this financial organization would not be able to meet all governmental and industrial needs. It was therefore proposed that, as long as administrative integrity and national sovereignty were not jeopardized, China should make use of foreign financial assistance for the development of her national resources.

Japan's predominant position in Manchuria and Mongolia was virtually recognized by the Consortium, which was in conflict with the announcement of the Chinese Banker's Association. Thus, there was no hope of persuading the Chinese people to cooperate with the Consortium. In fact, the New Consortium was never recognized by the Chinese government and its place in the history of Chinese government finance is purely theoretical. After the formation of the Consortium the member powers ceased to provide further loans to China.

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Aside from the formation of the New Four-power Consortium, which characterized this period of Chinese railway history, several significant events are worth recording during this period.

The first was the restoration to Chinese control of the Kiaochow-Tsinan Railway in accordance with the resolution passed at the Washington Conference after World War I. In 1922 the Chinese government issued treasury notes to the amount of Yen 40,000,000 with which it redeemed the whole of the Kiaochow-Tsinan Railway from Japan.

In 1924 an agreement was reached with Soviet Russia, permitting the purchase by China of the Chinese Eastern Railway. Prior to the Railway purchase by China it was controlled by a Board of Directors on which China and Soviet Russia each were represented by five members. The Board of Directors designated one Russian and one Chinese as deputy directors and a Russian as the managing director. By this agreement Russia virtually took back the control of the Chinese Eastern Railway, which in 1919 the Soviet government had offered to China unconditionally. However, Russia was soon forced to "sell" the railway to Japan in consequence of the Japanese invasion of Manchuria.

The National Government Control Period, 1927-1935

The political instability of the Republic was ended by Chiang Kai-shek's military victory. China was united

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under Chiang's army, and he established a national government in Nanking. The lower Yangtze region resumed its role as the political center of China, a position it lost after the fall of the Ming Dynasty in 1644. With the establishment of the National government in the south, it was soon found necessary to increase traffic to and from the new capital. A new Ministry of Railways was created in the National government. The investments for railway construction came primarily from two sources: indemnities from the Boxer Rebellion and taxes on imports and exports.

This period concluded Chinese railway development during the seventy-year period from 1866 to 1935. It brought important changes into China's national life and altered her relations with foreign countries. From the position of a self-sufficient, self-contented, and pre-industrial nation, through periods of external enforcement and internal strife, China found her way to national consciousness through railway planning and control. The interest aroused by successful railway operation had taken hold in China.[44] However, the internal peace, which at

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[44]In an interview with opponents of international control of Chinese railways in 1926, Sir John Jordan, the British Minister, pointed out that China had been concluding railway contracts with foreign nationals which gave them considerable political influence over ever-widening areas of China, which affected the economic and political security of China and tended to give rise to international controversies. Sir John further stated that the Sino-Japanese War of 1894-1895, the Russo-Japanese War of

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last brought unification under the National government, left the country in a feverish and exhausted condition. Periods of disorder and internal strife had depleted the treasury, and the pressure of taxation and debts was made even heavier by the general distress of the country. The nation was disturbed by frequent political changes, and the widespread distress of the rural population added further complications to an already difficult situation.

Independent foreign capital was not forthcoming for railway development because the agreement establishing the Consortium expressly prohibited independent action on the part of the individual Consortium members. At the same time the Consortium was uncertain of the future policy of the new National government and would not risk further investments before the political situation became clearer. The National government, on the other hand, was too busy putting its house in order to pay any attention to railway development.

The provinces which had escaped the ravages of civil war were nevertheless anxious to improve their

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1904-1905, and the Japanese-German War of 1914, were all caused by the conflict of interests among the powers in China and by their attempts to enlarge and strengthen their respective spheres of interest. On the other hand, according to Sir John, if the railways were brought under centralized control, there would be three advantages to China: she would be able to recover the railways which were in foreign hands, to regain all administrative and political rights in her own territory, and within a certain period, to build and operate her own railways. Chang,Kia-ngau, op. cit., pp. 67-68.

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internal communications as a means of relieving economic stress. This desire brought to the front new leaders whose courage in initiating construction projects with China's own resources marked the revival of popular railway development. Parallel development of railways by both the central government in Nanking and local governments in Manchuria formed the characteristics of this period in China's railway construction.

The Sino-Japanese War Period, 1936-1945

After the Japanese invasion of Manchuria in 1935, China armed for defense. The eight-year Sino-Japanese hostilities erupted in 1937, but this period of railway construction actually began in 1936. This is because the goals of the railway construction in 1936 were altered to prepare the nation for war.

Railway construction during this period was more complicated than it had been during previous periods.[45] Construction was divided into four phases including preparation for war, adjustment to war conditions, wartime transportation, and wartime construction. However, this period was characterized primarily as one in which the goal was to protect the railways from enemy attacks, and

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[45]For details see Chang Chia-ngau, op. cit., pp. 193-293.

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of evacuating the railways in the occupied areas for strategic reasons. The railroads were, therefore, almost entirely used for military purposes.

Preparation for war stage, 1936

The facilities of Chinese railway systems were originally used to meet the requirements of freight and passenger movements under normal conditions. In times of emergency, congestion and interruption of traffic were bound to occur. To forestall such an eventuality certain improvements in station facilities had to be made. Where distances between two stations were great, additional crossing stations were opened with the hope of increasing traffic density along the whole line. Stations with insufficient trackage or very short loop lines were improved by laying additional tracks or extending the loop lines to facilitate train movements. In some cases special military tracks were added. Where the station platforms were too short or the loading and unloading platforms were insufficient in number, the existing facilities were lengthened or special military platforms were built. Water stations necessary for the steam locomotives were enlarged and new water supply sources created. Emergency water stations were also built at all important points to replace any regular water stations that might be destroyed. Numerous coaling stations were added to enable locomotives to take

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on coal at convenient points. Since the railways provided main targets for enemy aerial attacks, air-raid shelters were built in all stations and concrete dugouts erected to house railway telephone exchanges and control offices. It was quite evident that in the event of war the enemy would attempt to interrupt China's regular transport routes and to blockade China's coast so that it would be very difficult to import railway materials. All railways were therefore ordered to store up sufficient quantities of all essential materials to meet one year's requirements.[46]

The adjustment to war condition stage, 1937

When fighting broke out, the Ministry of Railroads ordered the work on the Nanchang-Pingsiang Railway to be completed immediately. Through trains were ordered to be operated in the Hangchow-Yushan-Nanchang-Pingsiang sections, using pontoon bridges in place of permanent bridges which had not been completed. On the Hangchow-Hushan section of the railway, originally built with light rails, the work of laying heavy rails was accelerated. At the same time the construction work of the Nanking-Kiangsi Railway was ordered to be rushed to completion, and the traffic movement of other railways was accelerated.

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[46]Chang Chia-ngau was ordered to manage the procurement of materials by the railways.

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In the history of Chinese railways there had been no previous occasion in which railways were called upon to meet the requirements of a modern war against a foreign power.[47] To co-ordinate transportation, the Railway Military Transport Corps was organized on July 24, 1937, under a Commander and a Lieutenant-commander, with field officers responsible for each line. All matters relating to military transport were placed in the hands of the Railway Transport Corps. The station staff and dispatching officers were jointly responsible to the Civil Railway Administration and to the Railway Military Transport Corps.

The wartime transportation stage, 1937-1945

The performance of the railways in the annals of wartime transportation may be reviewed in five periods: the first beginning with the outbreak of war to the time of the fall of Nanking (July 7, 1937, to December 13, 1937); the second covering the time to the great battle of Hsuchow (December 13, 1937, to May 31, 1938); the third period (May 31, 1938, to November 25, 1938) lasted until the evacuation of Hankow; the fourth period to the loss of Nanning (November 26, 1938, to April 30, 1939); and the fifth period beginning in May, 1939, and extending through

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[47] Hung-Hsueh Lin, op. cit., pp. 14-15.

the third victorious Changsha campaign to the end of the war (August, 1945).

From the very beginning of the war Japanese strategy involved the utilization of Chinese railway lines.[48] Japanese occupation of railways gave the Japanese facilities for military control in China. The first twenty-one months of the war, from the fighting at the Marco Polo Bridge on July 7, 1937, to the fall of Nanchang on March 30, 1939, were characterized by a violent struggle for railway lines. With the fall of Hankow, over 80 percent of the railways built before the war in China had either fallen into enemy hands or had been destroyed.

After the fall of Hankow the railways ceased to play an important part in China's defense, and China concentrated her military effort on counterblockade and guerilla fighting. Accordingly, China's transportation policy was concentrated on the development of highways and waterways. The military role of China's railways was therefore most important only during the first twenty-one months of the confrontation with Japan.

Prior to the fall of Hankow and even after it can be shown that the number of troops and the tonnage of supplies moved by the railways were tremendous. In the first

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[48]Chiao-min Hsieh, China--Ageless Land and Countless People (Princeton: D. Van Nostrand, 1967), pp. 52-55.

period, from the outbreak of war on July 7, 1937, to the fall of Nanking on December 13, 1937, the railways moved 4,460,000 troops and 1,230,000 tons of supplies. In the second period, ending with the battle of Hsuchow in June, 1938, the railways moved 4,330,000 troops and 1,140,000 tons of supplies. In the third period until the evacuation of Hankow in December, 1938, over 2,600,000 troops and 480,000 tons of supplies were moved. In the fourth period, until the fall of Nanning in December, 1939, the railways were still able to move 2,830,000 troops and 350,000 tons of supplies. During the fifth period the railways moved over 2,280,000 troops and 470,000 tons of supplies in 1940, 3,182,000 troops and 413,000 tons of supplies in 1942. In other words, during these first five and a half years of war China depended upon her railways for the movement of 21,582,000 troops and 4,433,000 tons of supplies, an achievement unprecedented in her history.

The wartime construction stage, 1939-1945

For the purpose of receiving allied military aid and for the protection of the unoccupied areas, the Chinese government was anxious to construct railways in southern, western, central, and northwestern China. Among the railways which had their inception during the war were the

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[49]Chang Chia-ngau, op. cit., p. 228.

Hunan-Kwangsi, Kweichow-Kwangsi, Yunnan-Burma, Suifu-Kunming, and the railways of the northwest. The shortage of capital and physical handicaps in the mountain regions made construction very difficult. One of the policies in railway construction in northwestern China was to assign engineers permanently to a given region. This assignment of employment solved some of the unemployment problems in China during the wartime period.

The Postwar Period, 1945-1949

The characteristic of this period in China's railway construction was the restoration and rehabilitation of the existing railways together with the beginning of the first Ten-year railway construction plan. Unfortunately, these goals were delayed by a civil war between the Communists and the Nationalists. The new railway construction was stopped and some operating railways that had survived in a relatively undamaged state were damaged or destroyed during the civil war between the Communists and Nationalists.

War resistance to Japanese aggression dealt a fatal blow to China's national economy. Prior to the war, despite many difficulties China's economy had been able to progress substantially. While the Communist military forces were virtually defunct after the 25,000 li[50] "Long

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[50]One "li" equals one-third English mile.

March," China itself was progressing toward political unification. The outbreak of the Sino-Japanese war and the subsequent loss of the established industrial areas in the coastal provinces dealt a lethal blow to China's new industries. Heavy destruction in the rice-producing areas of south and east China was responsible for a great decline in food production. Shortages in the commodity market became serious after 1939. To support ever-increasing war expenditures, the central government increasingly resorted to issuing bank notes. Japan's surrender in 1945 failed to normalize China's national economy. The civil war between the Nationalist government and the Communist forces erupted immediately and inflation entered a serious phase.

Of China's 12,030 miles of railways, 3,726 miles had been lost as the result of the Japanese invasion of Manchuria in 1931, and 6,566 miles were lost or destroyed during the Sino-Japanese War. Large sections of important trunk lines were removed by the Chinese in the course of war operations and were not rebuilt by the Japanese. Most of the railway junctions were the scene of heavy fighting. The junctions suffered great damage as did the rolling stock and other equipment.[51] Moreover, the Japanese in

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[51]Norton Ginsburg, "China's Railway Network," Geographical Review, XLI (1951), 470, 472.

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many cases failed to keep the much-used railways in those territories under their occupation well repaired and normally supplied.

The most immediate need at the end of the war was the reconstruction and general rehabilitation of existing railways. Judging from conditions in 1945, the following sections of main lines were torn up on account of war operations and were still unrehabilitated: the Kaifeng-Loyang section of the Lunghai Railway of 206 miles; the northern and southern section of the Canton-Hankow Railway, totaling 393 miles; and the Chekiang-Kiangsi Railway, totaling 565 miles--altogether 1,279 miles.[52]

Several lines which had been partly constructed were scheduled to be completed immediately after the war, to prevent erosion of the unfinished road bed. These lines included the Yunnan-Burma Railway of 556 miles, on which earthwork and tunnels had been partly completed; the Suifu-Kunming Railway of 534 miles, of which a 99-mile section had been finished; the 330-mile Chengtu-Chungking Railway on which half of the tunnels and earthwork were ready, and the section between the present terminus of the

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[52]The average requirement per mile was estimated as 160 tons of rails, rail-joints, spikes, and other steel; China needed 204,640 tons of these materials. To equip these lines and to replenish the rolling stock of other lines would require 500 locomotives and 6,000 cars and wagons.

Hunan-Kwangsi Railway and the border of French Indo-China, measuring 250 miles, on which earthwork and bridges had already been largely completed and some of the tracks laid, when the work had to be destroyed because of the enemy's attack. The incomplete parts of all of these lines totalled 1,571 miles.

To rebuild the lines that were destroyed and to complete those which had been partially completed during the war totaling 2,850 miles, China needed altogether 456,000 tons of rails, 8,610 cars and wagons, and 761 locomotives, at an estimated total cost of about U.S. $100,000,000. (See Appendix I.) The reconstruction of the destroyed and damaged lines and the completion of the unfinished lines was to be undertaken immediately, that is to say, during the two years immediately following the end of hostilities.

The most logical approach to the postwar industrialization of China focused upon railway development. When the war was over, China could hardly expect to obtain from her allies an unlimited supply of steel for the development of her railways. It was therefore necessary to confine China's program of railway construction to the most essential needs. The Nationalist government had given this problem serious consideration and proposed that a ten-year program covering the construction of 14,300 miles

of railways be launched. Economically, with the completion of the Ten-year program of rail construction, it was anticipated that the purchasing power of "450,000,000 customers"[53] was automatically assured and that a fair part of the surplus manufactures of the industrial nations would find a ready market in China. Concommitantly, it was hoped the growth of China's railways would greatly increase the productive power of the Chinese people enabling them to produce more for export and thereby to supply part of the raw material needs of the industrial countries. Thus, the direct economic assistance of the Western nations was not only to their own economic advantage, but it also enabled China to develop her production and to pay back her loan obligations. Rail development was thus to be a reciprocally beneficial arrangement to both creditor and debtor nations--an arrangement that fostered and strengthened the economic ties between nations and served to stabilize China. The first Ten-year rail construction program emphasized government intervention together with the rehabilitation of the existing railways.

The Characteristics of the Communist Era, 1949-1966

This era was significant in terms of central control of railways. Colonialism had been ended in China

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[53]The total population in China in 1945 was 450 million. It is now over 800 million.

and many new lines were built for political, strategic and economic reasons. Eight years of prolonged war against Japan and three years of civil war had exhausted China's existing resources and introduced two striking changes in the economic structure.[54]

First, the middle class, which was composed of the well-to-do peasants in the rural areas and the petty bourgeoisie in the urban districts, was destroyed. The second effect of the war was to place the central government in control of virtually all Chinese capital. Without the first change, the success of the Communist regime would have been uncertain. Without the second change, the course of the transformation of the private sector into a state enterprise would have had to be prolonged. In transforming its economic institutions, the Communist regime endeavored to closely imitate Soviet patterns in its early stages.[55] For this reason, its transformation must be traced from

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[54]Cheng Chu-yuan, Communist China's Economy, 1949-1962, Structure Changes and Crisis (South Orange: Seton Hall University Press, 1963), p. 8.

[55]Speaking at a banquet in honor of former Soviet President Voroshilov, on April 17, 1957, Communist China's leader, Mao Tse-tung, pointed out: "The Chinese people have always considered their revolution to be a continuation of the Great October Socialist Revolution and have looked upon this fact as a great honor." According to Jen-Min-Jih-Pao (People's Daily), April 18, 1957.

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its origins in Marxist-Leninist principles[56] and analyzed according to the development of Mao Tse-tung's thought which integrated classical communism with Chinese conditions.[57]

Although Communist China sought to follow the basic steps taken by the Soviet Union, differences in economic and cultural backgrounds necessitated certain adaptations to better suit Chinese conditions. This generalization may be supported through comparisons of several key factors. Compared with Russia on the eve of the Revolution of 1917, China's industrial base was more backward and its skilled labor force much smaller. The most useful comparison is between the level reached by China on the eve of the communist advent to power and that reached by Russia on the eve of the Bolshevik Revolution. Population factors indicate a second distinction between the Soviet and Chinese situations. The population of China in 1949 was three or four times that of Russia in 1913.[58]

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[56]Liu Shao-chi, Chairman of Communist China from 1960-1965, said, "The road we are taking is the road traversed by the Soviet Union. We have always believed that Marxism-Leninism is universal truth." According to Documents of the First Session of the First National People's Congress of the People's Republic of China (Peking: Foreign Languages Press, 1955), p. 41.

[57]Cheng Chu-yuan, op. cit., p. 11.

[58]Tseng Wen-ching, Socialist Industrialization of China (Peking: People's Publishing House, 1958), p. 24.

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Until 1952, China had only 10,120,000 nonfarm workers representing only 1.6 percent of the total population. In Russia, however, by 1937, Soviet nonfarm workers constituted 34.7 percent of the total population.[59] Under these conditions, even after their assumption of power, the Chinese Communists were forced to rely on the cooperation of the bourgeoisie class to a considerable extent. The Party's moderation toward the bourgeoisie was designed to make use of all available economic forces in order to facilitate the work of rehabilitating and building up the national economy.[60] The Communist government gave industrialization top priority in its planning, and has apparently assumed that massive railway building is a first (Table 3), rather than an accompanying, step in economic development.[61]

Railway building in China in the past has not been able to create de novo the kind of economic conditions conducive to profitable railway operation. Rapid expansion of mileage under such circumstances may outrun general

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[59] Ibid., p. 42.

[60] Liu Shao-chi, Political Report (Peking: People's Publishing House, 1960), p. 21.

[61] Rhoads Murphey, op. cit., 25; also see George B. Cressey, Asia's Lands and People (New York: McGraw-Hill, 1963), pp. 115-119.

TABLE 3

NEW COMMUNIST-BUILT INDUSTRIAL CENTERS IN CHINA CONNECTED BY RAILWAYS (1949-1966)

1. Hopei Province
   - Peking--industrial complex
   - Chinsi--coal mining
   - Chengteh--chemical
   - Shouwangfen--copper
   - Kalgan--engineering
   - Huanhua--steel
   - Paoting--complex
   - Shihchiachuang--complex
   - Hantan--textile
   - Fengfeng--coal

2. Shansi Province
   - Sishan--coal
   - Huankang--coal
   - Yuchih--textile
   - Fensi--coal
   - Houma--coal

3. Shangtung Province
   - Chinan--complex
   - Chihpo--iron, coal
   - Chinlingcheng--iron
   - Hsinwen--coal
   - Yentai--food industry
   - Weifong--textile, food
   - Tehchow--textile
   - Chining--food, farm tools

4. Honan Province
   - Chengchow--textile, engineering
   - Loyang--textile, engineering
   - Shanmensha--hydro-electric
   - Pingtingshan--coal
   - Hsinhsiang--textile
   - Kaifeng--chemical, engineering

5. Liaoning Province
   - Yingkow--paper, textile
   - Antung--lumber, paper, chemical
   - Chinchow--chemical, refining
   - Chinsi--chemical, refining
   - Huanjen--hydroelectric
   - Shuifeng--hydroelectric
   - Chinhsien--textile, paper

6. Kirin Province
   - Lioayuan--coal
   - Tunghua--coal, iron
   - Yunfeng--hydroelectric

7. Heilungkiang Province
   - Ochen--electric equipment
   - Hokang--coal
   - Shuangyashan--coal
   - Yichun--lumber, chemical
   - Mutankiang--lumber, paper
   - Anta--petroleum oil

8. Inner Mongolia
   - Huhohaote--complex
   - Hailaerh--steel, food
   - Chalainor--coal
   - Yakeshih--lumber, coal

9.

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12.

TABLE 3 (continued)

Chalantun--lumber
Ulanhaote--steel, engineering
Tungliao--meat, dairy industry
Paiyunpop--iron mining
Paotow--steel, electric, food
Shihkuaikow--coal
Chotzeshan--coal

9. Shensi Province

Hsienyang--textile
Paochi--steel, textile, engineering
Tungchuan--coal
Yaohsien--cement

10. Kansu Province

Lanchow--oil refinery, atomic
Tienshui--engineering, textile
Tehwulu--copper, dairy
Paiying--coal
Yungteng--cement
Wuwei--coal
Shantan--coal
Liuchiashai--hydro-electric
Yenkoshai--hydroelectric

11. Ningsha Province

Yingchuan--textile, chemical
Shihtsuishan--coal
Chingtungshai--hydro-electric

12. Chinghai Province

Sining--textile, dairy
Tatung--coal
Chilienshan--metal
Mahai--petroleum, natural gas
Lenhu--petroleum
Yushashan--petroleum

13. Sinkiang Province

Urumchi--steel, engineering
Shihhotze--textile, food
Kalamai--petroleum
Ining--food, textile
Olatai--metal
Hami--steel, chemical, food

14. Kiangsu Province

Nanking--electric, chemical, automobile, cement, textile
Hsuchow--coal
Chinping--mining

15. Chekiang Province

Hangchow--steel, textile
Ningpo--chemical, textile
Shaohsing--steel
Shiaoshan--chemical, textile
Hsingankiang--hydro-electric
Hsuhsien--chemical, hydroelectric
Kiangshan--cement

16. Anhwei Province

Hofei--steel, mechanic, chemical
Pangfou--mechanic, textile, food
Chaohsien--cement
Tungkwanshan--copper, iron

17. Hupeh Province

Hwangshih--cement, steel
Puchi--coal
Tankiangkow--hydro-electric
Shassu--textile
Ichang--coal

18.

19.

20.

21.

TABLE 3 (continued)

18. Hunan Province
- Changsha--engineering, textile
- Chuchow--engineering, chemical
- Hsiangtan--electric, textile
- Lienyuan--steel
- Hengyang--chemical, paper
- Changteh--textile, leather
- Tuchi--hydroelectric

19. Kiangsi Province
- Nanchang--aircraft, chemical
- Chiukiang--textile
- Fengcheng--coal
- Hsinyu--steel
- Kanchow--paper, sugar
- Shangyu--hydroelectric
- Tayi--mining

20. Fukien Province
- Fuchow--steel, engineering
- Kutien--hydroelectric
- Nanping--steel, lumber
- Sanming--steel, engineering
- Yungan--cement, paper
- Changchow--sugar, engineering
- Amoy--steel, engineering
- Chuanchow--sugar, engineering
- Putien--sugar, paper

21. Kwangtung Province
- Kiangmen--engineering, sugar
- Yingteh--cement
- Shaokuan--engineering
- Hsukiang--coal
- Jenhua--coal
- Swatow--chemical, canning
- Muming--petroleum
- Chankiang--chemical
- Haikow--engineering, canning

22. Kwangsi Province
- Nanning--steel, food, sugar
- Liuchow--steel, cement
- Kweilin--textile
- Wuchow--lumber, sugar
- Sichin--hydroelectric
- Iaiping--mining
- Ssuting--mining

23. Kweichow Province
- Kweiyang--steel, chemical
- Tsuni--steel, mining, food
- Kaiyang--mining
- Tuyun--steel, cement, paper
- Anshun--steel, engineering, food
- Miaotiacho--hydroelectric

24. Szechuan Province
- Chengtu--steel, complex
- Chungking--steel, complex
- Nanchung--petroleum, silk
- Kiangyu--steel, cement
- Chintang--chemical

25. Yunnan Province
- Kunyang--mining, chemical
- Yimen--iron
- Huanwei--coal, electric
- Tungchuan--copper, mining
- Kaiyuan--coal, electric

26. Tibet
- Lhasa--electric, steel
- Heiho--mining

Source: Information on new industrial centers is mainly from The Chinese Industry Under the Communists' Control, unpubl. report from Mainland China, National Security Bureau, Taipei, Formosa, 1966.

economic development too far and become a heavy charge on an economy inadequately eqipped to use it. As such, Communist emphasis on railway construction on a very large scale, in advance of the effective commercialization of the economy, posed problems even for a totalitarian system.[62] Capital was and is crucially scarce in China, and it may be questioned whether it was or is wise to concentrate limited funds so heavily on rail transportation to the exclusion of other economic considerations.

Largely a subsistence economy, Communist China is in a very different position from that of the United Kingdom and the United States when they expanded their railway systems in the great age of nineteenth-century railway building.[63] China cannot, as they did, build railways rapidly, and profitably in an expanding and already highly developed commercial-industrial economy, with a mounting capital surplus. Nor can China expect from railway building the same catalytic effect on economic development, since her own economy is in such a different stage to begin with. The Soviet Union, although placing a much greater reliance on railways for both passenger and freight traffic,

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[62] Rhoads Murphey, op. cit., p. 27.

[63] For further details, see Leland H. Jenks, "Railroads as an Economic Force in American Development," The Journal of Economic History, IV, 1 (May, 1944), 4-11.

has begun the shift to air and pipeline transport.[64] Communist China has just become familiar with the railway stage and lags far behind in air and pipeline movements of goods. Large-scale railway construction became the Communist regime's most important achievement. Railway construction in the early 1950's was primarily oriented towards defense.[65] Nevertheless, railways were expected to play a major economic role in the establishment of a national transport network. A detailed analysis of the function of the Communist-built railways points to predominately political, strategic and economic roles (Table 4, Map 3). This produced a heavy investment in strategic considerations and one which cannot be expected to pay for itself for many years. In comparison with previous eras, Communist China was motivated to plan and construct self-supporting railways.

The Rehabilitation Period, 1949-1952

The major characteristic of this period was the rehabilitation of the lines damaged during the Sino-Japanese and civil wars. The Nationalist government did not complete the reconstruction in the previous postwar

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[64] W. Owen, op. cit., p. 88.

[65] Yang Ming Shan Chuang, An Analysis of Communist Transportation in Mainland China (Taipei: National Defense College, 1957), p. 1. (Yang Ming Shan Chuang means a village at the Yang Ming Mountain. It was used here as the name of auther which included a group of reporters.)

TABLE 4

TABLE 4

REGIONAL DISTRIBUTION OF NEW RAILWAYS IN COMMUNIST CHINA SINCE 1949

Railway Line	Length (Km)	Year Completed	Borderland Line	Connecting Line	Trunk Line	Other Line
Northeast China (3 lines, 115 km)						
Tiehling-Sanchiatzu	33	1961-63				x
Tiehling-Faku	53	1961-63				x
Nuerhho-Nanpiao	29	1961-63				
North China (11 lines, 1,194 km)						
Shangpancheng-Yingshonying	120	1959		x	x	
Hsuchiachan-Miaotaitzu	11	1958				x
Huaijon-Yingshonying	61	1959				x
Fengtai-Shacheng	104	1955		x	x	
Chining-Erhlien	330	1956	x		x	
Paotow-Paiyunopo	148	1956			x	
Chiehhsui-Yangchuanchu	46	1961-63				x
Paotow-Sanchengkung	278	1958			x	
Taiyuan-Taohsing	27	1961-63				x
Tungkwan-Fenglingtu	9	1958		x	x	
Kowchuan-Wangtsun	60	1961-63				x
East China (7 lines, 535 km)						
Lantsun-Chefoo	183	1956		x	x	
Lanchi-Hsmanchiang	48	1958				x
Tsaoochiang-Chuanshan	164	unknown		x	x	
Shanghai-Wentsaopin	14	1961-63				x
Shanghai-Minhang	42	1961-63				x
Fulichi-Huaichi	31	1961-63				x

TABLE 4 (continued)

TABLE 4 (continued)

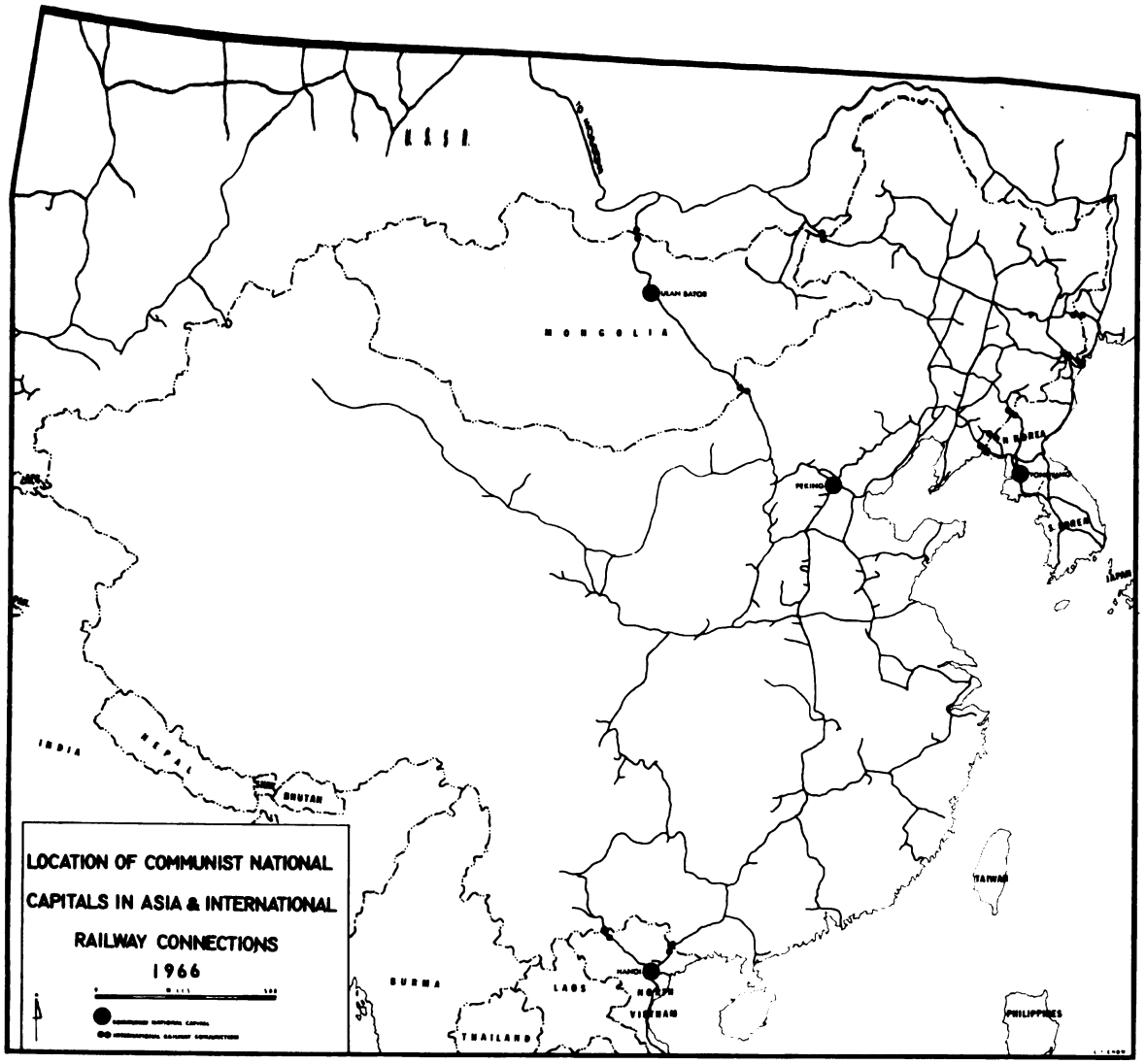
Railway Line	Length (Km)	Year Completed	Borderland Line	Connecting Line	Trunk Line	Other Line
Wuhu-Fenghsiangkuo	53	1961-63				x
Central China (10 lines, 811 km)						
Wuchang-Huangshih	98	1958			x	
Mengmiao-Shenlon	61	1957				x
Huihsing-Sanmenshia	14	1957				x
Yintan-Tzuchi	73	1957	x			
Loyang-Iyang	22	1961-63				x
Anyang-Lichen	32	1961-63				x
Lonti-Chinchushan	65	1961-63			x	
Lonti-Shaoyang	98	1961-63			x	
Wuchang-Suihsien	216	1961-63			x	
Chuchow-Lonti	132	unknown			x	
South China (8 lines, 1,613 km)						
Tzuchi-Amoy	621	1957	x			
Kuokeng-Lungchi	11	1958				x
Changping-Lungyen	58	1958				x
Waiyang-Nanping	24	1958				x
Nanping-Foochow	168	1958			x	
Laipin-Munankwan	355	1951	x		x	
Litang-Changchiang	315	1955	x		x	
Lienchiang-Maoming	61	1959				x
Northwest China (11 lines, 3,839 km)						
Tienshui-Lanchow	348	1957			x	
Lanchow-Urumchi	1,892	1961-63	x		x	
Heishanhu-Laochunmiao	32	unknown				x

TABLE 4 (continued)

TABLE 4 (continued)

Railway Line	Length (Km)	Year Completed	Borderland Line	Connecting Line	Trunk Line	Other Line
Sanshengkung-Lanchow	716	1958			x	
Lanchow-Hsining	175	1959			x	
Hsining-Haiyen	100	1961-63				x
Wuwei-Kantang	185	1961-63		x	x	
Lanchow-Akanchen	21	unknown				x
Paochi-Tatan	302	1958			x	
Sian-Yuhsia	45	1961-63				x
Ti-chiatai-Paiyin	23	1957				x
Southwest China (7 lines, 1,394 km)						
Tatan-Chengtu	367	1958			x	
Anning-Ipingtang	102	1959			x	
Chengtu-Chungking	504	1952			x	
Neichiang-Anpien	142	1957			x	
Tuyun-Kueiyang	132	1956			x	
Chungking-Kanshui	86	1960			x	
Hsintu-Kwansien	61	1961-63				x
GRAND TOTAL: 57 lines, 9,501 km						

Source: Yuan-li Wu, The Spatial Economy of Communist China (New York, 1967).


U.S.S.R.
MONGOLIA
ULAN BATOR
PEKING
N. KOREA
S. KOREA
JAPAN
INDIA
NEPAL
BHUTAN
BURMA
LAOS
THAILAND
VIETNAM
TAIWAN
PHILIPPINES
LOCATION OF COMMUNIST NATIONAL CAPITALS IN ASIA & INTERNATIONAL RAILWAY CONNECTIONS
1966

Map 3

period, and more lines were destroyed due to the civil war. The Communist leaders were most anxious to consolidate their new regime with an adequate transportation system (particularly the railway network), because the railways were able to carry troops to unstable urban centers where the Komingtang influences still remained. The railways played a significant role in the consolidation strategy. The increase in the rate of rehabilitation indicated the urgency of such political needs. The purpose of railway construction during this period was therefore mainly military and political.

The building of the new railways in China began in 1950, with three important lines: Laipin-Chennankwan,[66] Tienshui-Lanchow, and Chungking-Chengtu. The first was completed in 1951, the latter two in 1952. Two more major lines--Lanchow-Sinkiang and Chengtu-Paoki, as well as a few minor ones, were begun in 1952. When the Communist Five-year Plan was started in 1953, work on these lines was continued while surveying began on ten new routes, including major routes from Paotow to Lanchow and from Chengtu to Kunming.

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[66] Chennankwan 鎮南關 had its name changed to 睦南關 Munankwan after this railway opened to traffic. In the Chinese language Chennankwan means Southern Control Pass, Munankwan means Southern Friendly Pass. Peking-Hanoi relationships are reflected in the change of name of this new railway.

It is difficult to reconcile conflicting Communist figures on total new railway construction, but official claims indicate that possibly 400 to 480 kilometers (250-300 miles) were built in 1950-51, and about 480 kilometers (300 miles) were built in 1952.[67] One could easily be misled by these figures to think that until 1952 the Communists were doing nothing but rehabilitating or repairing existing lines. Actually, their efforts were concentrated on a few key lines that were to them most strategic in function.

The First Five-year Plan Period, 1953-1957

The First Five-year Plan for railway construction, announced by the Communist government early in 1953, set 125,000 miles of additional railways as the national goal.[68] Briefly stated, several characteristics presented themselves in this period of Chinese railway construction.

First, available data indicate that by far the greatest portion of the capital needed to finance the

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[67]The mileages of railway opened to traffic in mainland China from 1948 to 1953 are the following: 12,768 kilometers in 1948 (including both Kuomingtang and Communist parts); 21,715 kilometers in 1949 (including both parts); 22,238 kilometers in 1950; 23,063 kilometers in 1951; 24,332 kilometers in 1952; and 24,821 kilometers in 1953. According to Yung-hsing Chao, Communist China's Railway Constructions (Hong Kong, 1954), p. 23.

[68]People's Publishing House, The First Five-year Plan of the People's Republic of China (Peking, 1955), p. 3.

railway projects was to be furnished by the government, and that the latter had given railways a high priority in the overall national budget. These funds were mainly accumulated out of production by state enterprises and budgetary savings. Out of a national budget for 1953 amounting to US $9,864,700,000, the state's investment in basic industries and communications was reported to have been one third of the total amount. That part of the sum covering expenditures for communication and transportation represented an increase of some 65 percent over the 1952 investment, making it the biggest single item of increase over the previous year.[69] Under this budget, eleven new rail lines were slated for construction during the year.

Aside from government investments, a limited amount of Russian aid became available through the 1950 Sino-Russian agreement amounting to US $300,000,000 credit being advanced to China over a five-year period. The loan included credit for "railway and other transport equipment, rails and other material for the restoration and development of the national economy of China."[70]

It became clear that in railway development, as well as in overall industrialization, more responsibility

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[69] The New York Times, July 27, 1953: Central Daily News, Taipei, Feb. 12, 1953, October 7, 1953.

[70] Aitchen K. Wu, China and the Soviet Union (New York, 1950), p. 420.

would have to be assumed by domestic capital than was true in the past.

Secondly, in the operation of the railway system there appears to have been extensive overall planning during this period, as well as stepped-up centralized control. An indication of this trend was the nationwide program of planning "transportation schedules" that was launched in 1950.[71] Under this policy, the various railways were asked to report to the Ministry of Railways of the central government. Through the regional railway administration offices located at rail centers, estimates were generated of the passenger and freight traffic for the coming year. They were required to present their budget at the same time.[72] These "transportation schedules" would seem to have involved not only the sheer business operations of each railway, but to be realistic, the estimates would have to be coordinated with data on the probable volume of the production and distribution of major commodities. This system was called "an important part of the overall economic planning of the nation," and Teng Tai-yuan, in reviewing in October, 1952, the three

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[71] Yuan-li Wu, The Economy of Communist China, an Introduction (New York: Frederick A. Praeger, 1965), p. 22.

[72] People's Publishing House, Selected Essays on the Chinese Economy, 1950 (Peking, 1951), Vol. VII, pp. 45-46.

years' activities in China's railway affairs, pointed out that one of the major achievements under the new regime had been its high degree of unified administration.[73]

With the launching of the First Five-year Plan and the organization of a new State Planning Commission and other central agencies to supervise the industrialization of the country,[74] it is obvious that henceforth railway development would be based on a centrally directed and controlled basis.

Thirdly, and closely related with the general emphasis on the development of the country's resources, it can be seen that increasing amounts of domestic building material and rolling stock were being used, insofar as they were available. For example, light rails and train parts were produced by steel mills in Shanghai, and beginning in the autumn of 1953, the Anshan Steel Works in Manchuria was expected to produce rails that would reach an estimated total length of some 2,156 miles per year.[75] The partial blockade and embargo then in effect also contributed to the tendency toward a relatively greater dependence on and use of domestic products.

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[73] Central Daily News, Taipei, October 27, 1952.

[74] The New York Times, December 13, 1952.

[75] Central Daily News, August 1, 1953; August 24, 1953.

Fourth, railways continued to occupy the top place in China's communications both in a contemporary sense and in terms of planning for the immediate future. This emphasis resulted from the railways' great capacity for bulk haulage, and the availability in China of its principal fuel--coal. The relative dependence on the railways for communications and transportation during this period is indicated by the fact that while the officially scheduled volume of rail transportation for 1952 was expected to be 161 percent of the highest level before 1949, that of the highways was only set at 112 percent.[76]

The characteristic nature of this period is best seen in the parallel construction of new railways and the establishment of railway industry. This was the first time that China had built so many new lines and produced what might be considered sufficient numbers of rolling stock. The railway administration was reorganized and the Russian aid was evident early in the period.[77] Significantly, the manpower, capital, and planners associated with the railway industry were all Chinese. During the period, the rehabilitations, restoration, and new

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[76]Po I-po, "Three Years of Achievements of the People's Republic of China," New China's Economic Achievement 1949-1952 (Peking, 1952), p. 159.

[77]Theodore Shabad, China's Changing Map (New York: Frederick A. Praeger, 1956), pp. 82-87.

construction were carried out concurrently. The rehabilitation and restoration of old lines requently were emphasized by the government due to the urgency of political considerations. Some new lines were developed by the Communist regime mainly for foreign trade purposes particularly to Communist bloc countries in East and Southeast Asia.

The Second Five-year Plan Period, 1958-1962

After eight years of Communist control, the new regime was politically consolidated, but the sharply increasing population[78] caused many problems of economic unbalance. The railway construction during this period was for the first time characterized primarily by economic considerations (Table 5) rather than by political, military, or other factors. During peacetime the economic priorities of a country frequently receive prime consideration, and this was the case in China. Railways constructed during this period were premised upon the following economic principles:

1. Establishment of a national transportation system.[79]

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[78]Chandrasekhar, China's Population, Census and Vital Statistics (Hong Kong: Hong Kong Univ. Press, 1960), p. 10.

[79]Foreign Language Press, The Second Five-year Plan Fulfilled in Two Years (Peking, 1960), pp. 15-19.

TABLE 5

CHANGES IN RAILWAY TRACKAGE AND ROUTE LENGTH

IN OPERATION FROM 1949 TO 1963

Year	Trackage (km)	Route Length in Operation (km)	New Construction (km)
1949	26,700	21,989	
1950		22,512	
1951		23,352	
1952	23,600	24,518	1,233
1953	25,069	25,072	706
1954	26,269	25,873	1,132
1955	27,684	27,171	1,406
1956	29,548	29,237	2,242
1957	32,656	29,862	1,166
1958	34,391	31,193	2,376
1959	37,955		3,136
1960	42,659	32,570	7,344
1961			
1962			
1963	51,048	34,235	1,566

Sources: Ling, Hung-hsun, General Survey of Railways in China (Taipei, 1950), pp. 27, 74; Wu, Yuan-li, An Economic Survey of Communist China (New York: Bookman Associates, 1956), p. 350; Railways in Communist China (Taipei: Communication Research Bureau, Ministry of Transportation, 1961), pp. 25-28; and The Great Ten Years (Peking: People's Publishing House, 1959), p. 127.

2. Connection of existing mining centers and manufacturing centers.[80] (Table 6)

3. Movement of industry to the interior,[81] from east and north coastal regions. (Tables 7 and 8)

4. Only one policy was directly military in its orientation during this period; namely the construction of a strategic line along the southeast coast facing the Taiwan Strait.[82]

5. Strengthening intraregional transport systems as the foundation for future interregional development.[83]

6. Connection of all provincial capitals for centrifugal political purposes.

7. Implementing the double-tracked lines in the economically advanced regions to relieve the traffic.[84]

The Economic Recovery Period, 1963-1966

The Third Five-year Plan for railway construction was complicated by the political conflicts between the party leader, Mao Tse-tung, and the government chairman, Liu Shao-chi. The internal political conflicts were

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[80] Yuan-li Wu, op. cit., pp. 4-7.

[81] Choh-ming Li, Industrial Development in Communist China (New York: Frederick A. Praeger, 1964), pp. 5-9.

[82] Kuei-sheng Chang, "The Changing Railroad Pattern in Mainland China," Geographical Review, LI (1961), 540.

[83] Ta Kung Pao She, People's Handbook (Shanghai, 1959), p. 192.

[84] Peking Review, July, 1966.

TABLE 6

DISTRIBUTION OF 328 LARGE, MEDIUM, AND SMALL MINING AND INDUSTRIAL CENTERS BY RAILWAY RADIAL COUNTS*

Railway Radial Counts	No. of Cities	% Relative Frequency
Large Industrial Centers		
0 to less than 4	0	
4 to less than 8	2	22.2
8 to less than 12	1	11.1
12 to less than 16	4	44.4
16 to less than 20	1	11.1
20 to less than 24	0	
24 to less than 28	0	
28 to less than 32	1	11.1
Total	9	100
Medium Industrial Centers		
0 to less than 4	20	35.1
4 to less than 8	23	40.3
8 to less than 12	8	14.0
12 to less than 16	2	3.5
16 to less than 20	2	3.5
20 to less than 24	1	1.8
24 to less than 28	1	1.8
Total	57	100
Small Industrial Centers		
0 to less than 4	214	81.7
4 to less than 8	43	16.4
8 to less than 12	4	1.5
12 to less than 16	1	0.4
Total	262	100

*A city with a single-tracked railway passing through it is treated as having two railway radials. The number is halved if the rail line is a branch, spur, or special purpose line. An arbitrary weight of four is employed as a multiplier to give the terminus of a single-trackaged line a weighted index of four radials. The number is halved for branches, spurs, and special purpose lines. The numbers are doubled for double-track lines.

Source: The 328 cities are based on the information from Appendix E, Table E-3, of Yuan-li Wu, The Spatial Economy of Communist China (New York, 1967), pp. 264-267.

TABLE 7

RANKING OF COMMUNIST-BUILT ECONOMIC COOPERATION REGIONS BY INDUSTRIAL CAPACITY

Region	Annual capacity in million Yuan 1952 Gross value added in 1958-1960 average	% in total capacity	Rank by Industrial capacity
East	11,563	40.77	1
North	4,951	17.45	2
Northeast	3,362	11.85	3
Central	3,178	11.20	4
Southwest	2,406	8.48	5
South	1,785	6.29	6
Northwest	1,120	3.95	7
Total	28,365	100.00	

Sources: The amount of gross value-added data from I-wen Chao, New China's Industry (Peking, 1957); People's Handbook (Peking, 1950-62); and The Great Ten Years (Peking, 1960).

TABLE 8

DISTRIBUTION OF 100 CITIES BY INDUSTRIAL RANKING

IN SEVEN ECONOMIC COOPERATION REGIONS 1961

Economic Cooperation Region	No. of Cities in Indicated Industrial Rank			
	A	B	C	Total
Northeast	3	5 (4)*	14 (1)	22
North	3	4 (3)	10	17
East	5	3 (2)	18	26
Central	1	5 (4)	12 (2)	16
South	1		11	12
Northwest	1	2 (2)	5	8
Southwest	1	1 (1)	7	9
Total	15	20(16)	75 (3)	100

*Numbers in parentheses represent the number of new established centers after 1949.

Source: Appendix C. Table C-1, Table C-2 of Yuan-li Wu, The Spatial Economy of Communist China (New York: Praeger, 1967), pp. 238-241.

caused by the diplomatic split between China and the Soviet Union, and the "cultural revolution" was one result of this political instability during this period.

New railway construction had stagnated. Many projects were stopped, such as the extension of Lunghai Railway at Chumchi and it seems that it will not reach the Sino-Soviet border. Construction primarily involved continuation of the already begun work which had remained uncompleted from the previous periods. Conflicts within the Communist bloc, the disturbing condition created by the Red Guards, the decrease of international trade, along with the increased military aid to North Vietnam, as well as economic aid to some African countries, had a negative effect upon railway construction. Railway construction was not only reduced, but frequently brought almost to a standstill. The existing railways played an important role in internal political conflicts. Troops and Red Guards were dependent upon the railways.

In 1953, Communist China and other Asian Communist countries developed a very active trade with the European Communist bloc,[85] but the well-known rift between the two blocs, especially between the Soviet Union and China, was

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[85]Feng-hwa Mah, "The Terms of Sino-Soviet Trade," Industrial Development in Communist China, ed. Choh-Ming Li (New York: Frederick A. Praeger, 1964), pp. 174-175.

reflected in the sharp drop in traffic in 1963. (Imports from the Soviet Union dropped from 80.6 percent in 1953 to 34.2 percent in 1964; exports to the Soviet Union dropped from 64.1 percent in 1953 to 37.2 percent in 1964.)[86]

Summary

In summation, the characteristics of Chinese railways is one of obviously changing patterns. Comparatively speaking the distinguishable characteristics of each of the three eras include the following.

The Imperial Era emphasized foreign management for external strategic purposes and a relatively local passivity toward the foreigner and his railways. The Republic Era was characterized by an increasing Chinese awareness of the foreign threat, a realization of the unlikely value of railways, and a continued and increasing penetration of foreign investment. The Communist Era emphasized state control, political unity as well as self-directed economic considerations. This latter era also has proven to be the era of greatest railway expansion. Closer examination of the periods indicates the Conservative Period (1866-1894) was significant in psychological reaction towards the introduction of railways in China.

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[86] R. S. Thoman and E. C. Conkling, op. cit., p. 75.

The Scramble for Concessions Period (1895-1905) was the highlight period in railway construction and marked the formation of the basic structure of China's railway system. During the Self-strengthening Period (1906-1910), the railways were used in defense against the Western powers. The Nationalized Period (1910-1911) was characterized by the movement of the Manchu government control over the railways in China. It greatly influenced the railway policy of state ownership from then until the present.

National control of railways and the use of railways for domestic economy purposes are the factors associated with Dr. Sun Yat-sen's planning period (1911-1914), for the plan was mostly unrealistic. The Japanese Capital Penetration Period (1915-1920) was indicative of Japan's political ambition in China through the railway loans, so that attempts at economic penetration and political strangulation could work hand in hand. The New Four-power Consortium Period (1921-1926) was effected by the backing of foreign capital in China's railway construction but in a moderate and cooperative manner. The parallel development of railways between the central government in Nanking and the local government in Manchuria under different economic and political circumstances formed the characteristics of the National Government Control Period (1927-1935). The Sino-Japanese War Period

(1936-1945) was characterized by the protection of the railways from enemy attack, evacuation of the railways in enemy-occupied areas, and the building of strategic lines in the unoccupied areas. The characteristics of the Postwar Period (1945-1949) were the restoration and rehabilitation of the existing railways for military needs together with the beginning of the Ten-year Railway Construction Plan for new economic development.

The characteristics of the Rehabilitation Period (1949-1952) were the rehabilitation of the lines damaged during the Sino-Japanese War and the civil war, and commenced immediately after the Communist regime was established. The First Five-year Plan was significant in the parallel construction of new railways for consolidation of the new regime, connections within the Communist bloc, and the establishment of a railway industry. However, during the Second Five-year Plan period economic functions were emphasized. Stagnation was the primary characteristic of the Economic Recovery Period (1963-1966) in China's railway history because of the internal and external political conflicts.

CHAPTER III

CORRELATION OF FACTORS IN CHINA'S RAILWAY PATTERN: INTERNAL STRUCTURE OF THE CHARACTERISTICS

The internal structure and spatial characteristics of the railway pattern demonstrate a multifunctional origin. The railway developed as a response to seven factors: geography, colonialism, military strategy, politics, capital availability, foreign trade, and the domestic economy. These factors working in various combinations or alone affected each of the fourteen railway construction periods. In this centennial review of rail development it is useful to identify the dominant factors whenever more than one is applicable during a given period.

Physical Geography as a Factor in the Development of China's Rail Pattern

Landform and drainage systems formed a serious barrier to the development of Chinese transport systems. Consequently, the goal of railway development since 1866 has been to break the transport barrier and to improve mobility. The land mass in China is generally of high relief in the west and low relief in the east. This west-east inclination is like a three-section staircase.

The first and highest section is located in the southwest where the Chinghai-Tibet Plateau rises for the

most part to over 4,000 meters above seal level, constituting the highest land mass in the world. Here are located the headstreams of most of China's major rivers. These rivers generally flow in an easterly direction serving as a barrier to north-south communication. Northwards, across the Kunlun and Chilien Mountains on the northern fringe of the Chinghai-Tibet Plateau and eastwards, across the Ta Hsueh Shan (Great Snow Mts) on its eastern fringe, the land slopes away to plateaus and basins at altitudes of 1,000-2,000 meters. This forms the second step of the staircase in an arc from the Tarim Basin in the northwest, across the Inner Mongolian Plateau, the Loess Plateau, and the Szechuan Basin to the Yunnan-Kweichow Plateau in the southwest. Among the sub-regions identified on this second step, the Szechwan Basin, at 500 meters above sea level, is relatively low-lying.

The lowest step in the generalized relief of China follows a line running from the high slopelands of the Greater Khingan Mountains in the northeast and passes through the Taihang Mountains on to the east--nowhere dropping below 500 meters elevation. This third and lowest section includes the Northeast Plain, the North China Plain, the Middle and Lower Yangtze Plains, and the Southeastern Hills.

As the Romans used roads for transportation, the Chinese use rivers. The Amur, Yellow, and the Yangtze

rivers are among the longest in the world. The Yangtze, more than 3,000 miles long and with several lakes and large navigable rivers, is by far the most important waterway. Its basin embraces more than two fifths of the country--an area which is the most densely settled and most productive in the country. The tributaries of the Yangtze, including a great system of canals (The Grand Canal extends from the coast near Ningpo, east of Hangchow, across the great lowland for 1,000 miles to Tientsin, the port of Peking) serve this vast area. Railways parallel the Grand Canal and a portion of the main river and its tributaries. Ocean vessels navigate the river at all times between Shanghai and Nanking. In the summer high-water season vessels of 10,000 tons use the river to Hankow, but in this stretch during the winter, the low-water season, only vessels that draw 10 feet of water can navigate the stream. Shallow-draft steamers operate throughout the year to Chungking, 1,500 miles from Shanghai. Farther upstream and on other parts of the system, powered boats, sailboats, junks, and rafts transport a huge tonnage of foodstuffs, minerals, fibers, forest products, and manufactured commodities.[1] It is to be noted that this river primarily provides an east-west communication and transportation link.

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[1]H. J. Wiens, "Riverine and Coastal Junks in China's Commerce," Economic Geography, XXXI (1955), 248-264.

In southern China, the Si, Han, and Min River systems perform services for their smaller basins similar to that of the Yangtze system. In contrast, northern China has no great waterways. The Hwang Ho, a long, large river, is navigable only by small craft in several short stretches because of the large amounts of deposited sediment, the shifting channels, and the generally shallow depths encountered. The Pei River can be navigated by ocean vessels to Tientsin. In northern Manchuria, the Sungari is navigable for small craft from the border to Harbin, and unlike other main Chinese rivers, it flows north. The Liao, which flows towards the south, can carry considerable freight as far north as Mukden.

Since the major rivers primarily run from west to east, the Chinese have less trouble carrying goods downstream from the interior than westward from the coast. Unfortunately, the great bulk of China's population, markets, and production lies in the east and south, but the great bulk of China's industry and mineral resources lie in the north and west. Thus, the logical direction of transport flow in China is, in broad outline, to and from the coast, and secondarily between north and south. This is the ideological spatial pattern which best reflects regional and international complementarity.[2]

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[2]Rhoads Murphey, "China's Transport Problem, and Communist Planning," Economic Geography, XXXII, 1 (January, 1956), 19.

Since the direction of rivers and mointain ranges is predetermined by nature, the Chinese need to use artificial means to impose directional changes in transport. In ancient days, the lack of waterways created a problem for communications between the north and south. Indeed, the Grand Canal was dug to solve this problem.[3] Inland waterways, nearly everywhere in the world, handle chiefly bulk, low-priced commodities such as coal, petroleum, iron ore, bauxite, stone, sand, gravel, logs, wheat, and corn, but in some places they handle a variety of manufactured goods, such as iron and steel, lumber, wood pulp, machinery, sulphur, industrial bulk chemicals, raw cotton, and the like. The main advantage of inland water transportation is its cheapness. The main disadvantages associated with inland waterways include the fact that they thwart the main direction of traffic movement. In regions like China the inland waterways are closed by ice for part of the year. A third disadvantage of using inland waterways is the relative slowness of this form of transportation.

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[3]By Emperor Yang of the Sui Dynasty during the sixth century. It played an important role until the Ching Dynasty (1644-1911) when a section of the canal in Shantung became choked with sediment. In later years, it fell more and more into disuse as further sections became unnavigable, owing to the consistent neglect of maintenance. Y. T. Jen, A Concise Geography of China (Peking: F.L.P., 1964), p. 6.

[4]Wilfred Owen, Strategy for Mobility (Washington, D.C.: The Brookings Institution, 1964), pp. 90-93; also see Lawrence A. Hoffman, Economic Geography (New York: The Ronald Press, 1965), pp. 43, 78, 153 and 394.

Railways can give faster, but not cheaper, service than can inland waterways and can meet the transport needs of areas lacking waterway services. Some railways were built for the purpose of breaking the north-south physical barriers, and thus form an easily identifiable characteristic of the spatial development of the Chinese railway system.

The principal railways running north-south are the Peking-Canton line, the Tientsin-Pukow and Shanghai-Nanking lines, and the Changchun-Harbin and Changchun-Dairen lines. Starting from the capital, the Peking-Canton line extends southward through the North China and Middle Yangtze Plains. After crossing the Yellow River by the bridge at Chengchow and the Yangtze Bridge at Wuhan, it passes through the Tungting Basin and the Nanling mountain area, finally reaching Canton at the Si Delta. The Peking-Canton railroad cuts across the five basins drained by the Hai, Yellow, Hwai, Yangtze, and Pearl Rivers.

The Tientsin-Pukow and Shanghai-Nanking lines link the two principal industrial cities of Tientsin and Shanghai. These two railways connect Hopei, Kiangsu, and Anhwei Provinces. Together with the Peking-Shanhaikuan and Shenyang-Shanhaikuan lines, these railroads connect regions north and south of the Great Wall.

The Changchun-Harbin and Changchun-Dairen lines join the Harbin-Manchouli and Harbin-Siufenho Railways

to form a T-shaped rail framework in the northeast (Manchuria).

The main east-west railways are the Lunghai, Lanchow-Sinkiang, Peking-Paotow, Paotow-Lanchow, Chekiang-Kiangsi, and Hunan-Kwangsi lines. It must be quite obvious to the reader that the lack of navigable rivers prompted the development of these east-west links. The Lunghai and Lanchow-Sinkiang trunk lines link the eastern and western parts of the country. The Lunghai runs between Lienyunkang on the sea coast and Lanchow in central China. The Lanchow-Sinkiang line extends west from Lanchow to Sinkiang. Southward from Paoki, the Lunghai is connected with the southwest by the Paoki-Chengtu-Chungking lines. Both the Lunghai and the Lanchow-Sinkiang lines are of prime importance for long-haul connections to east China.

The Peking-Paotow and Paotow-Lanchow lines provide vital east-west links between the North China plain and the Inner Mongolia Upland.

The Chekiang-Kiangsi line starts from Hangchow in Chekiang and terminates at Chuchow in Hunan Province on the Peking-Canton Railway; the Hunan-Kwangsi Province line starts from Hengyang in Hunan, which is also on the Peking-Canton line, and ends at Munankuan in Kwangsi. These two lines cut across the southeast, linking many

areas in the southeastern hills to the primary north-south transportation route.[5]

Before the establishment of the Communist regime, several railway bridges already crossed the Liao, Yellow, and Huai Rivers, making possible north-south communication. Before the Communists' first Five-year Plan began there was no railway bridge across the Yangtze River. The Yangtze River, which formerly had been an obstacle to smooth railway traffic between the north and south, was bridged in three locations during the Communist Era. Prior to that time all north and south moving trains were forced to cross the river by ferryboats.[6] The first of these bridges was completed at Wuhan in 1957 with Soviet technical assistance and provided the first uninterrupted railway connection between Peking and Canton. The Wuhan Bridge is considered to be the largest rail bridge in Asia. Another railway bridge across the Yangtze River was completed in 1959 at Chungking. It is 500 feet long and connects the existing Chengtu-Chungking Railway with the Szechwan-Kweichow line. The third Yangtze River bridge is at Nanking, where it provides uninterrupted rail connection between Peking and Shanghai.

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[5]Jen Yu-ti, A Concise Geography of China (Peking: Foreign Languages Press, 1964), pp. 55-57.

[6]Victor P. Petrov, China, Emerging World Power (Princeton: D. Van Nostrand Co., 1967), p. 76.

In order to improve the efficiency of railways crossing rugged terrain as well as to increase the cargo-carrying capacity of the trains, the most difficult sections have been electrified in China after 1949,[7] especially in the mointainous regions, where it is especially difficult for coal-burning locomotives to operate. Of the completed electrified lines, several should be mentioned, including the difficult section on the Chengtu-Paochi line between Paochi and Fenghsien, as well as the section between Paochi and Tienshui. In addition, work is underway between Fengtai and Shacheng, north of Peking, between Taiyuan and Shohsien in Shansi Province, and in several other areas. Electrification by 1966 was planned for the sectors of Fenghsien-Luehyang on the Paochi-Chengtu line and Paochi-Sian, east of Paochi on the Lunghai line.

The logical direction of transport flows in China, as determined by geographic factors like landforms, drainage systems, markets, population, and natural resources, is southward from northeast and eastward from northwest. The major trunk lines were built in China for the purpose of breaking the physical barriers between isolated regions, thereby improving mobility. Geography, therefore, influenced the railway pattern of China significantly.

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[7] Ibid.

Colonialism as a Factor in the Development of China's Railway Pattern

Colonialism is another spatially discernible factor in the development of railways in China. Colonialism particularly affected the period of initial railway construction when the backbone of the contemporary railway pattern was established (Map 4). Since colonial lines were built by half a dozen foreign powers, the resulting pattern was a fragmented one. Both the Nationalists and Communists have made it a point to connect these disjointed sections wherever possible.

The modern era of greatest colonial expansion coincided in time with the era of the greatest railway construction.[8] The coincidence is by no means accidental, for modern colonialism on a continental scale required the services of railways. The end result of the construction of railways and other improvements to transportation and communication in colonial countries was, however, unexpected. The improvements, which in the beginning advanced colonialism, in the long run produced conditions that led to the rejection of colonial influences.

The largest areas of colonial rail development activity in the nineteenth century were India, China, and tropical Africa. Of these, only the last is an example

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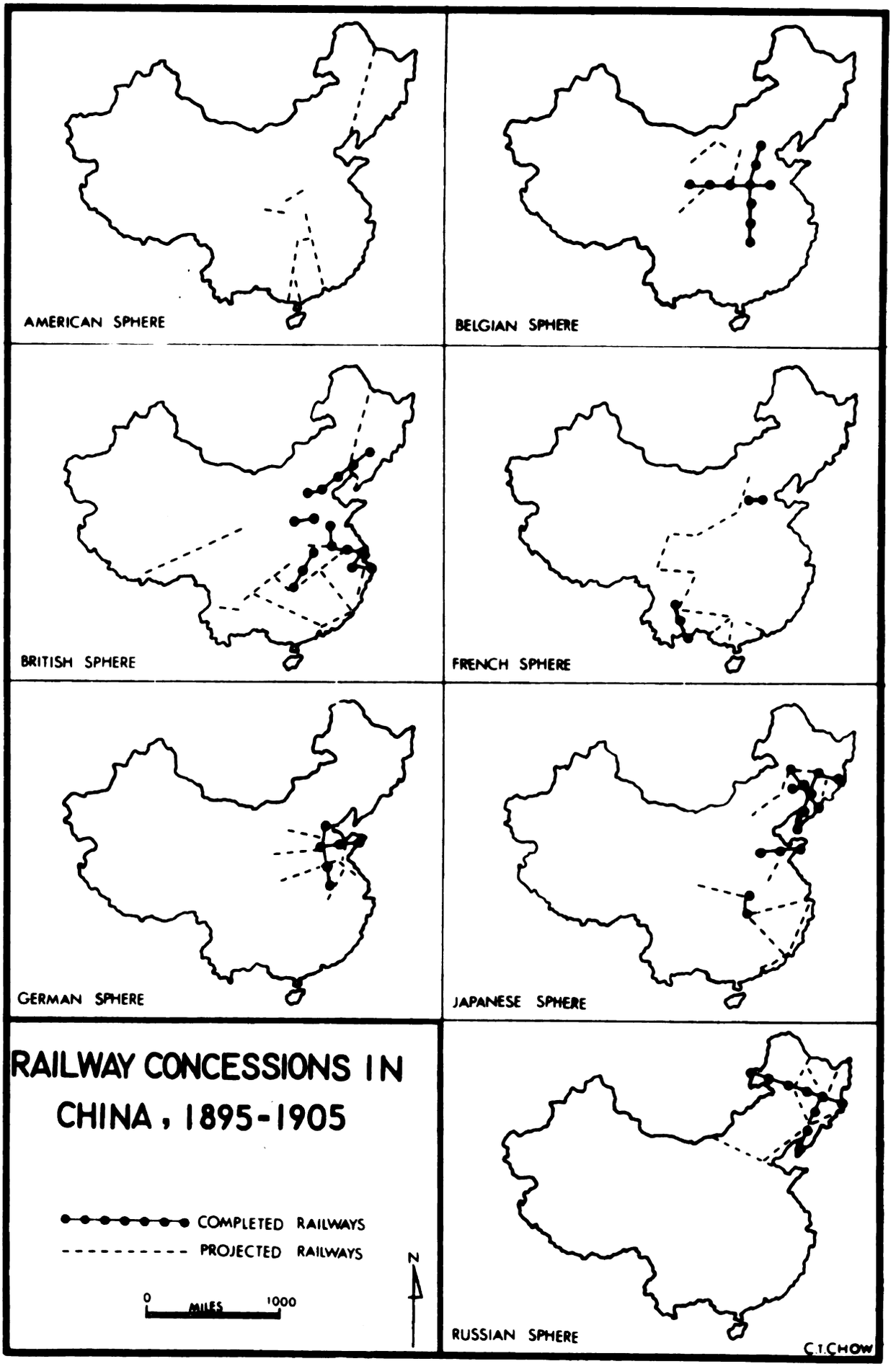
[8]Roy I. Wolfe, Transportation and Politics (Princeton: D. Van Nostrand Co., 1963), p. 77.


AMERICAN SPHERE
BELGIAN SPHERE
BRITISH SPHERE
FRENCH SPHERE
GERMAN SPHERE
JAPANESE SPHERE
RAILWAY CONCESSIONS IN CHINA, 1895-1905
COMPLETED RAILWAYS
PROJECTED RAILWAYS
0 MILES 1000
N
RUSSIAN SPHERE
C.T.CHOW

Map 4

of colonialism in its purest form. The imperial penetration of India, China, and tropical Africa during the nineteenth century was in each case different. However, in each case there were these similarities:

1. The foci of invasion originated at coastal points where administrative centers were established. Railways were later built from these centers into the interior. The attempt was to link as large an area as possible under the economic, political, and military control of the coastal centers.

2. In no case did the foreign builders intend the railways to serve the interests of the people through whose territory they passed, but rather, they were built to serve the colonial interests. For example, India had an advanced civilization, too many people, and too much diversity to be properly called a colony. With insignificant exceptions all parts of India were under the control of a single imperial power which meant that the railways had the function, not of carving out an empire, but of consolidating it. By contrast, in China the initial colonial rail developments attempted to fragment the territory. The land frontiers with the Russian Empire in the north and the French colonies to the south were pulled in opposite directions. The nominally independent Chinese government attempted to carve out its own territory

with the assistance of railway construction. Although no large part of China was formally detached from the central government during the nineteenth century, as was Manchuria during the twentieth century, to become a Japanese colony of Manchukuo, the aims of the colonizers were unmistakable. Fortunately, only the ports fell under extraterritorial rights and were thus ostensibly under the total control of the imperial powers, of which there were half a dozen. The attempt by each power to appropriate for its ports the largest and most profitable hinterlands led to the "Scramble for Concessions" of the 1890's during the course of which many rail networks were built.

The deficiencies in the several colonial networks plagued China until the present period. In the more complex situation of China, economic and political considerations reinforced each other. In Africa, where rivalries between the colonizing powers were intense, and there was no centralized local government to play the rivals off against each other, political considerations dominated all others. The experience of tropical Africa was an amalgam of those experienced in India and China: almost all of the African territory was in the hands of aliens as was the case in India, but there were half a dozen contending powers, as was the case in China.

In China, railways were related to colonialism in two ways. First, technological advances in transportation made possible the acquisition of colonies for political aggrandizement or for economic purposes and for the later exploitation and retention of these areas within the empire. For example, a rail spur was built from French Indo-China into Kwangsi Province in the south while another extended Russian influences into Manchuria. Second, the needs of railways led to the acquisition of other colonies. The role of these additional colonies was that of staging points or defensive posts along extended routes which served as lifelines to the colonial empires.[9] Though colonies may be acquired either with the aid of a railway or for the purpose of making an existing link more economical, the categories are not pure. Colonies that are established for some other purpose may also serve as jumping-off bases for further colonization or as defensive bases.

Whereas defensive bases are a means to an end, economically valuable colonies are an end in themselves. As such, they do not serve transportation but are served by it. They are needed in the first place through the exploitation of new technological refinements in transportation, and thereafter the position of the colonizing

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[9] Ibid., p. 70.

country is consolidated by means of transportation improvements in the colonized country.

The progression is logical. One of the distinctions between colonizer and colonized is that the former has much more sophisticated means of moving about than the latter. The colonizing country is stronger, but strength by itself is not enough. At all times the ability to exert military power at a distance has been the touchstone for colonial success.

It is important to emphasize that poverty in transportation facilities is symptomatic of other weaknesses. It may denote a sparsity of population and a low level of civilization, as in primitive North America and Australia. It may denote a period of decay and disintegration, as in China under the later Manchus. It may denote an extreme environmental adversity as in parts of Southeast Asia, South America, and Africa. It may denote a fundamental disunity, regional and social, as in India. In every case there has been weakness to be exploited; this weakness has found expression and has been exaggerated by inadequacy in transportation.

Once a country has been colonized, the inadequacy of its transportation facilities becomes a weakness to the colonizer. The problem is exactly the same as that confronting an independent state, which in order to remain

viable, must have an administrative center from which the farthest reaches of the domain may be controlled. In order to be able to reap economic benefit from the colony and to keep all parts of it under control, the colonizer must improve the facilities whose very inadequacy helped make his incursion possible.

When the decadence of the Manchus made China vulnerable to encroachment from outside, Europeans took advantage of her weakness from two directions--the Russians and French from the landward side, the other imperial powers from the sea.

Russia's desire was to gain imperial advantages in Manchuria. She used the pretext that the Trans-Siberian route was circuitous in order to persuade China to enter into partnership with her in the construction of the Chinese Eastern Railway. On her western borders Russia was careful to gain the defensive advantages offered by a difference in railway gauge, but the Chinese Eastern Railway, which was intended to be an integral part of the Russian railway system, was built to the wide Russian gauge.

When Russia persuaded China to enter into a further agreement, to build a branch line, the South Manchurian Railway, China took the precaution of insisting (successfully) that the new line have the standard gauge, to

conform with the Chinese rail network then being constructed by other European countries. In any case, though Russia's effort at colonial encroachment had placed Manchuria firmly within the Russian sphere of influence, it had the paradoxical result of bringing Manchuria into much closer relation with the rest of China than in the past. To counteract Russian influence, the Chinese used the railway to swarm into Manchuria in far greater numbers than the Russians themselves.

The encroachment from the sea was different. Here the pretext of obtaining a convenient corridor across Chinese territory could not be used. Instead there was the naked attempt at economic aggrandizement.

The very absence of adequate means of inland transport at first pinned the Western powers and Japan to their original ocean ports. China could be likened to an organism lacking a circulatory system. For this reason, China was able to keep the foci of infection on its exposed surface from spreading inwards. Towards the end of the nineteenth century, however, the invaders were able to make their way into the interior by establishing "spheres of influence" and extracting concessions from China to construct railways and to exploit the economic resources thus tapped. The sphere for Germany was Shantung Province; Britain focused on the centrally located Yangtze Valley;

Japan dominated the coastal area adjacent to Formosa; and France moved into the south. Britain tried, without success, to emulate the procedure that Russia followed in Manchuria, by opening a land corridor to Shanghai from her possessions in Burma. France was the only Western power able to advance into China from a broad land base provided by her possessions in Indo-China.

The United States' interest in China's railway building was represented by the American railroad magnate T. H. Harriman. He planned to extend his operations from southern Manchuria to northern Manchuria and to make connection at some American Pacific ports with American railways under his control. In this way he proposed to establish a transportation system that would encircle the globe.[10]

Belgium had little if any political ambition in China. Belgium was a small country, her iron and steel industries at this date were well established.[11] Her

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[10]T. H. Harriman went to Japan and drew up an agreement with Count Ito Hirobumi for the lease and operation with American capital of the South Manchuria Railway, which Japan had obtained from Russia. When Count Komura Yutaro returned from Portsmouth, where he signed the peace treaty after the Russo-Japanese War, he violently opposed the Ito-Harriman agreement on the grounds that it would rob Japan of the only tangible fruit of the Russo-Japanese War, which she had obtained at great cost. According to Chang Kia-ngau, China's Struggle for Railroad Development (New York: The John Day Co., 1943), pp. 31-34.

[11]So that the contracts with Belgium would have no political implications. On the other hand, Belgian prices and terms of payments might be more unfavorable than those of other countries. Ibid., p. 38.

interest in the building of the north-south Peking-Hankow Railway and the east-west Lunghai Railway was strictly economic.[12]

Besides the battle of economic spheres in China, the powers also shared political inconsistency among themselves. The directions of railway construction in China's territory were affected by these inconsistencies. The contradictions were most distinguishable between Japan and Russia, Japan and the United States, Britain and France, Germany and Russia, and Japan and Germany.[13]

Colonialism therefore influenced the railway pattern of China. The existing spatial pattern was established by foreign nations, although it was modified later.

Strategy as a Factor in the Development of China's Rail Pattern

Wars have been a continuously occurring feature of China's modern history. As a consequence, several locations acquired significant strategic and military importance. These locations could easily affect or determing the winning or losing of a military engagement. The

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[12]Chang Chia-ngau, China's Struggle for Railroad Development (New York: The John Day Co., 1943), p. 38.

[13]The Sino-Japanese War of 1894-1895, the Russo-Japanese War of 1904-1905, and the Japanese-German War of 1914, were all caused by the conflict of interests among the powers in China and by their attempts to enlarge and strengthen their respective spheres of interest.

efforts of connecting such points for strategic reasons highly influenced the development of China's railway pattern.

The mountain ranges in China divide the country into separate regions. The Yin Shan separates Mongolia from North China; the Tsingling range separates North China from Central China; the Nanling range separates Central China from South China; the Wu Shan separates eastern China from western China; the Taihang range marks the boundary between the North China plain and the loess plateau; the hilly land in Inner Mongolia separates the North China plain from the Manchurian Plain. Within this complex structure of the physical landscape, transportation nodes are mainly located at gaps where rivers have crossed the mountain ranges. The water gaps become the logical paths for communication between different regions.[14] Many a battlefield in Chinese history was located outside a city near such a water gap. For example, the city of Hsianyang in Hupeh Province is on the Han River, where it emerges from the Tsingling range. Hsuchow, a city in Kiangsu Province, is on the Hwai River, near the dividing line between north China and south China. Tungkuan , a city in Honan Province, is on the Yellow River bend.

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[14]Chiao-min Hsieh, China: Ageless Land and Countless People (Princeton: D. Van Nostrand Co., 1967), p. 49.

Shanhaikwan, a city in Hopeh Province, is on the Bay of Pohai which separates Manchuria from north China. Because of their location in water gaps these cities all became strategic military points.

Under wartime conditions, a military leader in control of water gaps could conquer the country and unite it. This was true at the beginning of each dynasty. Then, when a dynasty lost power, the water gaps were occupied by rebels and were no longer paths for communication, becoming instead formidable barriers. As a result the country would be divided and various regions isolated. Water gaps are not only strategic gateways for military action, but are also strategic locations on trade routes and serve as political boundaries as well.

The seven geographic gateways that have sometimes led to separation of the country and at other times have tended to unify it include five important water gaps along with two well-known land corridors. To control them by railway and to destroy the lines was a feature of military operations during the civil war and during the Sino-Japanese wars. These gateways include:

1. Tungkuan . Located on the north bank of the Yellow River, Tungkuan is the west gate of the North China Plain leading to the interior of the country. Throughout Chinese history, whenever this gate has been

blocked, various kingdoms have risen and the country has been divided. When the gap has been open the country has been united. The Lunghai railway passes through here and forms the southern terminal of the Tung-pu railway in Shansi Province.

2. Yangtze Gorge. This water gap is in the Wu Shan and separates the Szechuan basin in the west from the East Yangtze plains. During periods of blockade of the Yangtze Gorge, the Szechwan Basin usually has become an independent state. The Chengtu-Chungking railway and Szechuan-Kweichow railway focus on this water gap.

3. Nanling Gap. The Nanling Range separates central China from south China. The Nanling water gap provides access from Kiangsi Province to Kwangtung Province. The railway from Canton to Hankow passes through the gap. It is of strategic importance in military action and is a trade route in peacetime.

4. Tsingling Passes. The Tsingling range is sometimes referred to as the "backbone" of China. It divides the country into two distinct parts. The eight passes through the Tsingling are called "chan taos." Opening the chan taos provided a great impetus for Chinese unification. During periods of access through the Tsingling passes communication between the Szechuan basin and the Hanchung basin is possible; south and north China are

connected. During World War II, China utilized the passes to connect Szechuan Province with the northwest part of China. The Paochi-Chengtu railway traverses this area.

5. Kalgan Pass. The Kalgan pass connects the Mongolian plateau with the North China plain. In peace-time this is an important route for the fur trade. During World War II it was a strategic military point. The Peking-Suiyuan, Chiling-Erhlien, and Tungpu railways cross this pass.

6. Kansu Pass. Between Chilan Mountain in the south and Holi Mountain in the north--between Tibet and Mongolia--lies the Kansu corridor, an elongated valley roughly one thousand miles in length. During the Han Dynasty, a series of fortifications were built there and fire signals from the forts warned of invasion by the nomads. The area was occupied first by military camps. Today, the corridor is irrigated by water from the melted snow of Chilan Mountain. In ancient times the southeast coast of China was not opened to ships, and the Kansu corridor was China's front door connecting China proper with Sinkiang and central Asia. The famous "Silk Road" followed this corridor, and Marco Polo entered China through it. The corridor occupied an important position in ancient overland communication between the East and the West. The Paotow-Lanchow and Lanchow-Sinkiang railways

pass through here. This route is of continuing military significance in the maintenance of the western boundary with the Soviet Union.

7. Liaosi Corridor. A narrow, elongated coastal plain, located on the shore of the Bay of Pohai, the Liaosi corridor is a thoroughfare connecting the North China plain with the Manchurian plain. The corridor is so important in its strategic location that it became an important battlefield during the Sino-Japanese War. The Peking-Mukden and Tientsin-Mukden railways occupy this gap.

Before the Sino-Japanese War, China was viewed by the Japanese as a site for supplying such crucial raw materials as coal and cotton. In addition, China was considered as a market for the manufactured products of Japan. The Japanese dream of economic self-sufficiency required an agricultural China and an industrial Japan. Obviously, fulfillment of that dream would have placed China in a very unfavorable position. It is not surprising that the inappropriateness of the Japanese strategy resulted in an eight-year conflict.

The first two years of war were actually a railway war.[15] Japan planned to control China by controlling

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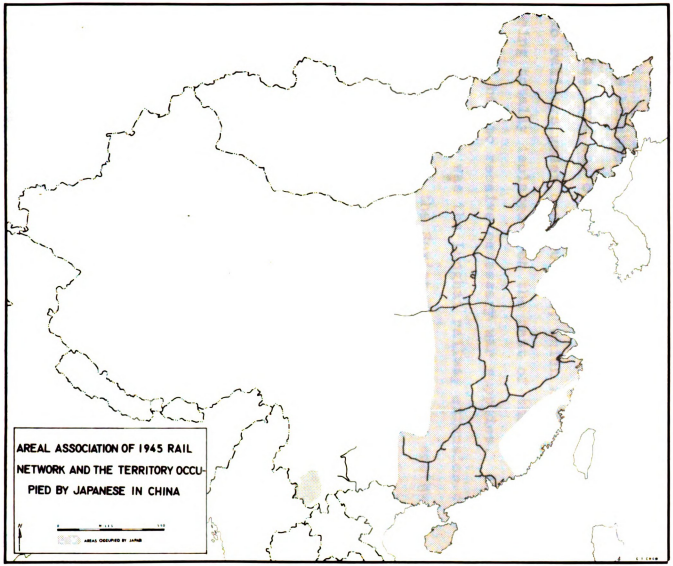
[15]Norton Ginsburg, "China's Railroad Network," Geographical Review, XLI (1951), 471. Also Chang Chia-ngau, China's Struggle for Railroad Development (New York: The John Day Co., 1943), pp. 197-226.

her existing railways. China's coastline was totally blockaded. Her industrial cities, most of them located on the coast, were overrun and her railways and navigable rivers fell into Japanese hands (Map 5). Under these circumstances the Chinese could only fight and withdraw. Fortunately the Chinese had a large hinterland into which they could retreat. They developed a policy of "trading space for time" and of "accumulating minor successes as the basis for a major victory."

In 1937, when the Japanese military operation was carried on mainly on the coastal plains, the invaders advanced an average of twelve miles daily on the Chinese territory. In 1938, when fighting had shifted to the rugged western land, the advance decreased to only six-and-one-half miles daily. In 1939, when the Chinese were defending the mountainous interior, the Japanese advance was limited to one mile a day. In 1940, the advance was reduced to half a mile a day. Here the terrain became a real asset to China's political survival.

The interior of China is very rugged. This configuration constituted a great obstacle to the mechanized Japanese army. The Japanese were checked at Tungkuan at the bend of the Yellow River in north China, at the Yangtze Gorge at Ichang, and by the north-south range of mountains on the border between Indochina and southwest China. The


AREAL ASSOCIATION OF 1945 RAIL NETWORK AND THE TERRITORY OCCUPIED BY JAPANESE IN CHINA

Map 5

Japanese army also had great difficulty attacking the Szechuan basin, which is surrounded by mountains.

With their advancement checked in the west, the Japanese blockaded the coast and tried to cut off China's supplies from the outside world. Fortunately, there were two railways under construction, which kept China from being totally isolated from the rest of the world and allowed her to receive necessary war supplies. In the northwest there was the Lunghai railway extension connecting China with the Soviet Union. In the southwest, the Yunnan-Burma Railway connected China with the Indian Ocean. Through these contacts, China received aid from the United States, Britain, the Soviet Union, and other allied countries.

Many railways were built in China for strategic purposes during the one-hundred-year period following 1866. The strategic factor satisfactorily explains the direction of many miles of railway construction in China.

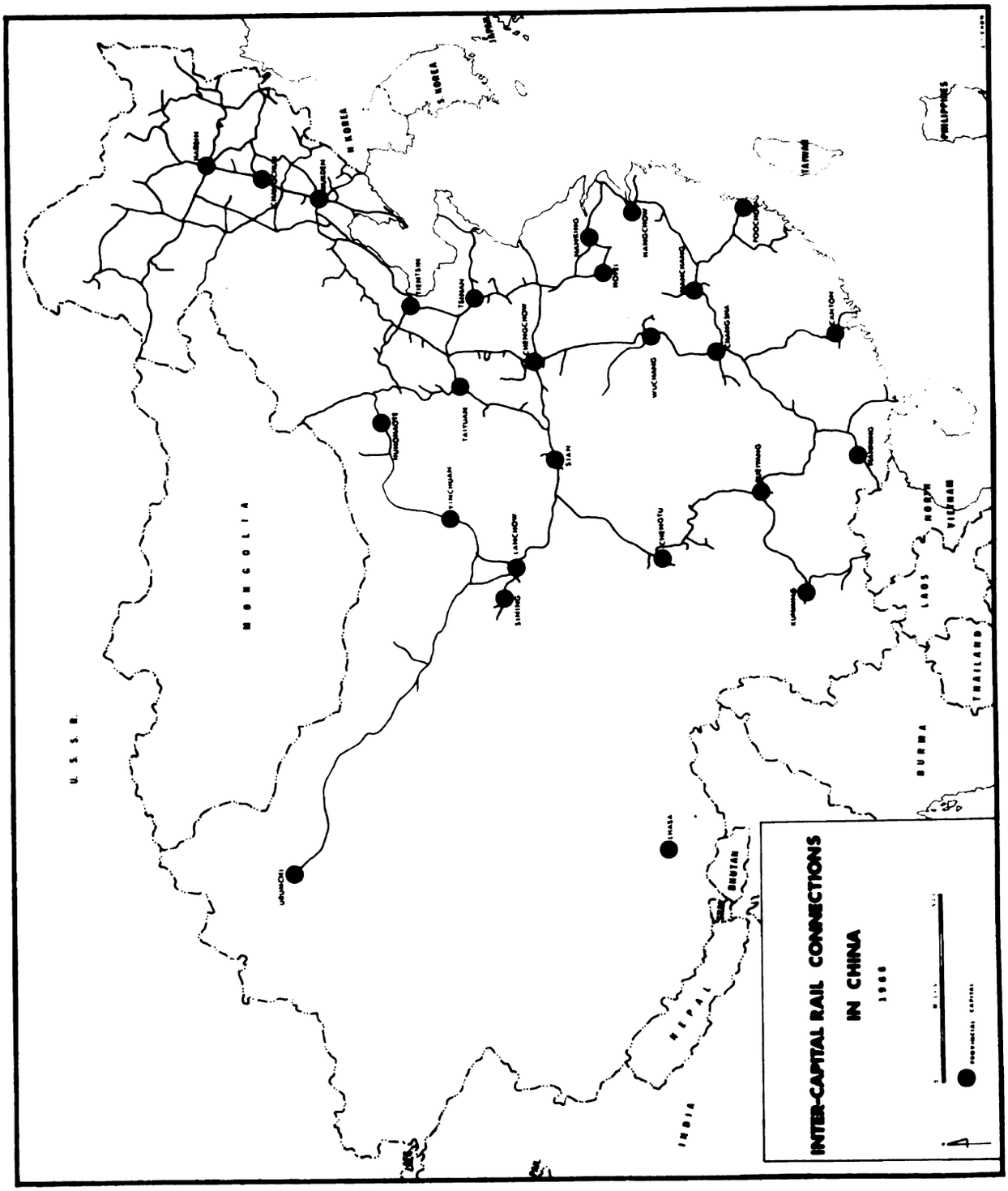
Political Administration as a Factor in the Development of China's Railway Pattern

In China there is a saying: "After a long period of unification, the country will be divided." How are different regions politically united and divided? It is natural that when two regions are similar in physical environment, it is easier for the inhabitants to unite

politically than if the regions are diverse. On the North China plain, which has a homogeneous physical setting, few political divisions exist. But in southwestern China, which has a variety of landforms and climate, the provinces of Szechwan, Kweichow, Yunnan, and Kwangsi have been customarily ruled by several different warlords.

The political element is therefore one of the important factors in characterizing the spatial pattern of Chinese railways (Map 6). The spatial pattern evidences two political movements: one centripetal and the other centrifugal.

The centripetal movement originated with the central government. This movement was significant in all three eras of railway construction. The new regimes always faced the same problem and tried to use railways as an immediate solution. The difficulty of communicating with the capital made the provinces almost independent of the central authority in local administration. More rapid means of locomotion had the immediate effect of bringing them under central control and of checking the misgovernment of the provinces. Two spatial patterns were formed during the one-hundred years both of which radiated from established capitals. One radiated from Peking, during the periods of the late Ching Dynasty, the early Republic, and the Communist regime. Another radiated from Nanking


INTER-CAPITAL RAIL CONNECTIONS
IN CHINA
1966
MONGOLIA
U.S.S.R.
N. KOREA
S. KOREA
JAPAN
TAIWAN
PHILIPPINES
VIETNAM
LAOS
THAILAND
BURMA
INDIA
NEPAL
BHUTAN
SIKKIM
URUMCHI
LANCHOW
SINING
TAITUAN
SIAN
TSINGTAO
TSINAN
TIENTSIN
PEKING
MUKDEN
CHANGCHUN
HARBIN
HARBIN
CHENGCHOW
WUCHANG
HANKOW
KWEIYANG
KUNMING
CANTON
FOOCHOW
NANNING

Map 6

during the National government of Kuomingtang rule. Today, Communist railway construction is more concentric for political purposes with most new mileage being built in the sparsely populated western provinces. Undoubtedly, these new lines will help to integrate the farthest reaches of the country with the rest of China.

The centrifugal movement in railway construction came from local or provincial governments. This movement was significant during the late Ching Dynasty and the early Republic Era. The local gentry built railways in their own provinces for the purpose of defying the Manchu rule. This was true in south China; Hupeh and Szechwan of central China; and Hunan in the Lake Region. The political instability of the early Republic Era also caused the development of local railways. The warlords built their own railway systems to isolate themselves from the new regime. Examples of this type of railway development include the Shansi system on the Loess Highlands, the Liaoning system, and the Kirin system in Manchuria.

The Role of the Government

From its earliest days the railway in China was regarded as at least partly a proper sphere of government enterprise. This was brought about by several factors. The agrarian focus of the economy resulted in a dearth of

accumulated capital. Moreover, the unwillingness of those who did have some capital to invest in long-term undertakings such as railway construction was clearly evident. These difficulties in raising funds for railway construction forced government action in an attempt to solve the problem. Between 1896 and 1911, an ever-increasing foreign financial and diplomatic pressure was directed at Chinese authorities to gain railway concessions. This pressure decidedly placed the government in a pivotal position with regard to railway development. Moreover, since the role of government had always been great in developing irrigation and in building canals and roads, it was easy for the people to accept the direct participation of the authorities in railway affairs. The fact that many of the early promoters of railway construction in China--statesmen such as Li Hung-chang, Chang Chih-tung, and Sheng Huan-huai--were members of the official bureaucracy only highlighted the role of the government.

As soon as railways were built they were placed under the jurisdiction of government agencies. At first railway jurisdiction was handled by the Bureau of Naval Affairs.[16] In 1895 railway matters were transferred to

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[16]This was because the railways were used for defense purposes at that time.

the Tsungli Yamen (Ministry of Foreign Affairs) as a supplementary item having to do with foreign relations.[17] Thus, for many years railway business was considered principally in the light of its strategic and diplomatic rather than its economic significance. Then in 1903, the Ministry of Commerce was given jurisdiction over the railways. Immediately a new set of regulations was drawn up by the Ministry. While the regulations tried to encourage local investments in new railways, local funding was minimal. The Ministry of Foreign Affairs, successor to the Tsungli Yamen, was also important in railway development in these years, since it was in charge of the negotiations with foreign representatives regarding loans for government-owned railways.[18]

With the setting up of the Board of Post and Communications in 1906, the railways became the responsibility of a specialized government agency, a practice that has continued to the present day. The Republican government after 1912 placed great emphasis on railway administration and entertained vast hopes for state construction of railways. After 1928 the basic policy of the National

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[17]This is because railways were now deeply involved in matters of foreign affairs.

[18]Chang Hsin-cheng, History of Modern Chinese Communication (Shanghai, 1937), pp. 72-73.

government as stated in the official Outline of Reconstruction was that "all communications enterprises that are nationwide in their effects, such as railways, highways, telegraph . . . are to be constructed and operated by the state."[19] As a consequence, during the period of the most rapid railway construction under the National government, the state railways remained the most important lines. In fact, between 1912 and 1915 the Republican government nationalized the more important railways[20] or railway branches that were still in the hands of private companies at a total cost to the government of $65,684,716.[21] Consequently, the remaining private railways made up only a small fraction of the total mileage.

Before the Sino-Japanese War, a Ministry of Railways was established in the central government. During the war and up to 1949, the railways were put under the administration of the Ministry of Transportation. The

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[19]Ministry of Railways, Railway Gazette (Nanking, 1928), p. 126.

[20]These transactions involved railways in eight provinces; the lines nationalized included the Shanghai-Hangchow-Ningpo Railway, built by private capital in Kiangsu and Chekiang and the rights over the projected Hankow-Szechuan line that rested with the railway companies of Hupeh and Szechwan. Hung-huan Lin, History of Chinese Railways (Taipei: World Press, 1963), pp. 12-13.

[21]Tseng Kun-hua, History of Chinese Railways (Peking, 1924), pp. 118-119.

policy of state ownership and control was continued by the Communist government after 1949, and a new Ministry of Railways was established by the Communist government.[22]

Lack of Administrative Unity

In view of the important role the government has played in China's railway development, it may seem a paradox that one of the problems that persistently plagued railway development and operation was the lack of an efficient, unified administration. One has to take into account the centrifugal forces that were operating in Chinese society to understand this paradox. It is true that designs for a national railway network had emerged as early as the policy-making sessions held in Peking in 1907 by the Board of Posts and Communications. Their plans called for the establishment of four main state rail systems with trunk lines radiating from Peking, each having its satellite lines and its own hinterland.[23] Despite this show of potential central authority, the actual management of the existing lines remained in

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[22]The Ministry of Railways was changed to Ministry of Communications in 1971, according to Ming Daily (Hong Kong), Feb. 13, 1971.

[23]The termini of the four trunk lines were to be as follows: in the north, Kiakhta; northeast, Aigun; south, Canton; northwest, Ili, according to Tung-hua hsu-lu, Kuang-hsu, Vol. CCVIII, p. 7.

regional control. As one British observer commented, "this was due to the powers of the provincial officials."[24] The lack of unified supervision or administration of even individual lines was the result not so much of the power of the provincial officials as such but of the nature of the Chinese administration structure. Given the territorial, unspecialized basis of traditional Chinese administration, it was not to be expected that officials would regard the railway as a business enterprise that required central financial control and direction. It was apparently quite natural for Chang Chih-tung and his colleagues to speak of the "Hupeh-section," "Hunan-section," and "Kwangtung-section" of the Hankow-Canton Railway as geographic and administrative units and to leave management to be handled on a provincial basis. The Szechuan-Hankow line was often referred to in a similar fashion. Fund-raising and bookkeeping, among other things, were carried out in divergent ways in different provinces. Strict provincial demarcations proved to be a retarding influence not only on government railways but on private efforts as well. It was estimated that, partly because of the lack of cooperation among people of neighboring provinces, the lines built by private capital in 1911

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[24] P. H. Kent, Railway Enterprise in China (London: Edward Arnold, 1907), p. 199.

--despite more than a decade of enthusiastic activity--totalled less than 300 miles.[25] At the same time it seemed debatable, even to some of the advocates of government action in railway development, whether the provincial or central authorities should have ultimate control over the lines. Chang Chih-tung, for example, objected strongly to a proposal originating in Peking for the central government to take control over the railways of Hupeh.[26]

The fact the major railways were built with loans from a number of foreign countries also contributed to the lack of single administrative control over a particular railway. For the duration of the loan period, each system remained tied to the control of the lending agency. For each system the relative powers of Chinese and foreign personnel, the function of foreigners employed by the railway administration, and the ultimate seat of authority were defined differently.[27] The Chinese government was the legal owner of the major lines, and at least on the formal level, the government's right to control was not

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[26]Chang Chih-tung, "Memorials," Collected Works of Chang Chih-tung, Vol. LXVI, p. 24.

[27]Compare, for instance, the working agreement for the Shanghai-Nanking Railways, and the provisions in the Canton-Kowloon and Tientsin-Pukow railway loan agreements: J. V. A. MacMurray, Treaties and Agreements with and Concerning China, Vol. I (Washington, D.C., 1912), pp. 405-408.

disputed. However, it was not until the Republican Period that each railway relinquished control over its own policies. For example, the accounts of different railways were kept in different ways and in different currencies. It was not until 1905 that the financial administration and accounting of the various state railways were unified under regulations set up by the Ministry of Communications.[28] The overall administrative pattern remained unchanged during the difficult and unstable latter years of the Republic. Upon gaining power the Communists set up a five-year plan for the railways (1953-1957), immediately after the end of the "Rehabilitation Period." During this time, the Peking Ministry of Railways divided the administration of the railway system into five major areas:[29]

1. Manchuria: Harbin, Chichihaerh, Chilin, Chinchow.
2. North China: Peking, Tientsin, Taiyuan, Chinan, Chengchow.
3. South China: Shanghai, Canton, Liuchow.

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[28]Chang Hsin-cheng, op. cit., p. 82.

[29]There were 12 administrative bureau branches in 1953, according to Chi Yu, New China's Railway Construction (Peking, 1953), p. 34. There were 17 branches in 1957, according to National Security Bureau, Reports on Railway Construction in Mainland China (Taipei, 1957), pp. 9-10.

4. Chengtu-Chungking Railway Bureau.

5. Northwest Trunk Line Engineering Bureau.

The administration in Manchuria was directed from a central and semi-autonomous bureau in Mukden while regional bureaus were located at Chichihaerh, Kirin, and Chinchow. In the north, bureaus were located at Tientsin, Chinan, Taiyuan, and Chengchow. In the south, the main bureaus were Shanghai and Hengyang. Secondary centers were at Hangchow, Liuchow, and Kunming.[30]

Capital as a Factor in the Development of China's Railway Pattern

Capital for the construction of Chinese railways during the one-hundred years since 1866 can be divided into four categories:[31] government funds, foreign loans (Table 9), domestic loans, and private capital. Of the varied combinations of funds possible, three broad types of economic support for railway development emerged. These were: state railways (in which foreign loans

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[30]The Manchuria Administrative Bureau managed 10,819 kilometers of railway, including 30 major and 60 branch lines. The North China Administrative Bureau managed 7,468 kilometers of railway, including 12 major and 60 branch lines. The South China Administrative Bureau managed 4,394 kilometers of railway, including 22 major and 26 branch lines. The Northwest China and Southwest China Bureaus were formed in 1954. According to Y. H. Chao, Communist China's Railway Construction (Hong Kong, 1954), pp. 35-36.

[31]Tseng Kun-hua, op. cit., p. 412.

TABLE 9

FOREIGN LOANS OF CHINESE RAILROADS, DECEMBER 31, 1935

Underwriting Countries	Loans	Dates of Issue	Original Principal	Total Loans with Interest
Great Britain	Peiping-Hankow Ry.	1908	2,500,000	375,000
"	Tientsin-Pukow Ry.	1908	1,850,000	1,735,531
"	Original			1,354,200
"	Supplementary	1910	1,776,000	488,750
"	Peiping-Liaoning Ry.	1898	2,300,000	2,992,800
"	Shanghai-Nanking Ry.	1903	2,900,000	718,765
"	Taokow-Chinghua Ry.	1905	800,000	
"	(Honan Ry.)			86,994
	Equipment	1911	126,838	224,651
"	Chingmeng Branch	1920	87,300	1,823,458
"	Hukuang Ry.	1911	1,500,000	1,695,037
"	Canton-Kowloon Ry.	1907	1,500,000	CN$ 8,235,053
"	Nanking-Hunan Ry.	1914	CN$ 3,745,455	416,463
"	Pukow-Sinyang Ry.	1913	207,256	462,000
"	Shanghai-Fengcheng Ry.	1914	375,000	CN$ 2,343,524
"	Shanghai-Hangchow-Ningpo Ry.	1934	CN$ 2,343,524	209,637
Belgium	Lunghai Ry.			
	Sterling Loan	1912	4,000,000	6,000,000
"	Advance			72,837,238
"	Advance			
"	Belgian Fr. Loan	1920	B.Fr.137,743,000	B.Fr.247,937,400
"	Chinese Dollar Loan	1924	CN$ 5,000,000	CN$ 1,574,032
"	Belgian Fr. Advance	1924	B.Fr. 75,000,000	B.Fr. 16,760,430

TABLE 9 (continued)

Underwriting Countries	Loans	Dates of Issue	Original Principal	Total Loans with Interest
Belgium	French Fr. Loan	1925	F.Fr. 21,250,000	B.Fr. 17,850,000
"	Pienlo Ry.	1903	B.Fr. 41,000,000	B.Fr. 29,962,500
"	Paotow-Ninghsia Ry.	1922	800,000	1,472,000
"	Tatung-Chengtu Ry.	1913	385,108	310,924
Germany	Tientsin-Pukow Ry.	1908	3,150,000	4,074,236
"	Original			2,742,882
"	Supplementary	1910	3,024,000	2,097,987
"	Advance	1916		
"	Hukuang Ry.	1911	1,500,000	2,005,431
Netherlands	Lunghai Ry.			
"	Guilder Loan	1920	30,750,000	Fl. 35,350,000
	Advance			1,815,959
Japan	Peiping-Hankow Ry.	1911	¥ 10,000,000	12,408,000
"	Kiaochow-Tsinan Ry.	1922	¥ 40,000,000	40,000,000
"	Peiping-Suiyuan Ry.	1918		10,337,336
		1921	¥ 6,000,000	18,045,914
"	Nanchang-Kiukiang	1912,		
	Ry.	1922	10,000,000	20,000,000
"	Kaomei-Hisuchow Ry.	1918	¥ 20,000,000	
France	Peiping-Hankow Ry.	1908	2,500,000	375,000
"	Hukueng Ry.	1911	1,500,000	1,823,458
"	Tatung-Chengtu Ry.	1913	385,108	310,924
			F.Fr. 2,248,993	2,290,105

TABLE 9 (continued)

Underwriting Countries	Loans	Dates of Issue	Original Principal	Total Loans with Interest
U. S. A.	Hukuang Ry.	1911	1,500,000	1,823,510
"	Chuchow-Yamchow Ry.	1916	US$ 1,150,000	2,435,200

Distribution of Chinese Railroad Obligations by Countries

Great Britain	13,221,446	24.6%
Belgium	10,943,888	20.4%
Germany	10,920,536	20.3%
Netherlands	7,982,287	14.8%
Japan	5,901,177	10.9%
France	2,540,123	4.7%
U. S. A.	2,317,986	4.3%

Source: Chia-ngau Chang, China's Struggle for Railroad Development (New York: The John Day Co., 1943).

outweighed government funds), private railways (including in their capitalization both Chinese investments and private loans from foreign banks), and foreign controlled railways (built and operated directly by foreign financial interests, of which the Chinese Eastern Railway in Manchuria and the Yunnan-Hanoi Railway were the notable examples).[32] While all four kinds of capital were present throughout the one hundred years of railway development, there were changes from time to time in the relative importance of each. The difficulty in obtaining funding under all four methods deeply affected the characteristics of railway patterns in China. The variations can be found among the Imperial, Republic, and Communist eras.

Imperial Era

By far the largest block of capital made available to the Chinese government for railway construction during the late Ching Dynasty was money from foreign loans. By 1899 the major railway concessions had been obtained by the interested foreign powers. In general these loans averaged thirty years for maturation, with interest at 5 percent, issued to the Imperial government at 90 or 95 percent of par.[33]

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[32] E-tu Zen Sun, "The Pattern of Railway Development in China," Far Eastern Quarterly, XIV (1955), 186.

[33] Ibid.

When the railways became an object of national attention there emerged in China a movement for the cancellation or redemption of foreign railway concessions. The gentry, in cooperation with a number of railway-minded officials like Chang Chih-tung, took a leading role in this campaign which characterized Chinese railway affairs in the late nineteenth and early twentietn centuries. The degree of gentry activity differed greatly, however, in accordance with local conditions. Gentry interests made only a negligible showing in the northern and Manchurian provinces whereas those of the Yangtze Valley from Szechuan to Kiangsu and of Kwangtung were strong enough to make the movement of redemption effective. The redemption of the Hankow-Canton Concession from the American China Development Company in 1905[34] was made possible by the union of forces of the gentry of Hunan, Hupei, and Kwangtung and of the provincial authorities. By contrast, the controversy over the Shanghai-Hangchow-Ningpo Railway Concession dramatically represented the conflict between local interests and a foreign concessionaire[35] over securing financial redemption of a line.

With the exception of the Shanghai-Hangchow-Ningpo Railway none of the major lines during the period was

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[34]The J. P. Morgan & Company acted as agent of the China Development Company.

[35]Under the American Company two short lines had been built, the Canton-Samshui Railway of thirty miles and the Chuchow-Pingsiang Railway of fifty-six miles.

constructed with domestic capital.[36] To begin with, capital accumulation was weak in a society hitherto based primarily on agriculture. Not only were the sums demanded of the investors in enterprises like a railway trunk line often beyond the ability of the gentry to furnish, but the resources of credit institutions in China were also unequal to the task. Since private capital was difficult to obtain, the responsibility for raising funds for railway construction was passed up to the authorities. This was true even of the provincial railway companies which were sponsored by the local gentry. The officials could choose between two alternatives--they could raise the necessary funds through additional local taxes, or through foreign loans. The outstanding examples of the former method are found in Hunan and Szechuan. Upon suggestion of the gentry, an additional salt tax was introduced in Hunan as a way of obtaining capital for the Hunan section of the Hankow-Canton line. In Szechuan the gentry and officials agreed on a 3-percent levy on grain, the proceeds to be used toward the partial financing of the Hankow-Szechuan Railway.[37] But the money so raised in the provinces was seldom effectively used for the stated

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[36] E-tu Zen Sun, "The Shanghai-Hangchow-Ningpo Railway Loan of 1908," Far Eastern Quarterly, X, 2 (Feb., 1951), passim.

[37] Ta-ching Li-chao Shih-lu, Kuang-hsu, Vol. DXCII (Peking, 1898), p. 9.

aims, creating opportunities for the entrance of foreign capital.[38]

Republic Era

The scarcity of domestic capital enhanced the role of foreign loans. Political instability during the early part of the Republican Era and the slow rate of industrialization--in spite of some progress made during and after World War I--accentuated the situation. Although the major railways were government-owned, government investment played only a minor part in the actual financing of these lines. It was reported that the Peking-Mukden and Peking-Hankow lines had the largest proportion of government investment, but much of the money so categorized consisted of the railways' own earnings, especially in the case of the Peking-Hankow Railway.[39] On the other hand, foreign loans were estimated in 1924 to constitute some 80 percent of the total investment in Chinese railways. As compared with loans concluded at an earlier date, the loans contracted during the early Republican years tended to be short-term, high-interest transactions. The full

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[38]Michael Loewe, Imperial China (New York: Praeger, 1966), pp. 270-276.

[39]Tseng Kun-hua, op. cit., p. 413; also Bureau of Statistics, Ministry of Railways, Statistics of Railways for the Year Ending December 31, 1927 (Nanking, 1928), p. 36.

sums of these loans were often not paid.[40] It was reported by the Ministry of Railways in 1931 that foreign railway loans had reached the sum of CN $1,504,498, approximately half of the total foreign debt of the Chinese government.[41] A portion of that foreign debt was owed by privately owned railways. However, private railways constituted only a small percentage of the existing lines. Most of these were short local lines;[42] only a few of them were able to maintain themselves financially.[43] Japanese capital steadily increased its hold over Chinese railways during the early Republican Era, and was able to obtain important shares in the Hanchang-Kiukiang, Chaochow-Swatow, and Lin-Chiang railways.[44]

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[40]The £10,000,000 Lunghai Railway loan contracted by Belgian interests in 1920, for example, had an interest rate of 8 percent; the same was true of the British loan for the Peking-Mukden Railway of 1921. An extreme case was the Ssuping-Taonan Railway loan of ¥ 12,500,000, concluded with the South Manchurian Railway Company in 1921, which was to run for just one year at 9.5 percent interest.

[41]Chu Chi-hua, Economic Structure of Chinese Society (Shanghai, 1932), p. 20.

[42]Such as the seventy-two miles of Taishan-Hsinhui Railway in Kwangtung and the seven miles of Changchow Railway in Fukien.

[43]Notably the Kochin-Pisechai Railway in Yunnan and the Tungyu coal line at Chinchow of Manchuria.

[44]Chang Hsin-cheng, op. cit., pp. 141-143; Tseng Kun-hua, op. cit., p. 422.

There was an attempt by Chinese banking circles after World War I to gain a controlling voice in the country's railway finances. The previous leadership of the gentry-officials in China's industrialization was replaced after 1911 by merchant capitalists. It was only after the formation of the four-power New Consortium in 1919 by the banking groups of Britain, France, United States, and Japan, that the China Finance Corporation was established.[45] The avowed purpose of this organization was to compete against foreign economic influences. Twenty-two Chinese banks took part in this venture, and in 1921 a $6,000,000 Railway Equipment Loan was launched. The first effort of the Chinese banks was to "neutralize" the influence of the New Consortium in railway development.[46] Both the state and private banks began to play a more positive role in railway financing with active encouragement from the National government after 1928. The Kiangnan railway, linking Wuhu of Anhui with Chapu on the Chekiang Coast, and the Chekiang-Kiangsi Railway were supported using Chinese banks.[47] The Chinese efforts in

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[45] Chang Chia-ngau, op. cit., pp. 72-74.

[46] Ibid., pp. 68-75.

[47] The Bank of China, the Bank of Communications, and the private Shanghai Commercial & Savings Bank, according to Chang Chia-ngau, ibid., pp. 77-79.

raising capital between 1928 and 1937 also showed initiative on the provincial level. Yen Hsi-shan, Governor of Shansi, was able to build the Tung-pu railway in his province using only local taxes. At the same time, the Ministry of Railways assumed some responsibility for financing necessary construction, like the Soochow-Chiahsing railway and the Chientang River Bridge at Hangchow. Certain other agencies of the central government, like the Reconstruction Commission, were likewise concerned with the building of new lines.[48]

The success of the various domestic efforts was attributed not only to the increased strength of the New Consortium but also to the hesitancy of foreign banking groups to risk investment in a field where some of the existing loan payments had been in default since 1917.[49] Nevertheless, all these efforts to raise funds within China were not enough to meet the needs of the times. Some additional sources had to be tapped.

The first important measure in this respect was taken in 1933. The British Boxer Indemnity Funds[50] were

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[48]These new lines were: the Kiangnan, Weinan, and Soochow-Kashing Railways. Ibid., pp. 81-82.

[49]Ibid., p. 153.

[50]For a loan of £1,500,000.

returned to the Chinese government and were used for the construction of the Hangchow-Canton Railway. Plans were afoot to use all the returned Boxer Indemnity Funds from Italy and Russia for the purpose of railway development. It was estimated that the proceeds from loans received on these funds would finance the building of nearly 900 miles of new railways.[51] Further, the new autonomous maritime customs resulted in increased revenue for the government after 1929. Plans were developed for using revenue for railway loans.[52] There was a heightened tempo of railway financing between 1934 and 1937 as a consequence of Japanese activities in the area.[53] At the same time, new foreign credit became available.[54] Some idea of the magnitude of foreign investment in 1931 is indicated by the

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[51]Ministry of Industries, Chinese Economic Yearbook, Vol. II (Nanking, 1943), p. 347. These new lines were: Chekiang-Kiangsi Railway and Hangchow-Lanchi Railway.

[52]Actually the plans for the Boxer Indemnity and Maritime Customs loans had their inception in January, 1929. Ibid.

[53]During those four years, the National government floated five issues of domestic railway bonds totalling CN$145,000,000; in addition, Chinese banks and syndicates advanced sums to several railways that amounted to nearly $6,000,000. Leonard G. Ting and R. Q. P. Chin, "War and Transportation in China," Nankai Social and Economic Quarterly, XII, 1-2 (January, 1941), 7.

[54]The foreign capital channelled toward Chinese railway development for the years 1934-1937 amounted to some 350 million Chinese dollars. Ibid.

fact that transportation amounted to more than 26 percent of all foreign investment in China.[55]

Communist Era

For the first time in China's railway history, private and foreign loans completely disappeared from consideration in railway construction. The railway investment funds were all supported from state capital. Railway investments dominated other sectors within the transportation category (Table 10). The funds for railways shared 60 percent of the transport funds in 1953, 63 percent in 1954, 69 percent in 1955, 67 percent in 1956, 64 percent in 1957, 60 percent in 1958,[56] 70 percent in 1959,[57] and 75 percent in 1960.[58]

Such figures indicate the responsibility of the Communist government for providing investment funds. Communist concern for transportation emphasizes major projects on the national railway system, notably those of political,

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[55]H. D. Fong, Industrial Capital in China (Tientsin, 1936), p. 5.

[56]People's Publishing House, Ten Great Years (Peking, 1960), pp. 58-59.

[57]Peking Review, April 5, 1960, p. 16; and Li-fu-chun, Director of State Council Office of Industry and Communications, Report on Draft 1960 National Economic Plan (Peking, 1961), p. 2.

[58]Li Hsieh-nien, Minister of Finance, "Report on Finance to NPC," People's Handbook (Peking, 1960), p. 185.

TABLE 10

STATE INVESTMENT IN TRANSPORT AND COMMUNICATION, 1953-1960

State Investment in Transport, Posts and Telecommunications (million yuan)			*State Investment in Transport Posts and Telecommunications as % of total state Investment	*State Investment in Railways only as % of total state Investment	State Revenue (i.e. profits) from Transport, Postal and Telecommunications enterprises under its ownership (million yuan)
	Total	Rys. only			
1953	1,070[1]	650[1]	13	8	
1954	1,500[1]	950[1]	17	10	
1955	1,760[1]	1,220[1]	19	13	
1956	2,610[1]	1,760[1]	18	12	2,132[4]
1957	2,070[1]	1,340[1]	15	10	2,265[5]
1958	3,400[1]	2,030[1]	13	8	2,388[6]
1959	4,950[2]		19		
1960	6,810[3]	5,000[3]	21	15	

*The 1960 figures specifically exclude "self-provided" investment funds raised by local authorities and enterprises (Peking Review, April 5, 1960, p. 11), i.e., they exclude extra-budgetary funds. People's Handbook, Renmin-Shouce, 1960, p. 185. This exclusion is not specifically stated for the earlier figures, but probably holds for them too.

Sources: [1]Ten Great Years (Peking: Foreign Language Press, 1960), pp. 58-59; [2]Peking Review, April 5, 1960, p. 16; [3]Li Hsien-nien, Minister of Finance, "Report on Finance to NPC," People's Handbook (Renmin Shouce, 1960), p. 185; [4]Ibid., 1958, p. 214 (figure given is for final accounts); [5]Ibid., p. 218 (budgeted figure only); [6]Ibid., p. 229 (budgeted figure only).

strategic, and economic importance of the railways to the Communist regime.[59] The predominant position of railways as recipients of investment funds in the transport sector is clearly evident. Throughout the First Five-year Plan railway construction took between 60 and 70 percent of the sector's investment allocation. The figure fell slightly below these limits in 1958, but rose to 75 percent in 1960 at which time railways were mentioned as weak links to be strengthened.[60] During the years 1958 and 1959, when investment in railways rose sharply, the average cost of railway construction fell from ¥544,000 per kilometer to ¥380,000, a decline of over 30 percent.[61] The total length of new track laid between 1958 and 1963 increased considerably, yet it is difficult to relate the total construction, total expenditure, and average kilometer cost in the different years as the proportion of new, restored and double-tracked length in the total changed from year to year.[62]

A very important factor contributing to the spatial development of Chinese railways was the source of capital.

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[59]Audrey Donnithorne, China's Economic System (New York: Praeger, 1967), p. 272.

[60]People's Handbook, op. cit., p. 185.

[61]Ibid., p. 183.

[62]People's Publishing House, op. cit., p. 69.

External versus internal capital, national versus provincial sources, controlled versus competitive capital--each had an impact upon railway development.

Foreign Trade as a Factor in the Development of China's Railway Pattern

Foreign trade provides yet another characteristic in the development of the spatial pattern of China's railways (Map 7). The exports from China during the one-hundred-year period under investigation were mainly agricultural products and unrefined materials (minerals, rare metals, and iron ore).[63] (Tables 11 and 12) Transportation focused coastward from the agricultural lowlands and from mountainous regions. The inland waterways played a major role in such coastward movement, and several railways were built for better and faster service in the areas lacking inland waterways' services.

These railways differed from colonial railways in their spatial patterns. Colonial lines were built by different foreign nationals in their own spheres to connect seaports and the hinterland for their own transportation routes (Table 13), often with political overtones. The railways for national foreign trade were built by and for China in order to connect the hinterlands and coastal

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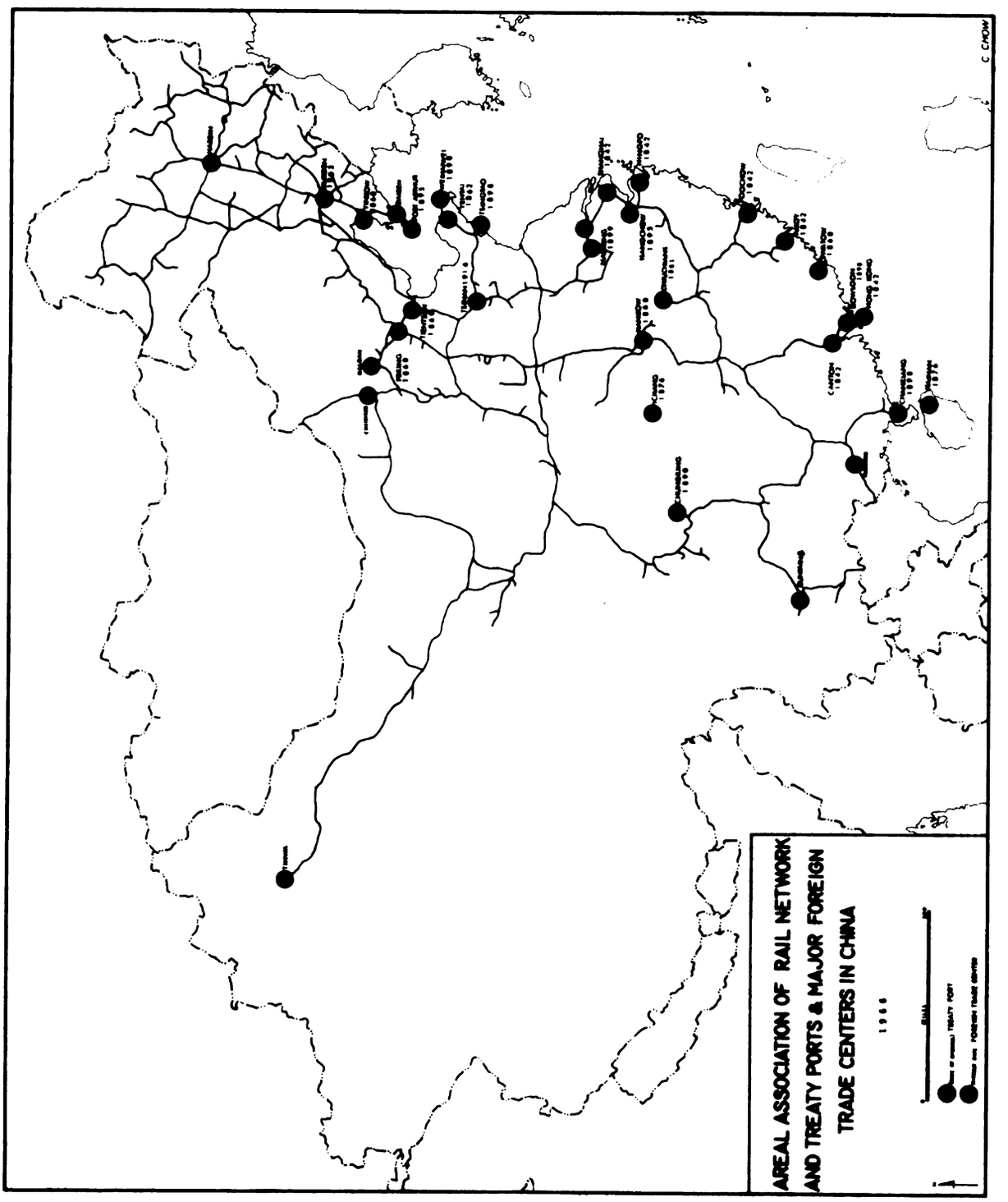
[63] R. Murphey, op. cit., Table 1, p. 24.


AREAL ASSOCIATION OF RAIL NETWORK
AND TREATY PORTS & MAJOR FOREIGN
TRADE CENTERS IN CHINA
C. CHOW

Map 7

TABLE 11

EXPORTS OF CHINA BY ECONOMIC CLASSES (In Percentage)

1913-1936

Class	1913	1916	1920	1925	1928	1931	1936
Living Animals	1.7	1.1	1.0	0.5	0.4	0.7	*
Beverage & Foodstuff	17.4	16.9	20.6	13.9	15.7	15.0	24.7
Unmanufactures	4.1	2.4	8.9	4.5	5.1	4.3	**
Manufactures	13.3	14.5	11.7	9.4	10.6	10.7	**
Raw Materials	29.1	24.7	23.9	31.3	35.4	37.7	35.8
Semi-manufactures	38.7	43.2	37.5	38.9	34.8	32.5	23.2
Manufactures	12.2	11.0	14.6	13.8	13.3	13.6	16.3
Miscellaneous	0.9	3.1	2.4	1.6	0.4	0.5	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Already included in other groups.
**Not separated.

Source: Chinese Customs Reports (Shanghai: Commerce Press, 1937).

TABLE 12

EXPORTS (NET) OF CHINA IN PERCENTAGE, 1913-1936

Year	Total Value (in 1,000 H.K.T.)	%	Silk and Silk Goods	Tea	Beans and Bean Cake	Seeds and Oil
1913	403,306	100.00	25.3	8.4	12.0	7.8
1916	481,797	100.00	22.3	9.0	9.3	8.4
1920	541,631	100.00	18.6	1.6	13.0	9.1
1925	776,353	100.00	22.5	2.9	15.9	7.9
1928	991,355	100.00	18.4	3.7	20.5	5.8
1931	909,476	100.00	13.3	3.6	21.4	8.4
1936	452,979	100.00	7.8	4.3	1.3	18.7

Year	Egg and Egg Products	Hides, Leather and Skins	Ores and Metals	Coal	Cotton and Yarn Goods	Cotton Raw	All Others
1913	1.4	6.0	2.3	1.6	0.6	4.0	29.6
1916	2.6	6.0	6.3	1.2	0.8	3.6	30.5
1920	4.0	4.3	3.2	2.3	1.4	1.7	40.8
1925	4.3	4.0	2.9	2.6	2.0	3.8	31.2
1928	4.4	5.4	2.1	2.9	3.8	3.4	29.6
1931	4.1	4.1	1.6	3.0	4.9	2.9	32.7
1936	5.9	5.7	7.7	1.6	3.0	4.0	40.0

Source: Chinese Customs Reports (Shanghai: Commerce Press, 1937).

TABLE 13

PERCENTAGE DISTRIBUTION OF CHINA'S TRADE, 1868-1913

Country	Imports from					Exports to				
	1868	1888	1896	1906	1913	1868	1888	1896	1906	1913
Gt. Britain, British Dominion, etc (except Hongkong)	33.4	24.0	21.1	18.4	16.5	61.8	18.1	8.6	5.6	4.1
Hongkong	37.6	7.9	13.7	9.7	10.2	5.5	6.6	4.1	2.7	3.7
Japan*	21.4	55.1	43.2	33.8	29.3	13.0	36.3	41.2	35.0	29.0
U.S.A.	3.6	4.6	8.2	14.3	20.4	1.3	3.9	8.7	14.1	16.2
Russia	1.1	2.5	5.6	10.4	6.0	9.5	9.7	8.5	10.9	9.3
France**	0.1	0.4	1.1	0.1	3.8	1.2	7.9	11.4	7.9	11.1
Germany**	--	--	--	1.0	0.9	--	--	--	10.7	10.1
Other Countries	--	--	--	4.0	4.8	--	--	--	2.4	4.2
Total	2.8	5.5	7.1	8.3	8.1	7.7	17.5	12.3	10.7	12.2
	100	100	100	100	100	100	100	100	100	100

*Including Taiwan after 1895.
**Figure before 1906 included in "Other Countries."

Source: Yu-kwei Cheng, Foreign Trade and Industrial Development in China (Washington, D.C.: The University Press of Washington, D.C., 1956).

outlets which were either river ports or seaports (Table 14). A second difference was that colonial lines all used treaty ports as railway terminals (Table 15). This was not the case of the foreign trade lines built by the Chinese. In pre-Communist China, foreign trade routes emphasized coastward movements from the central and southwest regions (Table 16). The Communists reversed this pattern, placing stress on movements in the direction of Outer Mongolia, North Korea, and the Soviet Union. With the blockade of the Taiwan strait, seaports along the northern coast lost their function of foreign trade. Accordingly, Chankiang,[64] a new port on Neichow Peninsula and Canton on the Si Delta became the major outlets for foreign trade. The Communist railway network connected Chankiang and Peking. Indeed, Chankiang became a new international market center for China.[65]

Chinese foreign trade during the hundred years prior to 1966 can be divided into three distinct periods.[66] The first period, lasting until 1936, included the opening of China to world trade as a consequence of the Opium

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[64]Former name was Tsamkong.

[65]Jen Yu-ti, op. cit., pp. 157-158.

[66]Cheng Yu-kwei, Foreign Trade and Industrial Development of China (Washington, D.C.: The University Press of Washington, D.C., 1956), p. 208.

TABLE 14

REGIONAL DISTRIBUTION OF TRADE PORTS IN CHINA (1842-1913)

Location	1842	1858-1880	1881-1900	1901-1913	Total
Central and South China Seaports	Shanghai, Canton, Amoy, Foochow, Ningo	Swatow, Kiungchow, Lappa, Pakhoi, Wenchow	Hangchow, Kowloon, Santuo, Wuchow*, Samshui*	Kongmoon	16
North China Seaports		Tientsin, Chefoo	Kiachow, Chinwangtao		4
Yangtze River Ports		Hankow, Nanking, Chinkiang, Ichang, Kiukiang, Wuhu	Chungkiang, Shasi, Soochow, Yochow	Changsha	11
Southwestern China Inland Ports			Mengtsz, Szemao, Tengyueh, Yatung** Lungchow, Nanning,		6
Manchurian Ports		Newchwang	Suifenho	Darien, Antung, Harbin, Aigun, Hunchun, Lung-chingtsun, Manchouli, Sansing, Tatungkow	
Total in Number	5	14	18	11	48

*South China river ports. **Closed in 1912.

Source: Yu-kwei Cheng, Foreign Trade and Industrial Development in China (Washington, D.C.: The University Press of Washington, D.C., 1956).

TABLE 15

PERCENTAGE OF CHINESE TRADE BY MAJOR PORT, 1870-1913

Year	Shanghai	Canton	Tientsin	Hankow	Darien	All Others	%	Value in HKT 1,000
1870	63.6	13.4	1.5	1.7	--	19.8	100.00	118,988
1875	55.2	11.6	2.9	4.2	--	26.1	100.00	138,907
1880	57.8	9.9	3.4	4.8	--	24.1	100.00	159,523
1885	56.4	10.5	3.3	4.9	--	24.9	100.00	154,413
1890	45.9	12.0	3.0	2.7	--	36.4	100.0	215,903
1895	52.0	10.6	4.4	1.7	--	31.3	100.0	323,240
1900	53.6	8.5	1.3	1.8	--	34.8	100.0	381,126
1905	53.2	9.2	6.1	5.2	1.8	24.5	100.0	689,083
1910	43.6	10.1	4.5	4.3	4.5	33.0	100.0	857,387
1913	42.6	8.9	6.0	5.2	5.9	31.4	100.0	898,596

Source: Chinese Customs Reports (Shanghai: Commerce Press, 1937). Total value includes gross imports and exports.

TABLE 16

FOREIGN TRADE BY REGION (1911-1913) AVERAGE

(Value in H.K.T. 1,000)

Type of Trade	Central China		South China	
	Value	%	Value	%
Imports	260,631	50.3	136,776	26.4
Exports	186,249	48.5	106,497	27.8
Total	446,880	49.5	243,273	27.0
Trade Balance	+74,382		-30,279	

	North China		Manchuria	
	Value	%	Value	%
Imports	61,339	11.8	59,446	11.5
Exports	26,017	6.8	64,943	16.9
Total	87,356	9.7	124,389	13.8
Trade Balance	-35,322		+5,497	

Source: Chinese Customs Reports (Shanghai: Commerce Press, 1937).

War[67] and other international conflicts.[68] This was a period of passive development under the dominance of foreign economic and political influences brought about by unequal treaties. Notwithstanding intermittent and short-lived external hostilities and internal strife, the period was relatively peaceful and orderly in comparison to the one that followed (Table 17).

Prior to the Sino-Japanese War of 1933, China's economic structure was characterized by several peculiarities. Institutionally, it was a free economy providing open markets for both domestic and foreign traders. Socially, the bourgeoisie dominated the economic society.[69] Of the various components of the national income, agriculture led all others overwhelmingly. Thus, prewar China had a free, elite-dominated agrarian economy.[70] Modern industry in China began only after the mid-nineteenth century. In the first stage, the state played an important role in the construction of modern factories and the development of railway transportation. Modern private industry began with the birth of the Republic in

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[67]John King Fairbank, Trade and Diplomacy on the China Coast (Cambridge: Harvard Univ. Press, 1964), pp. 74-84.

[68]Ibid., pp. 84-104.

[69]John King Fairbank, China, the People's Middle Kingdom and the U.S.A. (Cambridge: Harvard Univ. Press, 1967), p. 36.

[70]M. Loewe, op. cit., pp. 186-211.

TABLE 17

VALUES AND INDEX NUMBERS (1913 = 100) OF

FOREIGN TRADE OF CHINA, 1864-1936

Year	Net Exports	Net Imports	Total	Trade Balance	Indices of Total Trade
1864	48,655	46,210	94,865	+2,445	9.7
1865	54,103	55,715	109,818	-1,612	11.3
1866	50,596	67,174	117,770	-16,578	12.1
1867	52,158	62,459	114,617	-10,301	11.8
1868	61,826	63,282	125,108	-1,456	12.9
1869	60,139	67,109	127,248	-6,970	13.1
1870	55,295	63,693	118,988	-8,398	12.2
1871	66,853	70,103	136,956	-3,250	14.1
1872	75,288	67,317	142,605	+7,971	14.6
1873	69,451	66,637	136,088	+2,814	14.0
1874	66,731	64,361	131,074	+2,352	13.5
1875	68,913	67,803	136,716	+1,110	14.0
1876	80,851	70,270	151,121	+10,581	15.5
1877	67,445	73,234	140,679	-5,789	14.5
1878	67,172	70,804	139,976	-3,632	14.2
1879	72,281	82,227	154,508	-9,946	15.9
1880	77,884	79,293	157,177	-1,409	16.1
1881	71,453	91,911	163,364	-20,458	16.8
1882	67,337	77,715	145,052	-10,378	14.9
1883	70,198	73,568	143,766	-3,370	14.8
1884	67,148	72,761	139,909	-5,613	14.4
1885	65,066	88,200	153,206	-23,194	15.7
1886	77,207	87,479	164,686	-10,272	16.9
1887	85,860	102,264	188,124	-16,404	19.3
1888	92,401	124,783	217,184	-32,382	22.3
1889	96,948	110,884	207,832	-13,936	21.3
1890	87,144	127,093	214,237	-39,949	22.0
1891	100,948	134,004	234,952	-33,056	24.1
1892	102,584	135,101	237,685	-32,517	24.4
1893	116,632	151,363	267,995	-34,731	27.5
1894	128,105	162,103	290,208	-33,998	29.8
1895	143,293	171,697	314,990	-28,404	32.4
1897	163,501	202,829	366,330	-39,328	37.6
1898	159,037	209,579	368,616	-50,542	37.9
1899	195,785	264,748	460,533	-68,963	47.3
1900	158,997	211,070	370,067	-52,073	38.0

TABLE 17 (continued)

Year	Net Exports	Net Imports	Total	Trade Balance	Indices of Total Trade
1901	169,657	268,303	437,960	-98,646	45.0
1902	214,182	315,364	529,546	-101,182	54.4
1903	214,352	326,739	541,091	-112,387	55.6
1904	239,487	344,061	583,548	-104,574	59.9
1905	227,888	447,101	674,989	-219,213	69.3
1906	236,457	410,270	646,727	-173,813	66.4
1907	264,381	416,401	680,782	-152,020	69.9
1908	276,660	394,505	671,165	-117,845	68.9
1909	338,993	418,158	757,151	-79,165	77.8
1910	380,833	462,965	843,798	-82,132	86.7
1911	377,338	471,504	848,842	-94,166	87.2
1912	370,520	473,097	843,617	-102,577	86.7
1913	403,306	570,163	973,469	-166,857	100.0
1914	256,227	569,241	925,468	-213,014	95.1
1915	418,861	454,476	873,337	-35,615	89.7
1916	481,797	516,407	998,204	-34,610	102.5
1917	462,932	549,519	1,012,451	-86,587	104.0
1918	485,883	554,893	1,040,776	-69,010	106.9
1919	630,809	646,998	1,277,807	-16,189	131.3
1920	541,631	762,250	1,303,881	-220,619	133.9
1921	601,256	906,122	1,507,378	-304,866	154.8
1922	654,892	945,050	1,599,942	-290,158	164.4
1923	752,917	923,403	1,676,320	-170,486	172.2
1924	771,784	1,018,211	1,789,995	-246,427	183.9
1925	776,353	947,865	1,724,218	-171,512	177.1
1926	864,295	1,124,221	1,988,516	-259,516	204.2
1927	918,620	1,012,932	1,931,552	-94,312	198.4
1928	991,355	1,195,969	2,187,324	-204,614	224.6
1929	1,015,687	1,265,779	2,281,466	-250,092	234.4
1930	894,844	1,309,756	2,204,600	-414,912	226.5
1931	909,476	1,433,489	2,342,965	-524,013	240.7
1932	492,641	1,049,247	1,541,888	-556,606	158.4
1933	392,701	863,650	1,256,351	-470,949	129.1
1934	343,527	660,889	1,004,416	-317,362	103.2
1935	369,582	589,994	959,576	-220,412	98.6
1936	452,979	604,329	1,057,308	-151,350	108.6

Source: "Indices of Quantity" and "Indices of Terms of Trade" are quoted from Nankai Index Number, 1936, published by Nankai Institute of Economics, Tientsin, China, 1937, pp. 37-38. The other figures are calculations based upon Chinese Customs trade returns. Figures after June, 1932, do not include Manchurian trade returns.

1911. In the period from 1910 to 1937, under pressures from foreign powers, China had an open market which lacked any protection for local industries. Consequently, foreign capital occupied a predominant place. No manufactured products were exported. Mineral and unprocessed agricultural products dominated the "outbound" railway transport. Shanghai, outlet for the Yangtze Valley, and Tientsin, outlet of the North China Plain and Manchuria, became the great railway terminals of the period of foreign concessions.[71]

The second period was composed of eight years of nationwide resistance against Japanese aggression beginning in July, 1937. This period was the forerunner of World War II. Three years of postwar hyperinflation and intensified civil war followed.

Though short in duration and marked by chaos and frustration, this period justifies detailed study, for it represents the negation of the passive, submissive, and uncontrollable development under foreign domination of the preceding period.[72] During these years, China, unhampered by foreign treaties, charted her own course

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[71]Rhoads Murphey, Shanghai, Key to Modern China (Cambridge: Harvard University Press, 1953), pp. 1-8.

[72]Cheng Yu-kwei, op. cit., pp. 217-230.

for railway development and enjoyed autonomy over her trade.[73]

In the years following 1949, the orientation of Chinese foreign trade underwent several changes which identify it as the third period. Communist victories were followed by a major change in the destination of commerce towards other Communist lands (Table 18); ideological preferences were reinforced by the Western embargo imposed at the time of the Korean War.[74] Not only the direction, but also the organization, of China's foreign trading system was altered to accommodate an ideological change. In many cases, this represented a continuing development of trends that were already apparent prior to 1949, in fact even before 1937.[75] In quantitative terms, foreign trade has always been a marginal activity in the economy. For example, the country's total foreign trade was estimated in 1965 to be less than $3,900 million.[76] The importance of China's international trade continually has been out of proportion to the size of the

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[73] Ibid., p. 217.

[74] Richard S. Thoman and Edgar C. Conkling, Geography of International Trade (Englewood Cliffs: Prentice-Hall, 1967), p. 73.

[75] Ibid., pp. 1-6.

[76] A. Donnithorne, op. cit., p. 318.

TABLE 18

DIRECTION OF MAINLAND CHINA'S TOTAL TRADE, 1950-1960

Year	Soviet Union		Other Bloc		Total Bloc		Total Nonbloc	
	Official	Derived	Official	Derived	Official	Derived	Official	Derived
1950	(23.4)		(2.6)		26.0		74.0	
1951	(38.5)		(22.5)		61.0		39.0	
1952	51.5		20.5		72.0		28.0	
1953	56.0	51.5	19.0	18.0	75.0	69.5	25.0	30.5
1954	58.0	52.8	22.0	21.5	80.0	74.3	20.0	25.7
1955	57.0	50.5	25.0	21.4	82.0	71.9	18.0	28.1
1956	53.7	47.4	21.3	19.7	75.0	67.1	25.0	32.9
1957	(41.0)	41.4	(24.1)	22.5	64.1	63.9	35.9	36.1
1958	(40.0)	39.1	(24.2)	22.6	64.2	61.7	35.8	38.3
1959		48.1		20.9		69.0		31.0
1960		43.0		22.7		65.7		34.3

Sources: The "derived" estimates were compiled by the author and are based on the trade returns of China's trading partners and converted into U.S. dollars. The "official" percentages are based on Chinese Communist data culled from the following: Jen-min Jih-pao (People's Daily), July 7, 1953; February 19, 1954; April 29, 1954; also M.I. Sladkovskii, Ocherki Ekonomicheskih Otnoshenii SSSRs Kitaem (Moscow, 1957); Institut fuer Asienkunde, Hamburg, Die Wirtschaftliche Verflechtung der Volksrepublic China mit der Sowjetunion, Frankfurt am Main and Berlin, 1959; A. Eckstein, "Moscow-Peking Axis, the Economic Pattern," Moscow-Peking Axis (New York, 1957); U.S. Department of State, Communist China's Trade with Non-Bloc Countries in 1958 (Washington, D.C., November, 1959), Table 3, p. 3.

Chinese population. This was already true before the Second World War when foreign trade forced a link with the modern world economy and served as a channel for introducing new ideas and methods into China which was much more significant than were the goods traded. A change in the post-1949 composition of the country's trade with respect to its imports is to be noted. The chief feature of the import trade in the regime's first decade was the predominance of capital goods. In the years 1952 to 1958, capital goods accounted for over 90 percent of the value of total imports.

Changes in the composition of exports have also been considerable. Between 1950 and 1957, the proportion of industrial and mining products rose relative to unprocessed goods. It appears now that agriculture difficulties after the "great leap" led to a reduction in farm produce available for export. In the mid-1960's, raw materials--agricultural and industrial--still dominated China's export trade.[77] Interestingly, the main agricultural exports, such as poultry and pork products, were commodities produced largely upon peasants' private plots.

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[77]Chinese exports in 1965 by U.S. dollars (million): Textiles 530, industrial materials 400, agricultural products other than foodstuffs 290, foodstuffs other than grain 230, meat products 150. Current Scene, Vol. IV, No.4 (February 15, 1966), p. 11.

Before 1911 foreign trade was important to the Chinese government as a primary source of simple revenue rather than for wider economic benefit. Indeed, there was no demand in China for most foreign goods although by this time there were many commodities in which Western techniques had surpassed those of China. Today the situation in this respect is radically different. Demand for foreign goods far exceeds the country's means of payment, and foreign exchange has to be allocated only for the most essential purposes. The government, therefore, has had to take a more positive approach to foreign trade than that of the officials of the Ch'ing empires. The direction of railway construction for the purpose of foreign trade has shifted from the late Ch'ing Dynasty (with the exception of the Litang-Chanchiang Railway) which focused on seaports. The other railroads in southwestern, northwestern, and northeastern China emphasized linkages towards internal overland routes.

Domestic Economy as a Factor in the Development of China's Railway Pattern

During the century since 1866, many railways were built in China for political and military reasons. However, some lines were built primarily for economic purposes. The economically oriented railroads also influenced the structure of China's railway pattern. The spatial

economy existing in China attracted construction of railways in a general sense as it has elsewhere in the world. Nevertheless, the total spatial pattern is not justifiable on economic grounds.

Unfortunately, the volume of traffic and value of commodities carried by the railways were not economical when compared with the costs of railway operation and construction in China.

The spatial economy in China can be divided into agricultural, mineral, industrial, and transportation network sectors.

Agriculture

In general terms, China's food crops are grown in three regions:[78]

1. The paddy-rice, coarse grain, and winter wheat sub-regions of southern China.

Embracing the areas south of the Chinling Mountains and the Huai River, this region is favored with heavy precipitation, high summer temperatures, and a long growing season. Here paddy rice occupies an extremely important place, claiming over 90 percent of the country's land under this crop. Not only are the plains dotted with rice fields, the gradual slopes in the hilly areas

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[78]Jen Yu-ti, op. cit., p. 49.

are also widely terraced to grow rice. The Middle and Lower Yangtze Plain, the Szechuan Basin, and the Canton Delta are all great rice producers.

Coarse grains, too, are extensively cultivated in this region. These grains fall largely into two categories: (1) autumn crops like maize and sweet potatoes, which are raised in mountain areas unsuited to paddy rice; and (2) winter crops such as broad peas and beans, which are sown in the rice or cotton fields after harvesting. As winters in this region are relatively cold and dry, winter wheat is grown in large areas in the Yangtze Valley.

2. The winter wheat and coarse grain region of the Yellow River valley.

Covering the area north of the Chinling Mountains and the Huai River and south of the Great Wall, this region is primarily a winter wheat and coarse grain belt and embraces over 57 percent of the country's total wheat area. The North China and Wei River Plains and the Fen River Valley are the nation's biggest producers of winter wheat. Maize, millet, and kaoliang are grown throughout the region. Sweet potatoes are grown mainly in the North China Plain where summer temperatures are high. Irish potatoes dominate the agricultural production on the northern parts of Hopei and Shansi where summers are comparatively cool.

3. The coarse grain and spring wheat regions of northern China.

The important crops of this region, which includes the areas north of the Great Wall and the Chinghai-Tibet Plateau, are made up of the lesser staples. Here, wide tracts of land are planted in maize, kaoliang, millet, and Irish potatoes. Northern China is the country's main producer of spring wheat, although the winter wheat area is being steadily expanded. In the 1960's, northern Sinkiang, the Ningsia Plain, and the Kansu Corridor grew more winter wheat than ever before.

Apart from the three main food crop regions, the coarse grain belt of the Chinghai-Tibet Plateau, with highland barley as its main product, is worthy of mention. In Chinghai spring wheat is cultivated over a large area.

Cotton leads the list of China's industrial crops. Although it is grown in practically every part of the country, the three main cotton regions are in the Yellow River Basin, the Yangtze Valley, and in northwest China. Tung oil ranks second to cotton in industrial importance. Tung oil is produced in southwest China, particularly on the Yunnan-Kweichow Plateau. Northwestern China dominates the country's livestock raising. Szechwan is noted for its poultry production.

Several railways pass through these regions, but the freight traffic is very low in volume.[79] Surpluses

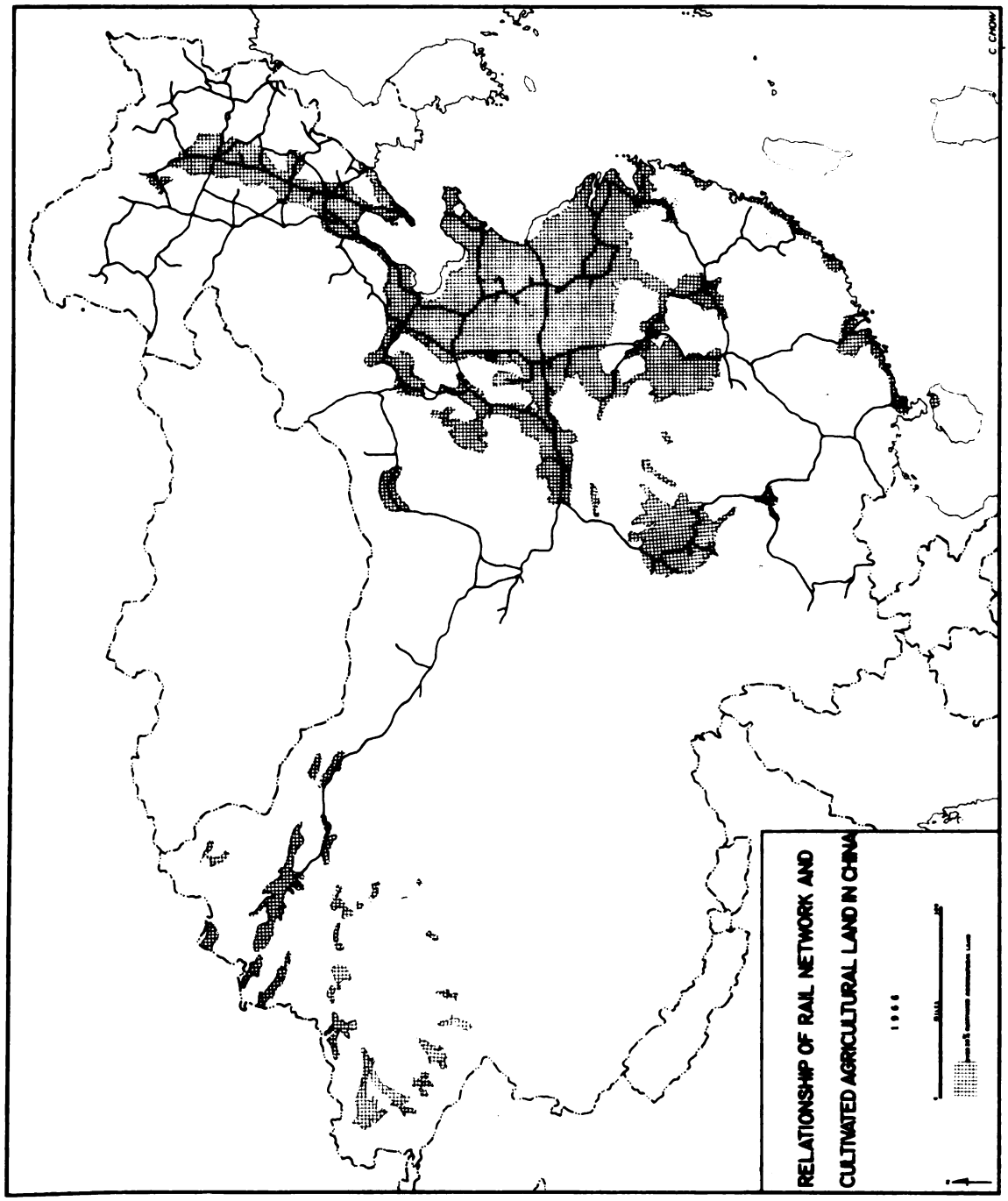
[79] Information from: Ministry of Communications, Chinese National Railway Statistics (Nanking, 1936).

are generally small. The Szechwan Basin continues to lack a rail connection to the eastern coast. Railways did not adequately serve the four main routes of agricultural movement to regional and national markets during the periods studied (Map 8). These included rice and wheat from Hupeh, Hunan, Kiangsi, and Anhwei Provinces to the coast; tung oil, eggs, silk, and hides from Szechwan to the coast; hides, skins, and wool from the northwest to north China ports. Where rail lines happened to cross these areas, they tended to carry only small amounts of these goods.

Mineral Resources

China has considerable wealth in mineral resources which are distributed in large and small deposits throughout the country. It has been established that China has large deposits of iron ore, coal, copper, aluminum, tungsten, tin, molybdenum, manganese, lead, zinc, and mercury. Iron ore deposits are widely distributed with the largest deposits centered around Anshan in Manchuria, Tayeh in Hupeh, Paotow in Inner Mongolia, and Lungyen in Fukien mines.

China's manganese is derived from sedimentary ores along the sea coast, on lake floors, or in swamps of ancient origins. Large manganese deposits are found in Liaoning, Hunan, and Kwangsi.


RELATIONSHIP OF RAIL NETWORK AND
CULTIVATED AGRICULTURAL LAND IN CHINA
C. CHOW

Map 8

Nonferrous metals--copper, aluminum, tungsten, tin, molybdenum, lead, zinc, and mercury--are widely distributed. Huge amounts of these minerals have been discovered in the Tienshan, Chilien, and Chinling Mountains and in areas south of the Chinling Mountains and the Yangtze River. The Nanling Mountain region is particularly rich with a variety of minerals.

Of the nonmetallic minerals, oil-shales were recently discovered in Fushan and Fuhsin in Liaoning Province, Kailan in Hopei Province, and Huainan in Anhwei Province. Various other nonmetallic minerals used in the building, chemical, and other industrial areas are also plentiful. Such fire-resistant minerals as refactory clay, quartz, and dolomite are widely available. Almost all of China's iron and steel enterprises can obtain necessary fire-resistant minerals from neighboring areas. There is an abundance of phosphorus, sulphur, salt, gypsum, and other chemical materials. Phosphorus is found chiefly at Omei in Szechuan Province, at Kaiyang in Kweichow Province, at Fengtai in Anhwei Province, at Lienyunkang in Kiangsu Province, at Maanshan in Anhwei Province, and at Yingteh in Kwantung Province. The coastal areas produce sea salt and the inland lakes in northern China contain huge quantities of lake salt, gypsum, sodium sulphate, and natural soda.

More railways were built for the transport of minerals than were built for agricultural reasons (Map 9). The railways built during the Imperial Era were mainly in Manchuria, Hupeh (central China), and Hunan and Kiangsi in the Lake Region. The railways built during the Republic Era were generally found in Kwangsi, Yunnan (southwest), Shansi, and Shensi (Loess Highlands). The railways built during the Communist Era were mainly in Sinkiang, Kansu (northwest), Ningsha, Suiyuan, and Chahar (Inner Mongolia) Provinces. Essentially, these lines were built in order to connect the river ports, seaports, industrial centers, and mining centers.

Industry

Industrial development in China closely paralleled the development of railways (Map 10). The shift in railway connection from the eastern regions to the interior areas of the west was, in part, a direct response to the industrialization in China.[80]

Pre-Communist China concentrated almost all of its industrialization in the eastern part of the country. Nearly all the iron and steel enterprises were established in the cities of Anshan, Penki, Dairen, Tientsin, and Shanghai--all within thirty miles of the sea. Since 1949,

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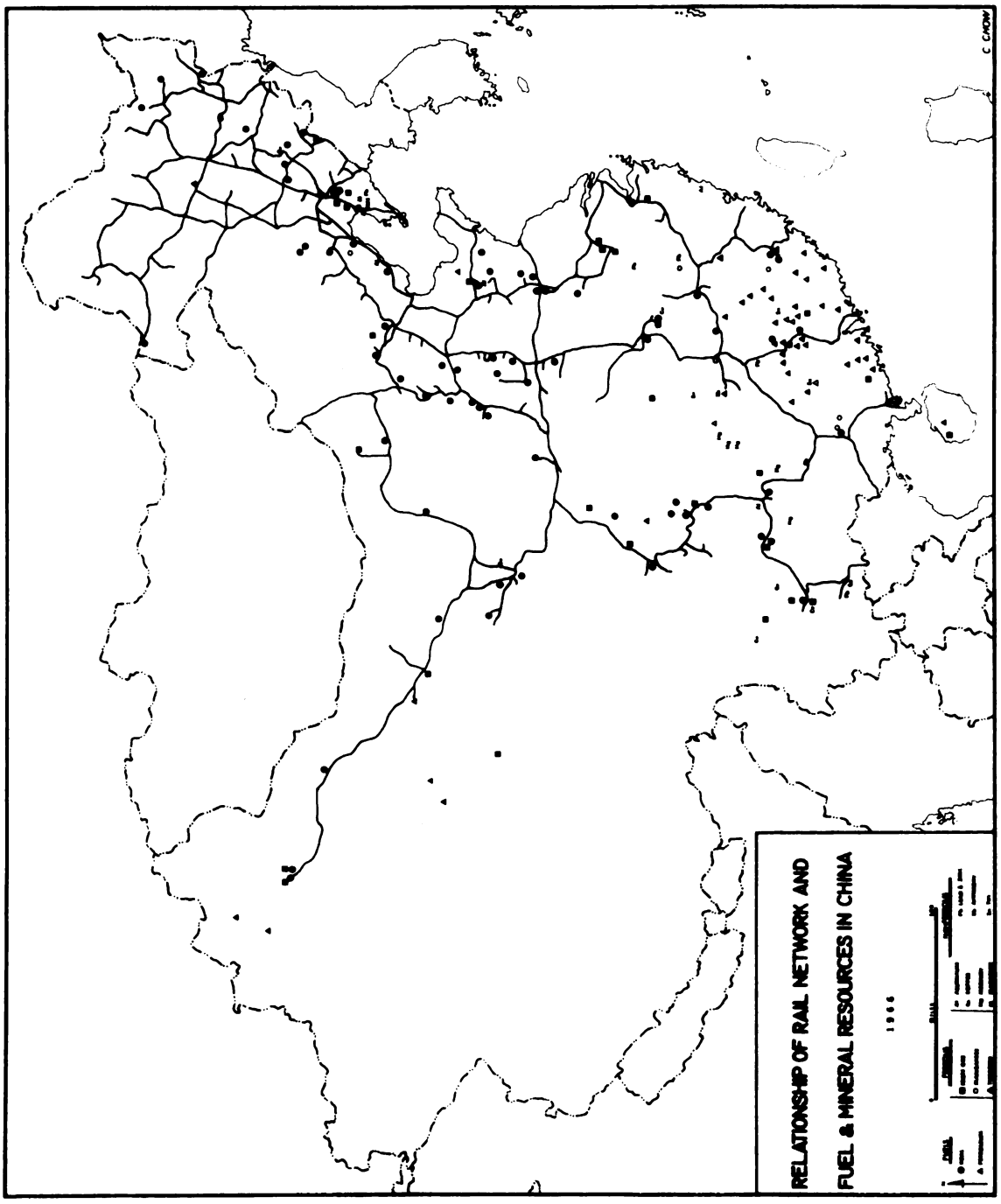
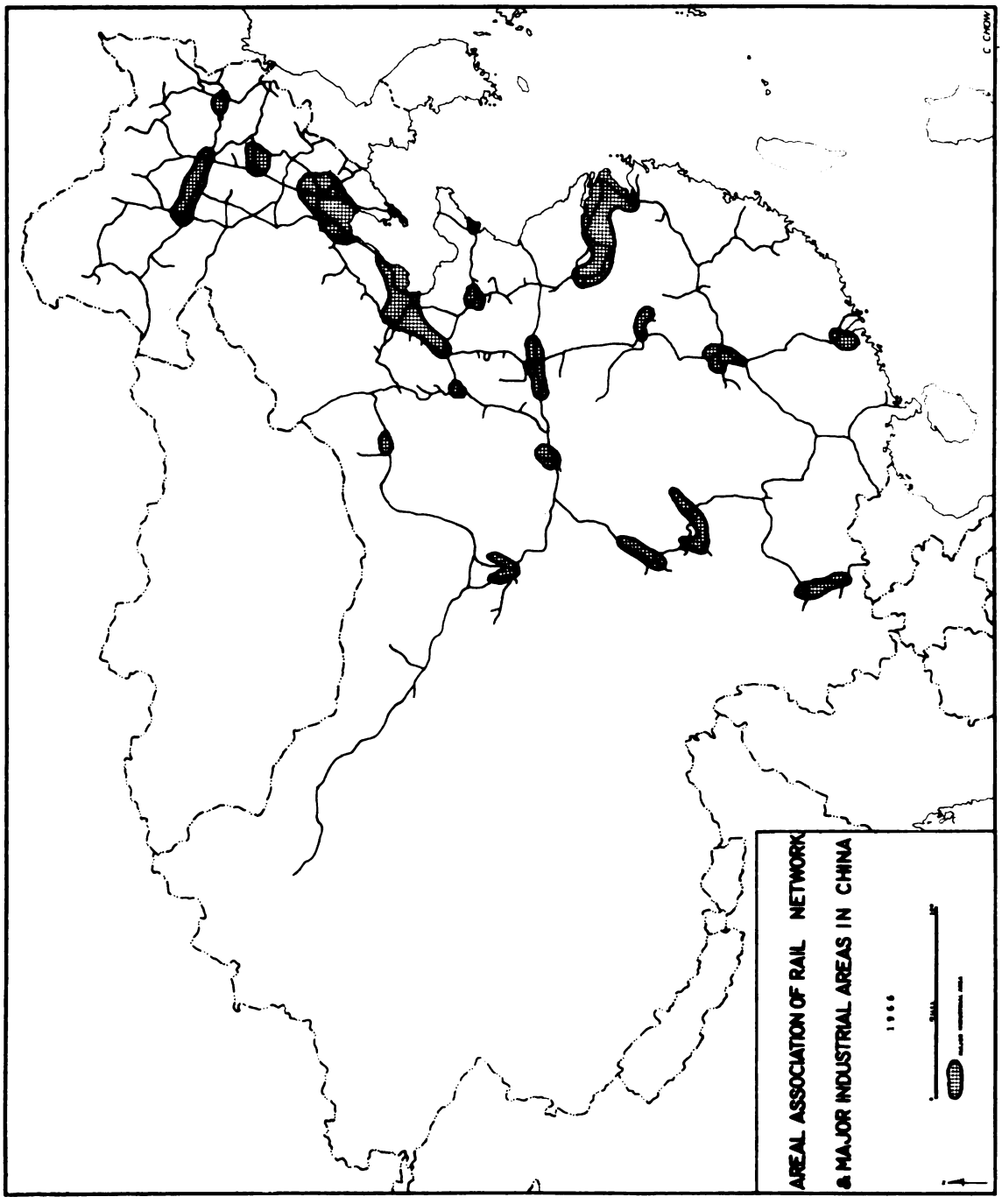
[80] E-tu Zen Sun, op. cit., p. 180.


RELATIONSHIP OF RAIL NETWORK AND
FUEL & MINERAL RESOURCES IN CHINA
C. CHOW

Map 9


AREAL ASSOCIATION OF RAIL NETWORK
& MAJOR INDUSTRIAL AREAS IN CHINA
C. CHOW

Map 10

large-scale industrial construction has been developed in the interior regions.[81] At the same time, the existing enterprises and favorable conditions in the coastal regions have been used to achieve the industrial build-up in the interior and to quicken the pace of the national industrialization. Many large enterprises which serve as the backbone of economic construction have been developed. There are also a large number of small and medium-sized establishments in the smaller towns, cities, and mining districts. All this has brought about a conspicuous change in the distribution of China's industry as well as her railways.[82]

Phenomenal progress has been made in developing heavy industry under the Communist regime. In addition to the three major iron and steel plants of Anshan, Wuhan, and Paotow, modern steel and iron plants of varying sizes have been built in the provinces of Hunan, Chekiang, Kwangtung, Kiangsu, Kweichow, and Kirin. A small modern iron-smelting plant has also been constructed in Lhasa, Tibet, which before 1949 knew no modern industry whatever.[83]

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[81]Chang Kuei-sheng, "Geographical Bases for Industrial Development in Northwestern China," Economic Geography, XXXIX (1963), 342.

[82]Yuan-li Wu, The Spatial Economy of Communist China, a Study on Industrial Location and Transportation (New York: Praeger, 1967), pp. 56-60.

[83]Theodore Shabad, China's Changing Map (New York: Praeger, 1956), pp. 49-70.

Pre-Communist machinery plants engaged mainly in repair work and the assemblage of machine parts imported from foreign countries. A few factories were adept at creating products very similar to the small and simple machines provided by foreign entrepreneurs. Today, China is turning out machines and heavy equipment of many kinds, including heavy precision apparatus. Many manufactured items which were inconceivable in the past are now produced on an assembly-line basis. The engineering industries of Shanghai, Shenyang, and Tientsin have many specialized branches. The hinterland cities of Harbin, Taiyuan, Loyang, Wuhan, Chungking, Kunming, and Sian are now important producers too. Since 1958, medium-sized and small engineering works, machine repair, and assembly plants have been built in the various special administrative regions at the sub-provincial and county level.[84] Many "people's" communes have also established small factories for making and repairing farm tools.[85]

China has paid particular attention to developing its chemical industry, which not only serves various

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[84]Choh-ming Li, "China's Industrial Development, 1958-1963," Industrial Development in Communist China, ed. Choh-ming Li (New York: Praeger, 1964), pp. 16-17.

[85]Leslie T. C. Kuo, "Agricultural Mechanization in Communist China," Industrial Development in Communist China, ed. Choh-ming Li (New York: Praeger, 1964), pp. 135-136.

branches of its national economy and national defense, but also makes the multi-purpose use of its rich resources possible. In this industry rapid advancement has been made in the manufacture of both consumer and producer goods, particularly chemical fertilizers. The existing chemical works in Shanghai, Nanking, Tientsin, and Lushun-Dairen have been improved or expanded while new and large works have been set up in Kirin, Taiyuan, Lanchow, and other cities of the interior. Medium-sized and small chemical fertilizer plants have been established over wide areas.

In the coal industry, the principal coal fields of Fushun, Kailan, Tatung, and Huainan have been expanded. In the interior, the coal mines at Hokiang (Heilungkiang), Pingtingshan (Hunan), Tungchuan (Shensi), and Chungliang-shan (Szechuan) are recent developments. In the electric power industry, a multitude of hydro-power stations of various sizes have been built. Power transmission networks are supplying electricity to the entire provincial countryside in several areas of the country today.

China's light industry depends on farm products for over 80 percent of its raw materials.[86] To bring light industry to the raw material sources and to the largest number of consumers, it has been necessary to

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[86] Ibid., pp. 143-145.

build factories--preferably of moderate size--in the smaller cities and towns which serve wide rural areas. The role of the railroad in the choice of the sites for these various industrial activities has been critical.

Light industry suffered from a lopsided distribution before 1949. Most of the factories were concentrated in the major coastal cities far removed from the sources of raw materials and the bulk of the consumers. Shanghai, for instance, had about half of the country's cotton-milling equipment, but the locally produced cotton fell far short of Shanghai's needs. On the other hand, the main cotton province of Honan had only two small cotton mills.[87] Regions which grew such crops as sugar cane, sugar beet, tobacco, and oilseeds were also short of modern processing facilities and processing was mainly done by hand.[88]

Since 1949, the rapid development of light industry has been accompanied by a change in the balance of industrial locations. Cotton textiles, the most important branch of the consumer industry, provides an interesting example. In addition to the existing cotton mills

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[87]Yuan-li Wu, op. cit., pp. 60-65.

[88]Peter Schran, "Handicrafts in Communist China," Industrial Development in Communist China, ed. Choh-ming Li (New York: Praeger, 1964), p. 151.

cities of Tientsin, Tsingtao, and Lushun-Dairen, new mills have been built in the cotton-producing districts on the North China Plain. Additionally, many cities along the railway between Peking and Wuhan now have their own cotton mills. Cotton mills have also appeared in Sian, the center of a cotton area in the Wei Plain, and in Urumchi, Sinkiang's expanding cotton production center.[89]

Equally swift expansion has been recorded in the sugar refining, cigarette making, and animal products processing industries. Here, again, the factories have been situated near the raw material sources. In general, China's industry has changed from labor oriented to power and raw material oriented locations.

Networks

Since 1935 improvements and additions to the existing communications have given shape to the transport system in China. Although China continues to emphasize primary manufacturing, this does not alter the increasing need for railways in order to achieve the goal of industrialization. With the principal railways and the major rivers as major arteries, the network as planned was to be supplemented by highways, lesser rivers, and airlines.

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[89]Chao I-wen, New China's Industry (Peking: Tung-chi Publishing Co., 1957), pp. 34-38.

In addition, roads and canals were to be built by local administrations. The overall network plan was not successful in meeting its goals. Partial success was achieved as the railways gradually formed a network by connecting some existing trunk lines. Examples of this type of connection include the Yintang-Chuchow Railway, Tehchow-Shihchiachuang Railway, and Fengtai-Shacheng Railway in North China; the Tienshui-Lanchow Railway and Paochi-Chengtu Railway in central China; the Kantang-Wuwei Railway in Inner Mongolia. These railways are relatively short in terms of mileage, but important to the overall railway network. Since the colonial period left China an unplanned, fragmented railway pattern, it was the Nationalists and Communists' contribution to connect the segments into a useful network. The goal is worthy, but the work is difficult. The lines of connection, therefore, formed a special sub-characteristic in China's overall railway pattern closely linked to economic rather than political development.

Railways based on economic considerations are needed in China. Unfortunately, economic considerations usually were taken into consideration only after political, strategic, or other interests were served. Although the structure of the rail network has been affected by economic considerations, the number of truly economically

based links are rather difficult to isolate from the total system.

Summary

In summation, the internal structure of China's railway system is of a multi-nuclear composition. The complex structure is related to the correlation of the following factors: geography, capital, colonialism, strategy, politics, foreign trade, and domestic economy. Each of these factors appears separately or in combination in each of the fourteen periods, although a single factor seems to dominate the rail development in each of the periods explained.

While the major rivers and mountain ranges in China extend from west to east, the great bulk of China's population, markets, and production lies in the east and south. It follows that the logical direction of transport flow in China is, in broad outline, to and from the coast, and secondarily, between the northern and southern regions. As a result of terrain features the Chinese were obliged to use artificial means to change the natural patterns of movement. Railways provide faster services than do the existing inland waterways and can meet the need in areas without waterway services. Basically, the railways were built in north-south and east-west alignment. The geographic factor therefore contributed to patterning the rail network of China.

The colonial transportation system was the only railway system in nineteenth-century China. It was during this period that China's railway backbone was formed. The role of colonial railways was to connect seaports and hinterlands; to play a transitional function in transporting raw materials from the colonial holdings to the mother country.

The colonial transportation network served as the major means of land transportation for the purpose of meeting the ocean carriers at the seaports. The system did not benefit China directly because in no case did the foreign builders intend their railways to serve the economic interests of the country over which their railroads passed. The colonial pattern was not constructed to comply with China's economic circumstances and was not intended to fit China's national economy. Since colonial lines built by foreign nationals left a fragmented pattern, the Nationalists and Communists were obliged to connect the segments into a network whenever it was possible to do so.

China has a very complex land pattern and an uneven distribution of population. Therefore, some points were considered important for strategic and military reasons. Several of these locations could determine the winning or losing of a war. These locations occur

primarily at water gaps where the mountain ranges, by no means continuous, are cut by rivers. They become the paths for communication between or among different regions. Many a battlefield in Chinese history was located at such a water gap, including: Tungkuan, Yangtze Gorge (between Ichang and Chungking), Nanling Gap (Shaokuan), Tsingling Passes (Paochi, Liohyang, Kwangyuan, and Tienshui), Kalgan Pass (Chiling, Kalgan, and Tatung), Kansu Pass (Lanchow, Yungshin, Wuwei, Changyi, and Chiuchuan), and Liaosi Corridor (Shanhaikwan, Suichang, Shingcheng, and Chinchow). The efforts to connect these points for strategic reasons provided considerable impetus for developing China's railway pattern.

The political element is one of the important factors in understanding the spatial pattern of China's railways. This characteristic resulted from the two political forces: one centripetal and the other centrifugal. The centripetal force was initiated by the central government; the centrifugal force was the consequence of local and provincial government actions. For example, the local governments usually used different rail gauges from those used by the national government in order to protect themselves from invasion by government forces.

Capital was a very important factor in the formation of China's railway pattern. The directions of

railway construction were partly or entirely controlled by the lenders for their own purposes.

Foreign trade provides yet another insight for understanding China's railway pattern. Exports from China during the past century emphasized unprocessed commercial crops and crude metals. Transport routes were mainly directed towards the agricultural lowlands or from the undeveloped mountain regions. The colonial lines connected only the individual concessional hinterlands and their seaports. Foreign trade lines built by the Chinese connected the productive lands, either agricultural or mining centers, with sea outlets. These foreign trade routes changed from era to era because of various political situations affecting changes in Western agreements.

The domestic economy of China can be divided into agricultural, mineral, industrial, and transport spheres. The railway construction or pattern based upon individual regional circumstances forms part of the total railway characteristics. The food crops are mainly grown in the Yangtze Valley, Si Valley, Yellow River Delta, Fen Valley, Wei Valley, Liao Valley, and Loess Highlands. The mineral deposits are generally located in the north and the west of China. In a relative sense, there were more railways built for mineral transportation than there were for

agricultural purposes. The greatest portion of the industrial concentrations was initially in the east along the coast and only recently has changed to the western interior. During the Communist period, lines were built that emphasized the connection of manufacturing and mining centers, thus changing the overall spatial pattern of the railway network. Since 1935 improvement and additions to the existing communications have given shape to the ever-changing network. The colonial-imposed, fragmented railway pattern in China is now difficult to perceive as the Nationalists and Communists connected the industrial segments into a useful and increasingly complex spatial pattern.

CHAPTER IV

SPATIAL CHANGES IN CHINA'S RAILWAY PATTERN

The spatial pattern of railways in China provides a visual expression of the periods of railway development. A glance at the spatial aspects indicates that the railway pattern is unequally distributed throughout the country. The structure of railways has changed from period to period. Moreover, the spatial pattern has been influenced not only by economic factors. Indeed, the economic justification for the rail network is only one of many considerations.

During the Imperial Era, construction was mainly in China proper, concentrated particularly in the commercially well-developed coastal areas. It was a colonial pattern developed by half a dozen Western powers. This fragmented pattern left many segments without connection between one system and the other. During the Republic Era, government construction was localized in two areas, Manchuria and the South Yangtze Hills. Additional railway construction was scattered at random between various unconnected segments--segments which remained as a legacy of the colonial period. During the Communist Era, construction priorities were begun in

western and northern China and subsequently shifted to the eastern and southwestern regions. The characteristics of railway development were clearly expressed in the uneven spatial pattern that evolved. The spatial pattern of the fourteen periods may be analyzed individually.

The Spatial Pattern of the Imperial Era, 1866-1911

The railways in China during the Imperial Era were built by external powers in areas of the greatest economic significance to them. Often points of commercial significance to the foreigner were connected to ports which also served alien interests (Map 11, Table 19). Because of the slow growth of new industries, the railways tended to serve only the existing productivity of the areas they traversed. Many of the major lines originated with foreign demands for railway rights that reached a climax in the "battle for concessions" in 1898. The locations of these lines in China proper indicate that the principal objective in the building of these railways was the further development of trade between commercially well-developed points.[1] The two north-south trunk lines were the Peking-Hankow-Canton system and the

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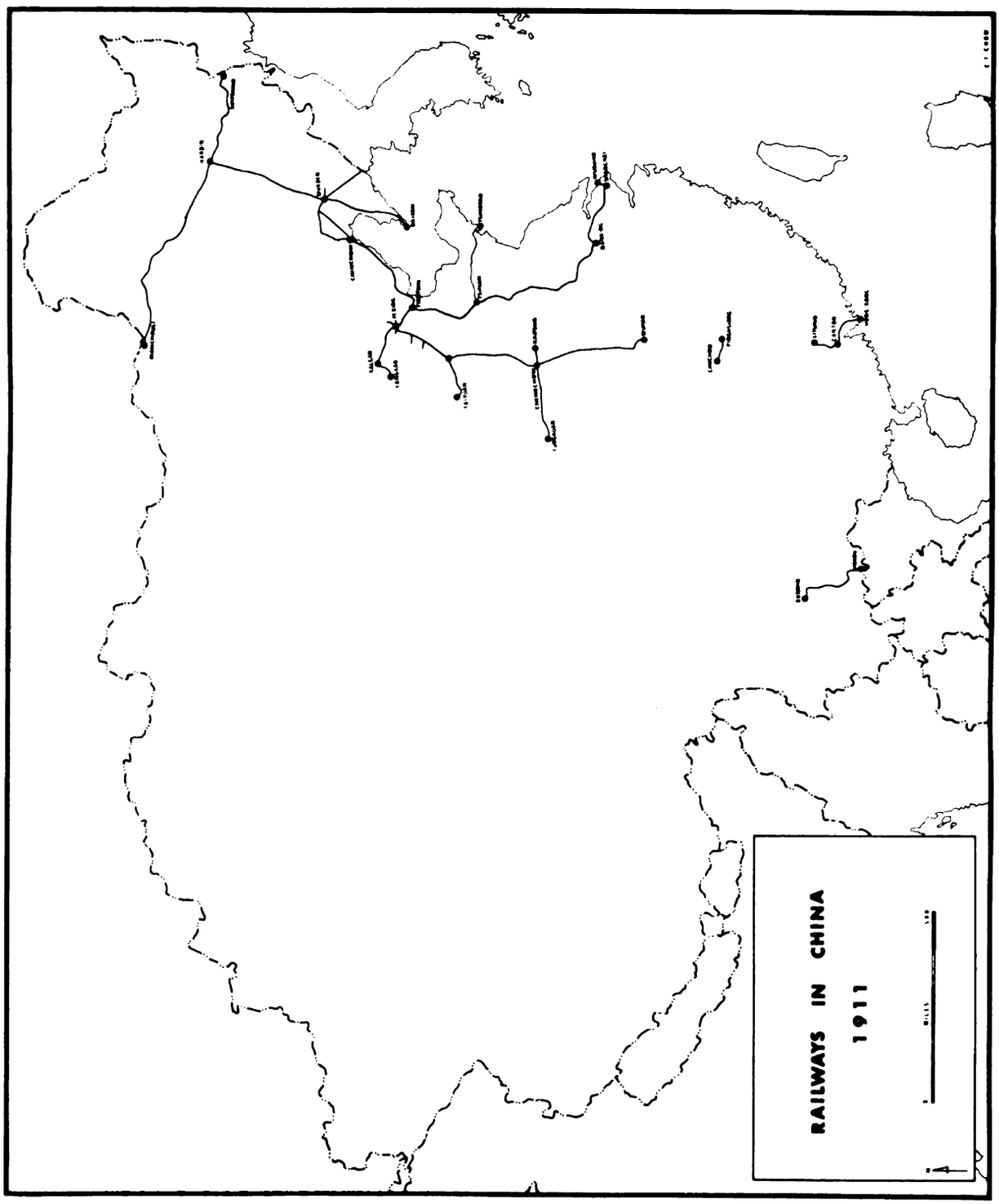
[1]E-tu Zen Sun, "The Pattern of Railway Development in China, Far Eastern Quarterly, XIV (1955), 180.



Map 11

TABLE 19

RAILWAYS IN IMPERIAL ERA, 1866-1911

Railway	Miles	Railway	Miles
Conservative Period, 1866-1894		Scramble for Concessions Period, 1895-1905	
1. Tientsin-Chuanchow	220	1. Peking-Tientsin	87
2. Kuantung	175	2. Shanhaikwan-Hsinmintun	226
3. Taiyeh	20	3. Peking-Tunghsien	14
4. Woosung-Shanghai	10	4. Koupantze-Newchwang	57
5. Tangshan-Shihkochuan	7	5. Peking-Paoting	91
6. Hsuan-wu Gate	1	6. Canton-Samshui	30
		7. Chuchow-Pingsiang	56
		8. Shanghai-Woosung	10

Railway	Miles	Railway	Miles	Railway	Miles
Self-strengthening Period, 1906-1910					
(By Chinese Private Enterprises)		(By Foreign Nationals)		(By Imperial Government)	
1. Canton-Litung	65	1. Chowtun-Tsinan	69	1. Peking-Kalgan-Yangkao	204
2. Changsha-Chuchow	32	2. Changtien-Pashan	28	2. Hsinmintun-Mukden	37
3. Shanghai-Hangchow	118	3. Chowshuitze-Port Arthur	39	3. Tientsin-Pukow	629
4. Chaochow-Swatow	26	4. Antung-Mukden	189	4. Shumchun-Canton	31
5. Nanchang-Tehan	32	5. Yunnan-Indo-China	289	5. Shanghai-Nanking	193
6. Changchow-Amoy	19	6. Canton-Kowloon	22	6. Taokow-Chinghwa	94
7. Ihsien-Chochwang	20			7. Chengting-Taiyuan	151
8. Angangki-Tsitsihar	18			8. Kaifeng-Loyang	115
9. Lokow Branch	5				

Source: Kia-ngau Chang, China's Struggle for Railroad Development (New York: The John Day Co., 1943).

Tientsin-Pukou Railway, the former linking the capital with the central and south China trading centers, and the latter running between the entrepot of Tientsin and the lower Yangtze area. Significantly enough, the Tientsin-Pukou Railway follows closely the course of the Grand Canal as rebuilt since the Yuan dynasty, thereby demonstrating the importance of connecting the rich lower Yangtze region with the metropolitan area in the north. Moreover, one of the first lines to be completed was the Shanghai-Nanking Railway, which lies within the Yangtze delta. Built with British capital and under British supervision, it was opened to traffic in 1908 and raised great hopes among its promoters of gaining quick profits. The Shanghai-Hangchow-Ningpo Railway likewise presented "sound commercial possibilities"[2] for the foreign entrepreneur.

In this connection it is interesting to project the early railways against the geographic pattern of traditional Chinese trade, and note the parallelism between the areas of trade concentration and the location of the location of the railways. The distribution of the regular customs stations prior to the advent of the railway points to the fact that the lower Yangtze and the metropolitan

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[2] Ibid., 182.

regions were areas where the greater relative volume of goods were gathered. In the mid-eighteenth century, for example, ten major stations were found in Chihli,[3] five in Kiangsu, while Chekiang, Anhui, Kiangsi, Fukien, Szechwan, Kwangtung, and Kwangsi all ranked next with two each. As late as 1887 Chihli still led with seven major stations, Kiangsu had five, while the other provinces generally retained the same number as before. After 1901 the distribution stood at six each in Chihli and Kwangtung, five each in Fukien and Hupeh, and four each in Kiangsu, Shantung, Anhui, Chekiang and Szechwan. Later, these figures were supplemented by considerations of the large volume of foreign trade at the forty-eight treaty ports that was handled by the Maritime Customs.[4] Shanghai, for example, situated on the Yangtze estuary, had become a leading commercial port in the Far East, although in terms of the traditional internal trade Kiangsu had lost its previous prominence. It may be said that there were some important railways which did not seem to fit the above spatial pattern during this era, namely the Chinese Eastern railway in Manchuria, and the

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[3]Chihli was the name of today's Hopeh Province.

[4]John King Fairbank, Trade and Diplomacy on the China Coast (Cambridge: Harvard University Press, 1964), pp. 462-468.

Yunnan-Indo-China Railway in the southwest. These lines traversed regions which were economically undeveloped at the time of their construction. Since the Manchurian line was intended by Russia as a vehicle of political as well as economic penetration of northeast China, whatever economic gains that accrued to the railway because of the development of the local resources were channelled primarily to the Russian interests. In the southwest the ultimate French objective for constructing the Yunnan-Indo-China Railway was not so much the development of Yunnan as it was the gaining of the rich potential market of Szechwan. It was planned to later connect the Yangtze valley, using a northward extension of the railway. The attraction of a traditional economic center was operating in the Yangtze Valley, albeit indirectly. In general, two spatial patterns of railway construction evolved during the Imperial Era. One pattern was constructed by the Western powers. Although most railways were of foreign construction, the Chinese did construct lines from Peking and concentrated on the North China Plain. The lines were radiating northward to southern Manchuria and southward to the Yangtze Valley. The foreign constructed lines functioned primarily to connect the seaports and their hinterlands. They radiated from the coastal lands towards internal China. Because the

railways of the Imperial Era in China were the embodiment of conflicting interests among powers, they were conspicuous by their lack of a comprehensive and well-balanced coordinated system. The railways were intended to bring raw materials from the interior to the great ports, whence they were to be sent to the factories of the foreign countries. Finished products were to be shipped in the opposite direction on the same routes. Because of the close relationship between railroads and foreign industry, the emerging pattern of railways tended to stifle rather than to develop China during this era. A more detailed analysis of the evolution of the railway pattern includes the following .

Spatial Pattern of the Conservative Period, 1866-1894

In this period of twenty-eight years China built 433 miles of railways, which included: (1) the Tientsin-Chuanchow Railway in Hopeh, (2) the Kuantung Railway between Hopeh and Liaoning, (3) the Tayeh mining line in Hupeh, (4) the Woosung-Shanghai branch line in Kiangsu, (5) the Tangshan-Shihkochuan Railway in Hopeh, and (6) the short line at the Hsuan-wu Gate of Peking City. By contrast, the Peking and Woosung-Shanghai lines were both dismantled during this period by the Chinese government for socio-political reasons.

The spatial distribution of railways during this period was concentrated in the economically advanced area between the Great Wall and the Yangtze Valley and was divided into two categories: the metropolitan regions along the eastern coast and the densely populated rural regions of the North China Plain. Just prior to 1890, the political core of this immense region in the North China Plain was Peking. The Yangtze Delta served as the location of the commercial centers along the coast. Indeed, the Yangtze Delta was the home for more than one third of the population of China. Shanghai, Tangshan, and Tientsin were all treaty ports which were developed by the colonial powers as their commercial and political bases.[5] The focus of railway construction during the Conservative Period was in Chihli (Hopeh) Province. Here, 403 miles of completed railways were located. In particular the railways were located along the coast of Po Hai from Tientsin northward to Shanhaikwan at the Great Wall.

Spatial Pattern of the "Scramble for Concessions" Period, 1895-1905

From 1895 to 1905, 2,513 miles of railway were built in China. Of this total, 1,699 miles were

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[5]P. H. Kent, Railway Enterprise in China (London: Edward Arnold, 1907), p. 3.

constructed by foreign nationals as foreign enterprises, and 814 miles by the Chinese government. This construction brought the total railway mileage in China to 2,935 miles by the end of this period. Important lines built by foreign nationals included: (1) the Chinese Eastern Railway from Manchouli to Suifenho in Manchuria, (2) the South Manchuria Railway from Harbin to Luta, both built by Russians, and (3) the German-built Kiaochow-Chowtsun Railway at Shantung Peninsula.

The lines constructed by the Chinese government, with foreign loans, included: (1) the Peking-Tientsin Railway in Hopeh Province, (2) the Shanhaikwan-Hsinmintun line in southern Manchuria, (3) the Peking-Tunghsien line near the Great Wall, (4) the Koupantze-Newchwang section of the Peking-Mukden Railway in Manchuria, (5) the Peking-Paoting line in central Hopeh Province, (6) the Canton-Samshui Railway in Kwangtung Province, (7) the Chuchow-Pingsiang Railway in Hunan Province, and (8) the rebuilding of the Shanghai-Woosung Railway in Kiangsu Province.

British efforts at railway construction were locationally concentrated in the Yangtze Valley. In addition, the British showed interest in the region of the South Yangtze Hills opposite Hong Kong, and also in the southwestern region bordering on Burma and India.[6]

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[6]E-tu Zen Sun, Chinese Railways and British Interests 1898-1911 (New York: King's Crown Press, 1954), pp. 1-8.

Russian interests in railway building were restricted to the North China Plain. The French were interested in South China near the Gulf of Kwangchow. The Japanese were interested in Southern Manchuria, the Shantung Peninsula, and the South Yangtze Hills off the Taiwan Strait. The Americans were interested in northern Manchuria for the purpose of making connection with the Trans-Siberian Railway to Europe. Railways constructed by the Belgians were located in central China and on the Loess Highlands. During the period of concessions, railway construction focused on Manchuria, the eastern coastal region, the Yangtze Valley and the Si Delta. These four regions were considered to be the developed regions in China, in that they included most of China's agricultural and mining products and contained her commercial centers.

Spatial Pattern of the "Self-strengthening" Period, 1906-1910

At the close of this period China had 5,796 miles of railways. The spatial distribution of major lines emphasized developments along the southeastern coast and in the Two Lakes region. Minor lines were to be found in the Loess Highlands and Manchurian Plain. Additionally, a single line of minor importance was located on the Yunnan Plateau in southern China.

The following lines were built by private Chinese enterprises: (1) the Canton-Litung and (2) the

Changsha-Chuchow sections of the Canton-Hankow Railway in the South Yangtze Hills, (3) the Shanghai-Hangchow Railway in Chekiang, (4) the Chaochow-Swatow Railway in Kwangtung Province, (5) the Nanchang-Tehan section of the Nanchang-Kiukiang Railway in Kiangsi Province, (6) the Changchow-Amoy Railway in Fukien Province, (7) the Ihsien-Chochwang Railway and the Angangki-Tsitsihar Light Railway in Manchuria, (8) the Lokow branch of the Tientsin-Pukow Railway on the North China Plain, and (9) some short lines scattered in the provinces of Szechwan and Shansi--lines which were later abandoned.

The following lines were later built by foreign nationals: (1) the German-built Chowtun-Tsinan section and (2) the Changtien-Poshan branch of the Kiaochow-Tsinan Railway in Shantung, (3) the Japanese-built Chowshuitze-Port Arthur branch and (4) the Antung-Mukden section of the South Manchuria Railway in Manchuria, (5) the Yunnan-Indo-China Railway on the Yunnan Plateau built by the French, and (6) the British section of the Canton-Kowloon Railway.

The following lines were built by the Imperial government: (1) Peking-Kalgan Railway to connect the national capital with Inner Mongolia, (2) Hsinmintum-Mukden Railway and Mukden-Antung Railway in Manchuria to facilitate military transportation on the Korean border,

(3) Tientsin-Pukow Railway to connect the North China Plain with the Yangtze Delta Plain, (4) Shumchun-Canton Railway to connect Canton with the British-leased territory of Kowloon, (5) Shanghai-Nanking Railway on the Yangtze Delta, (6) Taokow-Chinghua Railway in the South Yangtze Hills region, (7) Chengting-Taiyuan Railway on the Loess Highlands, and (8) Kaifeng-Loyang Railway on the Central Yellow Plain.

Spatial Pattern of the Nationalization Period, 1911

The first railway taken over by the Imperial government was the Canton-Hankow Railway, which the local gentry of Kwangtung, Hunan, and Hupeh had failed to complete after five years of controversy. The second railway to be nationalized was the Tientsin-Pukow line. Because of nationwide strikes opposing the new railway policy, construction lagged during this period. The railway map changed significantly only in coastal areas where one line was built along the coast of Pohai and another was established along the coast of the South China Sea. The plans were nationwide but the completed lines were all limited to the developed regions in China, particularly in connecting the urban centers.[7]

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[7] E-tu Zen Sun, "The Pattern of Railway Development in China," op. cit., 180-182.

The Spatial Pattern of the Republic Era, 1911-1949

The spatial distribution of railways reflected a concentration in two areas during this era (Map 12). This regional emphasis occurred after the National government had firmly established itself in Nanking. Both new regional rail networks focused on Nanking: one railway was extended south to Chekiang and Kwangtung and then west to Kiangsi and Hunan Provinces; the second connected the Yangtze Hills with the North China Plain.

From 1866 until the end of this era, China built 12,036 miles of railways (Table 20) which may be converted statistically to show an average construction of 160 miles per year, 27 miles for each million of her population, or 274 miles of rail line for every 100,000 square miles of territory. Despite these accomplishments, 8 of China's 26 provinces, comprising a total area of 1,692,000 square miles, remained entirely without railway facilities (i.e., Jehol, Ninghsia, Kansu, Chinghai, Sinkiang, Sikang, Szechwan, and Kweichow). By contrast, it is interesting to note that while China had 27 miles of railways for each million people, the United States had 1,940 miles, Britain had 437 miles, Germany had 550 miles, and Japan had 190 miles for each million people.[8]

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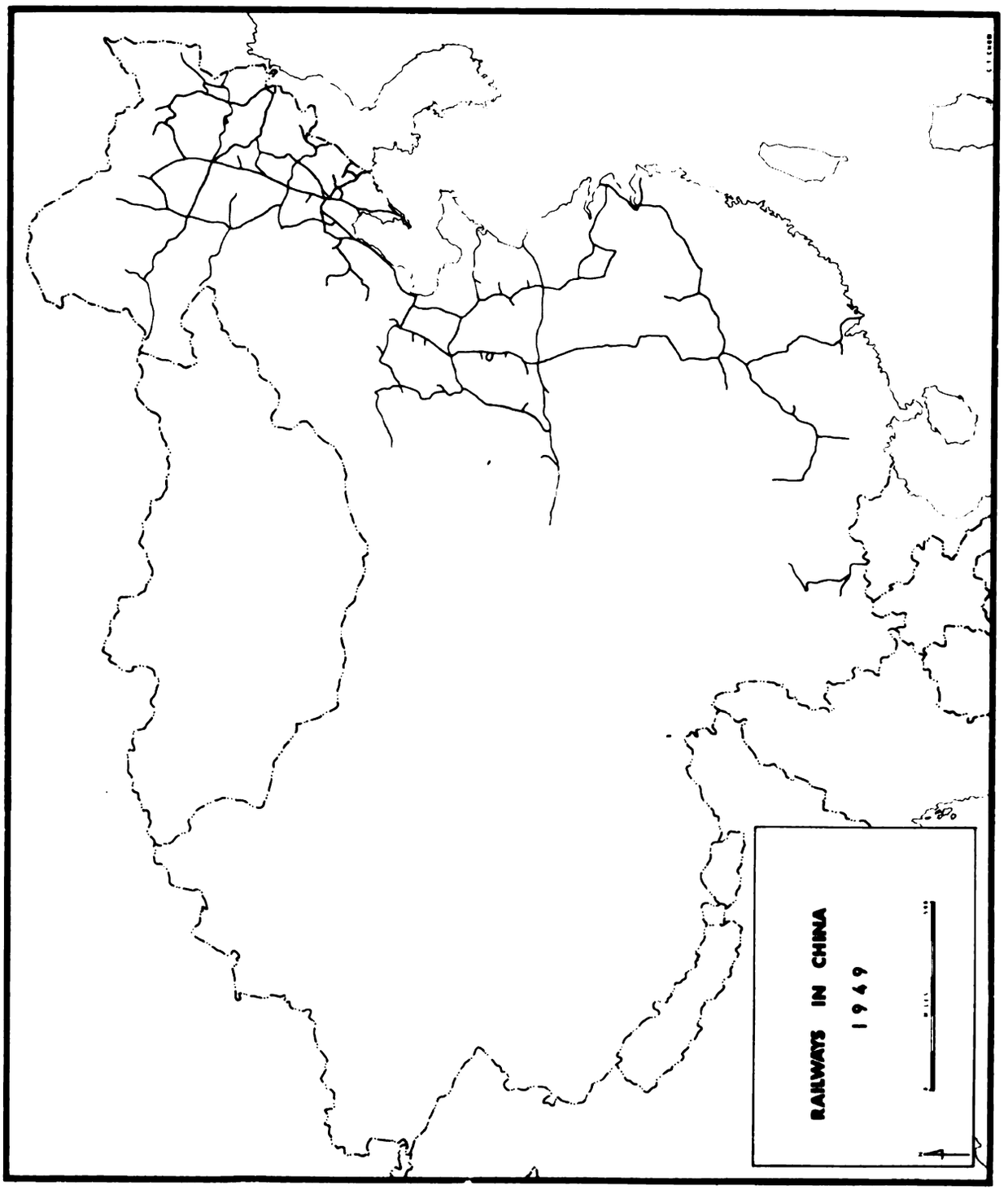
[8]Andrew C. O'Dell, Railways and Geography (London: Hutchinson's University Library, 1956), pp. 86-87.



Map 12

TABLE 20

CHINA'S TOTAL LENGTH AND DENSITY OF RAILWAYS, INLAND WATERWAYS, AND HIGHWAYS IN 1949

Carrier	Total Length (km)	Density* (km)	Length in Operation (km)	Density* (km)
Railways	26,700	0.0028	22,000	0.0023
Highways	137,000	0.0143	75,000	0.0078
Inland Waterways	56,600	0.0058	24,200	0.0025

*Total length divided by 9,561 km.

Source: Total length data from Hung-hsun Ling, General Survey of Railways in China (Taipei, 1950).

Also, China's 274 miles of railway for every 100,000 square miles of territory can be directly compared with comparative figures of 7,970 miles for the United States, 21,360 miles for Britain, 20,150 miles for Germany, and 9,120 miles for Japan.[9] Given the span of 38 years in the Republic Era, it is convenient to divide the era into 5 periods. Each period is distinguishable in terms of the rail pattern established during the period.

Spatial Pattern of Dr. Sun-yat Sen's Planning Period, 1911-1914

In this three-year period, 250 miles of railway were constructed, bringing the total railway mileage in China to 6,052 miles. This figure includes the Tsongo-Ningpo section of the Shanghai-Hangchow-Ningpo Railway along the southeastern coast, the Lincheng-Chochwang branch and the Tzeyang-Tsining branch of the Tientsin-Pukow Railway on the Yellow Plain, the Litang-Tahankow section of the Canton-Hankow Railway in South China, the Yangkao-Tatung section of the Peking-Suiyuan Railway in Inner Mongolia, and the Kirin-Changchun Railway on the central Manchurian Plain.

The distribution of the completed lines was mainly in the coastal regions of Hopei, Shantung, Kiangsu,

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[9]Wilfred Owen, Strategy for Mobility (Washington, D.C.: The Brookings Institution, 1964), pp. 13-14.

Chekiang and Kwangtung Provinces. Minor mileages were built in Inner Mongolia, along the Great Wall, and on the central Manchurian Plain. Although minor in traffic, these railways were nevertheless part of Dr. Sun's overall railway plan.

Dr. Sun's initial program covered three national trunk lines[10] running latitudinally across the breadth of China. The southern trunk line was to begin at Canton and pass through Kwangtung, Kwangsi, Kweichow, Yunnan, and Szechwan Provinces into Tibet. The central trunk line was to start from the estuary of the Yangtze at Nanking and to pass through Kiangsu, Anwei, Honan, Shensi, and Kansu Provinces to Ili in Sinkiang. The northern trunk line was to start from Chinwangtao where the Great Wall meets the sea, and to pass through Manchuria, Inner Mongolia, and Outer Mongolia to Tannu Ola on the Russian border. This original plan was revised and enlarged in 1918 to cover all provinces of China with a network of six national systems, that is, the Central, Northwestern, Southeastern, Northeastern, Southeastern and Plateau Systems. They were designed to stimulate the internal economy and for international trade purposes. Unfortunately, this railway network plan was quite unrealistic,

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[10]Sun Yat-sen, The International Development of China (London: Hutchinson & Co., 1921), p. 98.

especially the lines proposed for the outer provinces. The small population and low level of economic development of the outer provinces made this plan unrealistic.

Spatial Pattern of the Penetration of Japanese Capital Period, 1915-1920

By the end of this six-year period China completed 804 miles of railway bringing the total mileage to 6,856 miles. These additional lines were: (1) the Peitaiho branch of the Peking-Mukden Railway completed through the Liaosi Corridor, (2) the Shanghai-Nanking Railway extended to Lunghwa on the Yangtze Delta, (3) the Kiaochow-Tsinan Railway's Kinling-Teshan branch in the Shantung Hills, (4) the Canton-Hankow Railway's Hankow-Changsha section along Tungting Lake and the Taihankow-Shaokwan section near the Nanling Pass, (5) the Lunghai Railway's Loyang-Kwanyintang section in the Loess Highlands, (6) the Kaifeng-Hsuchow section on the Yellow Plain, (7) the Peking-Suiyuan Railway's Tatung-Suiyuan branch in Inner Mongolia, (8) the Kowchuen branch and the Peking City Belt Line in Hopei, (9) the Nanchang-Kiukiang Railway's Tehan-Nanchang section along the Poyang Lake, and (10) the Szepingkai-Chengkiatun Railway in the upper Liao Valley.

Spatial Pattern of the New Four-power Consortium Period, 1921-1926

In Manchuria, the following lines were completed during this period: (1) the Sifeng-Kaiyuan Railway, (2) the Chengkaitun-Taonan Railway, (3) the Chengkaitun-Tungliao Branch Railway, (4) the Taonan-Angangki Railway, (5) the Tienposhan-Kaishantun Railway, (6) the Sungpu-Mashunkow section of the Holan-Hailung Railway, and (7) the Lienshan-Hulutao branch line of the Peking-Mukden Railway. In China proper, the following lines were completed: (1) the Paoting-Nankwan branch in Hopei, (2) the Fenglochen branch of the Peking-Hankow Railway near Peking, (3) the Chinghua-Chenchwang extension of the Taokow-Chinghua Railway in Chekiang, (4) the Hsuchow-Hsinpu and (5) the Kwanyintang-Lingpao sections of the Lunghai Railway, and (6) the Suiyuan-Yangkao section of the Peking-Suiyuan Railway in Inner Mongolia.

Manchuria and Central China shared almost equally in the mileage of railways constructed during this period. Additionally, some development occurred along the southeastern coast of China.

Spatial Pattern of the National Government Control Period, 1927-1935

By the end of this period in 1935, the total length of railway mileage in China, including Manchuria, was 9,773 miles (Table 21). During this nine-year period

TABLE 21

RAILWAY MILEAGE IN CHINA, DECEMBER 31, 1935

Location		Miles
In China Proper:		
1. Peiping-Mukden Railway (Peiping-Shanhaikwan)		262
Branches:	Peiping-Tunghsien	14
	Peitaiho	13
2. Peiping-Hankow Railway		755
Branches:	Chowkiatien	9
	Sinyi (Imperial Tomb)	27
	Liangsiang-Tuli	12
	Kaoyicheng	10
	Paoting-Nankwan	4
	Fenglochen	13
3. Peiping-Suiyuan Railway (Peiping-Paotow)		510
Branches:	Peiping-Mentaokao	17
	Tatung-Kowchuen	12
	Peiping City Belt Line	8
4. Tientsin-Pukow Railway		269
Branches:	Ihsien-Chochwang	20
	Chochwang-Lincheng	20
	Tzeyang-Tsining	20
	Lokow	5
5. Kiachow-Tsinan Railway		256
Branches:	Changtien-Poshan	284
	Kinling-Teshan	4
6. Chengting-Taiyuan Railway (Shihkiachwang-Taiyuan, meter gauge)		151
7. Taokow-Chinghua Railway		94
Branch:	Chinghua-Chenchuang	8
8. Lunghai Railway (Lienyuan Harbor-Sian)		633
Branch:	Chaotun-Taierchuang	19
9. Tayeh Mines Railway (Hupeh) (Tienshanpu-Huangshihkang)		20
10. Tungpu Railway (Tatung-Pucheng, meter gauge)		374
Branch:	Chiyao	46
11. Weinan Railway (Tinkiangan-Yukikow, Anhwei)		133
12. Kiangnan Railway (Nanking-Sunchiapu)		109

TABLE 21 (continued)

Location		Miles
In China proper (continued):		
13. Nanchung-Kiukiang Railway		80
14. Nanking-Shanghai Railway		193
Branches:	Woosung	10
	Lunghwa extension	10
15. Shanghai-Hangchow-Ningpo Railway		
(Shanghai-Hangchow)		118
(Tsongo-Ningpo)		49
16. Chekiang-Kiangsi Railway		
(Hangchow-Yushan)		221
17. Canton-Hankow Railway		
(Canton-Lochang)		169
(Wuchang-Changsha)		259
Branches:	Canton-Samshui	30
	Chuchow-Pingsiang	56
18. Canton-Kowloon Railway		
Chinese section:	Canton-Shumchun	90
British section:	Shumchun-Kowloon	22
19. Chaochow-Swatow Railway (Kwangtung)		26
20. Changchow-Amoy Railway (Fukien)		19
21. Sinning Railway		
(Pakkai-Paksha-Towshan, Kwangtung)		87
22. Kokiu-Pisechai Railway		
(Kokiu-Pisechai, meter gauge)		45
(Kikai extension, meter gauge)		39
23. Yunnan-Indo-China Railway		
(Kumming-Laokay, French)		289
	Total in China Proper:	6,047
In Manchuria:		
1. Peiping-Mukden Railway		
(Shanhaikwan-Mukden)		263
Branches:	Koupantze-Newchwang	57
	Lienshan-Hulutao	7
	Chinchow-Pehpiao	70
2. Tahushan-Tungliao Railway		156
3. Kirin-Changchun Railway		79
4. Szepingkai-Chengkiatun-Tungliao Railway		125
5. Chengkiatun-Taonan Railway		139
6. Taonan-Angangki Railway		139
7. Taonan-Solun Railway		50
8. Tsitsihar-Koshan Railway		143

TABLE 21 (continued)

Location		Miles
In Manchuria (continued):		
9. Tsitsihar-Angangki Railway		18
10. Kirin-Hailung Railway		114
11. Kirin-Tunhua Railway		130
12. Mukden-Hailung Railway		198
13. Holan-Hailung Railway		139
14. Sifengo-Kaiyuan Railway		40
15. Tienposhan-Kaishantun Railway		77
16. South Manchuria Railway (Japanese) (Mukden-Dairen)		439
Branches:	Mukden-Antung	189
	Sukiatun-Fushun	30
	Tashihkiao-Newchwang	14
	Chowshuitze-Port Arthur	28
	Yentai Coal Line	9
17. Chinese Eastern Railway (Manchouli-Suifenho)		921
Branches:	Harbin-Changchun	152
	Total in Manchuria:	3,726
Total mileage in China Proper and Manchuria:		9,773

Source: Kia-ngau Chang, China's Struggle for Railroad Development (New York: The John Day Co., 1943).

a significant expansion of the railway network was achieved as China built 2,090 miles of railways, of which 995 miles were in Manchuria and 1,095 miles were located in China proper.

The spatial pattern was significant in that it concentrated on China proper and Manchuria. Within China proper, the South Yangtze Hills received considerable attention during this period. Two factors help to explain this spatial expression. First, it was politically and economically necessary to connect the provincial capitals in the South Yangtze region. Secondly, by connecting the manufacturing centers and mining areas,[11] cost and production efficiencies were achieved.

Spatial Pattern of the Sino-Japanese War Period, 1936-1945

Among the provincial railways connected in the southwestern mountain regions which had their inception during the World War II period were those of: Hunan-Kwangsi, Kweichow-Kwangsi, Yunnan-Burma, Suifu-Kunming, and some minor railway projects in the northwest. The construction of these lines presented problems peculiar to wartime China. China had to contend, on the one hand, with the changing fortunes of war and, on the other hand,

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[11] Hung-hsun Lin, History of Chinese Railways (Taepei: World Press, 1963), pp. 12-14.

with an enemy blockade (Tables 22, 23, and 24). The uncertainties, delays, damages, and blockades made it difficult to bring in railway materials and rendered the scheduling of construction practically impossible.

Spatial Pattern of the Postwar Period, 1945-1949

The rehabilitation of destroyed railways and restoration of existing railways after the eight-year Sino-Japanese War were nationwide necessities. However, these efforts were limited to Manchuria and the North China Plain for the purpose of defense against the Communists' forces. In many areas, the existing railways were even torn up or destroyed by military operations of the conflicting groups.

Some new construction did occur during this difficult period in the districts of the southwest, northwest, and South Yangtze Hills which were distant from the battlefields. Those railways which were constructed were short lines and carried small volumes of traffic. The lines were only significant as the beginnings of a well-planned ten-year railway program of the Nationalist government.

During the first stage of the Ten-year Plan, 7,155 miles of railways were to be built, with the primary object of knitting together all of the political and

TABLE 22

RAILWAYS IN FREE CHINA, DECEMBER 31, 1942

Railway	Miles
1. Canton-Hankow Railway	
Chuchow-Shaokuan	287
2. Hunan-Kwangsi Railway	
Hengyang-Laipin section	375
Branch: Lingling-Lufau	15
3. Lunghai Railway	
Loyang-Paoki section	340
Yingo Coal Line, meter gauge	28
Paoki-Hsiangshihpu, meter gauge	66
Sienyang-Tungkwanhsien branch	86
Loyang-Kinkuyuan, meter gauge	20
4. Paoki-Tienshui Railway	
Paoki-Yaoshien section	7
5. Hunan-Kweichow Railway	
Chuchow-Siangtan section	20
6. Kweichow-Kwangsi Railway	
Liuchow-Kaipetun	117
7. Suifu-Kunming Railway	
Kunming-Kutsing	99
8. Yunnan-Burma Railway	
Kunming-Anning	22
9. Kokiu-Pisechai Railway	
Kokiu-Pisechai Railway	
Kokiu-Pisechai-Kikai, meter gauge	84
10. Yunnan-Indo-China Railway	
Kunming-Shipping	178
Total	1,744

Source: Kia-ngau Chang, China's Struggle for Railroad Development (New York: The John Day Co., 1943).

TABLE 23

RAILROADS COMPLETED BETWEEN 1935 AND 1942

Railroad	Miles
1. Railroads completed before Sino-Japanese War, July 7, 1937:	
Canton-Hankow Railway	
Lochang-Chuchow section	252
2. Lunghai Railway	
Sian-Paoki section	106
3. Tungpu Railway	
Yungsti-Fengling Landing	20
Tantung-Taiyuan section	219
4. Taokow-Chinghua Railway	
Taokow-Tzuwang extension	41
5. Nanking-Kiangsi Railway	
Northern section: Hsuancheng-Sihsien	99
Southern section: Chenying-Kweiki	31
Loop line to Kiangnan Railway at Nanking	14
6. Soochow-Kashing Railway	45
7. Chekiang-Kiangsi Railway	
Yushan-Nanchang section	182
Nanchang-Pingsiang section	162
8. Shanghai-Hangchow-Ningpo Railway	
Zakow-Pokwan section	48
Total	1,262

Source: Kia-ngau Chang, China's Struggle for Railroad Development (New York: The John Day Co., 1943).

TABLE 24

RAILWAYS COMPLETED DURING SINO-JAPANESE WAR,

JULY 7, 1937, TO DECEMBER 31, 1942

Railway		Miles
1. Canton-Hankow Railway		
Whamgpao Loop Line		15
2. Lunghai Railway		
Branches:	Siangyang-Tungkuanhsien	86
	Yinghao Coal line, meter gauge	28
	Paoki-Hsiangshihpu, meter gauge	66
	Loyang-Kinkuyuan, meter gauge	20
3. Paoki-Tienshui Railway		
Paoki-Yaohsien section		7
4. Hunan-Kwangsi Railway		
Hengyang-Kweilin section		224
Kweilin-Liuchow section		108
Liuchow-Laipin section		43
Nanning-Chennankwan section		42
Branch: Lingling-Lufau		15
5. Hunan-Kweichow Railway		
Chuchow-Lantien section		109
6. Kweichow-Kwangsi Railway		
Liuchow-Kinchengkiang section		100
Kinchengkiang-Kaipetun section		17
7. Suifu-Kunming Railway		
Kunming-Kutsing section		99
8. Yunnan-Burma Railway		
Kunming-Anning section		22
	Total	1,001
	Grand Total	2,263

Source: Kia-ngau Chang, China's Struggle for Railroad Development (New York: The John Day Co., 1943).

military centers and to assist in the exploitation of the most essential mineral deposits. Lines were designed mainly to serve southwestern and central China. During the second stage, a total of 7,145 miles of important trunk lines were to be constructed to develop the frontier and coastal provinces and to open more overland routes to neighboring countries. Such lines were designed mainly for northwestern and southeastern China. Unfortunately, this Ten-year Railway Plan was delayed by the civil war between the Communists and the Nationalist government. The initial plans, nevertheless, provided ideological direction for China's railway construction under the economic circumstances of the time.

The Spatial Pattern of the Communist Era, 1949-1966

In viewing the essential aspects of the Chinese transportation system, one cannot overemphasize the importance of each of the various branches of transport to the achievement of the avowed goal of industrialization (Map 13). China could not hope to grow economically, and in particular industrially, without giving top priority to the development of her transportation system.[12] Consequently, leaders of Communist China exerted every

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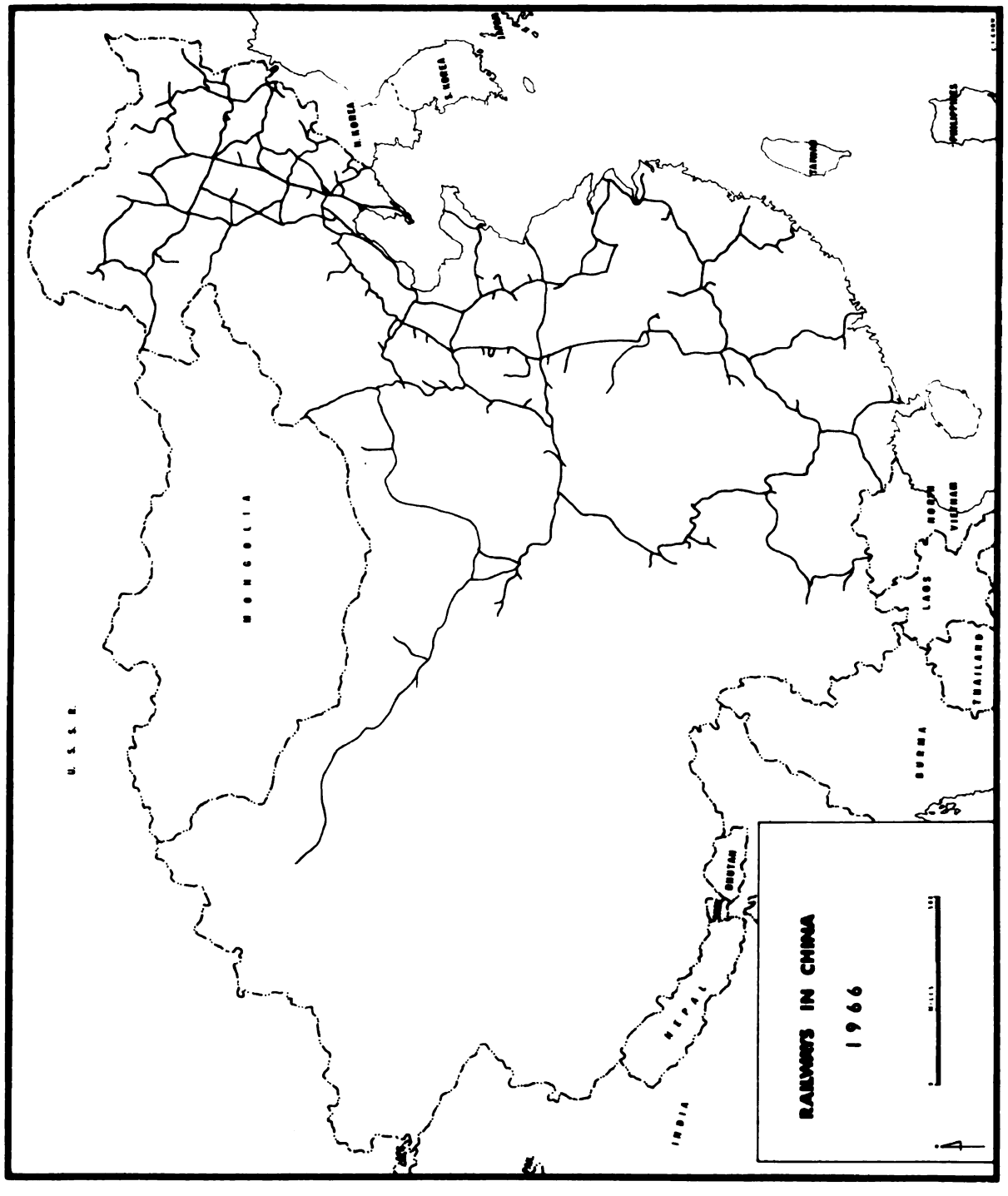
[12]Victor P. Petrov, China, Emerging World Power (Princeton: D. Van Nostrand, 1967), p. 93.


RAILWAYS IN CHINA
1966
U.S.S.R.
MONGOLIA
N. KOREA
S. KOREA
JAPAN
TAIWAN
PHILIPPINES
LAOS
THAILAND
BURMA
NEPAL
BHUTAN
INDIA

Map 13

effort to try to increase the overall mileage of the existing railways (Table 25). The results have been quite encouraging. Many thousands of miles of railway track were added to the system inherited from the Nationalists (Table 26). The railway pattern remained unevenly distributed. Functionally, the rail lines were not primarily based on an economic rationale because of the political and military factors which continued to hamper railway construction.

Efforts to construct new lines have been concentrated in two directions (Table 27). First, an effort has been made to decrease China's dependence on the coastal regions. Thus the new railways have been extended into remote areas of the interior. Secondly, it was recognized that railways would continue to be of strategic importance.[13] Accordingly, among the first railways to be built were those lines connecting every province of China to the main trunk lines. Thus, the provinces that were practically separated from China proper in the past, such as Sinkiang, Kansu, Tsinghai, Szechwan, and Yunnan, now were able to be reached without much effort via the newly constructed railways. Prior to this construction,

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[13]Yang Ming Shan Chwang, An Analysis of Transportation Development in Mainland China (Taipei: Government Press, 1957), p. 36.

TABLE 25

COMPLETED NEW RAILWAYS IN COMMUNIST CHINA, 1949-1966

Railway	Completed Date	Length in km.
1. Chengtu-Chungking	July, 1952	504
2. Chining-Erhlien	August, 1955	338.7
3. Lantaun-Yentai	January, 1956	183
4. Paochi-Chengtu	January, 1958	669
5. Paotow-Paiyungpop	December, 1956	113
6. Litang-Chankiang	July, 1955	315
7. Yingtan-Amoy	January, 1958	787
8. Nanping-Fuchow	November, 1958	168
9. Paotow-Lanchow	June, 1958	999
10. Lanchow-Singkiang(to Urumchi)	January, 1961	1,942
11. Kutuerh-Kanho	April, 1956	381
12. Ichun-Hsinching	March, 1956	273
13. Shangpancheng-Hwaijou	April, 1960	181
14. Kantang-Wuwei	April, 1963	150
15. Tienshui-Lanchow	October, 1952	371
16. Laiping-Munankuan	November, 1951	355
17. Yunnan-Burma (Anning-Yipingland section)	April, 1959	102
18. Kweichow-Yunnan (Kweiyang-Anshun section)	April, 1963	102
19. Neikiang-Kunming (Neikiang-Anpian section)	February, 1960	147
(Chanyi-Huanwei section)	May, 1960	105
20. Fengtai-Shacheng	July, 1955	105
21. Lanchow-Chinghai (Howkow-Haiyen section)	October, 1959	207
22. Kweichow-Kwangsi (Kweiyang-Tuyun section)	December, 1951	132
23. Szechuan-Kweichow (Shanchikow-Kanshuichang section)	July, 1956	84
24. Canton-Lienkiang (Mouming-Lienkiang section)	March, 1959	62
25. Hupeh-Kiangsi (Wuchang-Tayeh section)	July, 1958	98
26. Ningpo-Chuanshan	January, 1957	42
27. Lanchi-Hsinganklang	October, 1957	48
28. Hsuchiachan-Miaotaitze	November, 1958	11
29. Hanyang-Wuchang	October, 1957	9
30. Hankow-Hanyang	November, 1954	6
31. Chiamussa-Lienkiangkow	no date given	6
	Total:	8,905

Source: Information mainly from Communist China's Railway Transportation, unpub. rept. from Mainland China, National Security Bureau, Taipei, 1966.

TABLE 26

COMPARISON OF 25 RAILWAYS BUILT AND PROJECTED IN COMMUNIST PERIOD WITH NATIONALIST PROJECTED LINES IN "FIRST PHASE OF POSTWAR RAILWAY RECONSTRUCTION"

Communist lines		Nationalist lines	
Route	Length (km)	Route	Length (km)
Chining-Erhlien	330	Chining-Kulun	1080*
Paotow-Lanchow	278	Paotow-Ningsia	557**
Hsihsien-Yingtan	332	Hsihsien-Kueichi	315*
Sian-Wuhan	800	Huayuen-Hsiangyang	260*
Yingtan-Tzuchi	73	Kueichi-Nanping	280*
Chuchow-Lonti	132	Hsiangtan-Chihkiang	498*
Tzuchi-Amoy	621	Kueichi-Nanping	280*
Tzuchi-Amoy		Nanping-Changting	220*
Nanping-Foochow	168	Foochow-Nanping	150**
Laiping-Munankwan	355	Hsiying-Laiping	455*
Lungyen-Meihsien	350	Changping-Meihsien	230*
Shihlung-Hsingning	220	Shihlung-Meihsien	330*
Tienshui-Lanchow	348	Tienshui-Lanchow	378**
Lanchow-Urumuchi	1892	Lanchow-Hami	1636**
Hsining-Mangai	1125	Hsining-Yushu	800*
Paochi-Tatan	302	Tienshui-Kuangyuan	410**
Tatan-Chengtu	367	Chengtu-Kuangyuan	345**
Anning-Ipinglang	102	Anning-Suta	844*
Lienyuan-Tuyun	825	Tuyun-Chihkiang	357*
Chengtu-Chungking	504	Chengtu-Chungking	530**
Neichiang-Anpien	142	Neichiang-Loshan	180*
Chengtu-Ipinglang	958	Chengtu-Loshan	165*
Chungking-Kanshui	86	Chungking-Kueiyang	530**
Hsuanwei-Kueiyang	668	Kueiyang-Weining	416**
Hsuanwei-Kueiyang		Chani-Weining	260**

* = partially identical
** = identical

Sources: Railways in Communist China (Taipei: Bureau of Communication Research, 1961), pp. 29-33; Communist China Railway Passenger Time Table (Peking: 1960 and 1963); Tseng-chiao Chao, Postwar Communications Construction in China (Shanghai: Commerce Press, 1947), pp. 63-65.

TABLE 27

NEW RAILWAYS BUILT BY THE COMMUNIST CHINESE

AND NOT PROJECTED BY THE NATIONALISTS

Region	Borderland Lines		Connecting Lines		Trunk Lines and Others		Total Lines	
	#	Length (km)	#	Length (km)	#	Length (km)	#	Length (km)
Developed Regions								
Northeast	0	0	0	0	3	115	3	115
North	0	0	3	233	6	353	9	586
East	0	0	22	347	4	157	6	504
Total	0	0	5	580	13	625	18	1205
Under-developed Regions								
Central	0	0	0	0	9	553	10	553
South	1	315	0	0	4	155	5	470
Northwest	0	0	1	185	5	221	5	406
Southwest	0	0	0	0	3	295	3	295
Total	1	315	1	185	21	1224	23	1724
Grand Total	1	315	6	774	34	1849	41	2929

Sources: Railway Passenger Train Time Table (Peking: People's Railway Publishing Bureau, 1960 and 1963); Railways in Communist China (Taipei: Bureau of Communication Research, 1961).

inland travel by camel, mule, or even wheelbarrow had to be used, all of which required months of time for reaching given destinations. It is true that the introduction of trucks and automobiles somewhat eased the situation but not enough to initiate new industrial requirements.

Among the important lines built during the Communist Era, at least two railways in the province of Fukien are definitely more military than economic in value. Rapid access to the Strait of Taiwan is of primary importance for both lines.[14] Another line of similar military importance was constructed in Shantung, where the existing Tsingtao-Tsinan line was connected by a branch line with the city of Chefoo.[15] During the First Five-year Plan practically all railway construction was in the west.[16] It was not until after 1958 that the program changed and building was stepped up in the east during the Second Five-year Plan.[17] (Tables 28, 29, 30, and 31)

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[14]Kuei-sheng Chang, "The Changing Railroad Pattern in Mainland China," Geographic Review, LI (1961), 534-548.

[15]Ibid.

[16]Chin-kuo Cheng, An Analysis of China's First Five-Year Plan (Peking, 1955), pp. 44-49.

[17]En-lai Chou, A Great Decade (Peking: Foreign Language Press, 1960), pp. 23-25.

TABLE 28

RANKING OF REGIONS BY RAILWAY DENSITY (Km/1,000 Km)

1949 AND 1963

Region	1949 Density	1949 Rank	1963 Density	1963 Rank	Net Increase	Rank of Increase
Northeast	12	1	13	1	1	4
East	6	2	7	2	1	4
Central	4	3	6	3	2	2
South	2	4	5	4	3	1
North	2	4	4	5	2	2
Northwest	0.1	5	1.5	6	1.4	3
Southwest	0	6	1	7	1	4
Grand Total	2		4		2	

Source: Railway lengths and area data for the measurement of density are from Appendix D, Table D-1, and Appendix E, Table E-1, Yuan-li Wu, The Spatial Economy of Communist China (New York: Praeger, 1967), pp. 244-245, 252-261.

TABLE 29

RANKING OF PROVINCES BY RAILWAY DENSITY (Km/1,000 Km)

1949 AND 1963

Province	1949		1963		Net Incr.	Rank of Incr.
	Density	Rank	Density	Rank		
Liaoning	25	1	21	1	4	3
Heilungkiang & Kirin	9	2	11	3	2	5
Hopeh	8	3	12	2	4	3
Kiangsu	8	3	12	2	4	3
Honan	7	4	8	5	1	7
Shantung	6	5	7	6	1	7
Shansi	5	6	9	4	4	3
Anhwei	5	6	3	10	2	5
Chekiang	4	7	7	6	3	4
Hunan	4	7	6	7	2	5
Kiangsi	4	7	5	8	2	5
Hupeh	2	8	4	9	2	5
Kwangsi	2	8	6	7	4	3
Kwangtung	2	8	3	10	1	4
Shensi	2	8	4	9	2	5
Inner Mongolia	0.5	9	2	11	1.5	6
Fukien	0	10	7	6	7	1
Ningsia & Kansu	0	10	6	7	6	2
Tsinghai	0	10	0.3	13	0.3	9
Singkiang	0	10	0.4	12	0.4	8
Szechwau	0	10	2	11	2	5
Yunnan	0	10	2	11	2	5
Kweichow	0	10	2	11	2	5
Tibet	0	10	0	12	0	10

Source: Railway lengths and area data for the measurement of density are from Appendix D, Table D-1, and Appendix E, Table E-1, of Yuan-li Wu, The Spatial Economy of Communist China (New York: Praeger, 1967), pp. 244-245, 252-261.

TABLE 30

REGIONAL DISTRIBUTION OF NEW RAILWAY CONSTRUCTION

FROM 1949 TO END OF 1963*

Region	Number of New Lines	Length of New Lines (km)	% of New Lines
Developed Regions			
Northeast	3	115	1.2
North	11	1,194	12.6
East	7	535	5.6
Subtotal	21	1,844	19.4
Underdeveloped Regions			
Central	10	811	8.5
South	8	1,613	17.0
Northwest	11	3,839	40.4
Southwest	7	1,394	14.7
Subtotal	36	7,657	80.6
Total	57	9,501	100.0

*These data included all trunk lines and major branches identified, but excluded forest railways, spurs, railways under construction and planned lines.

Sources: Railway Passenger Train Time Table (Peking: People's Railway Publishing Bureau, 1963), and Railways in Communist China (Taipei: Bureau of Transportation Research, 1961), pp. 29-33.

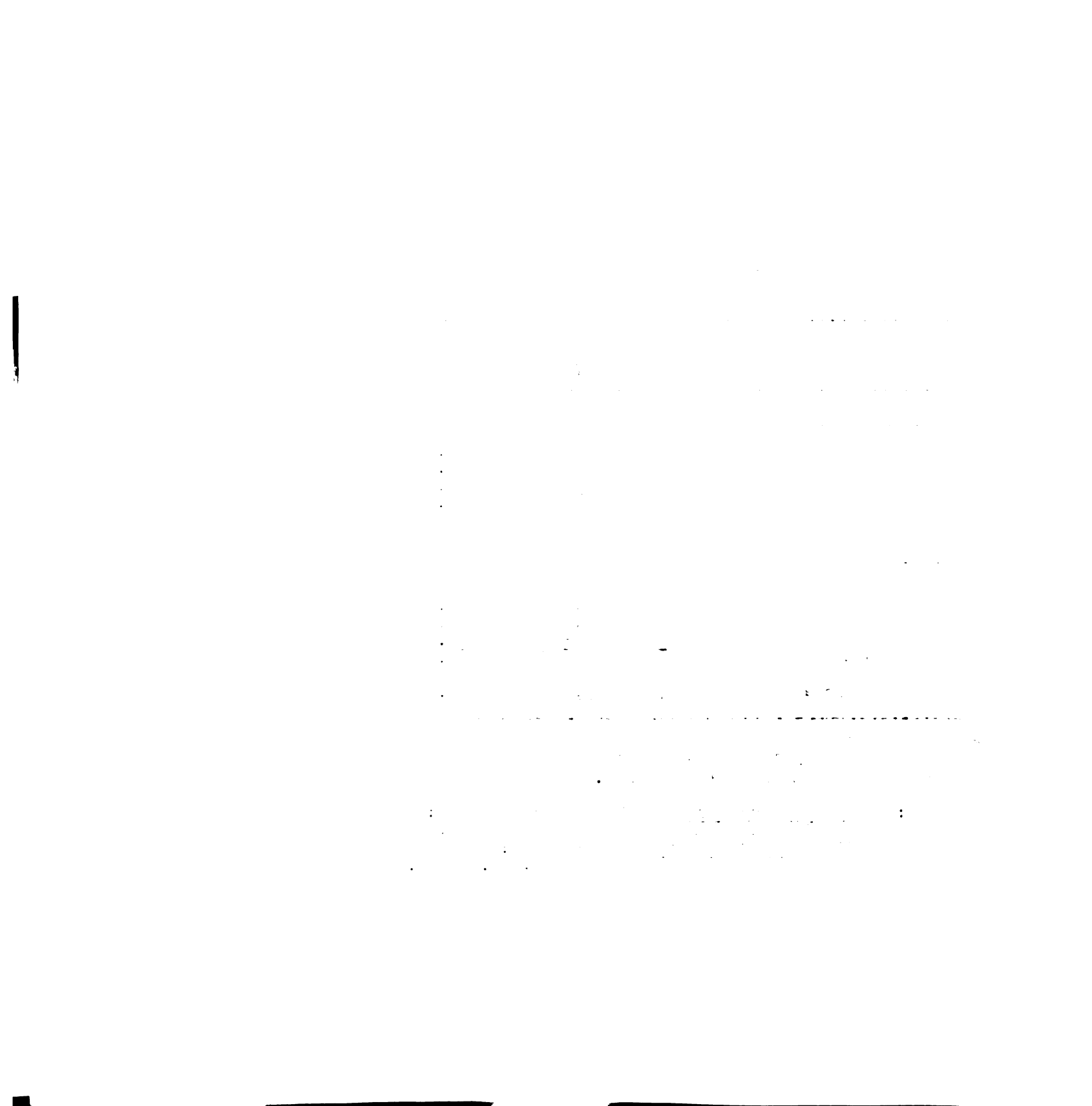

TABLE 31

COMPARISON OF COASTAL PROVINCES WITH INLAND PROVINCES AND OF DEVELOPED REGIONS WITH LESS DEVELOPED REGIONS IN TERMS OF THE NUMBER OF INDUSTRIAL CITIES AND INDUSTRIAL CAPACITY

Area	Number of Industrial Cities				% Industrial Capacity			
	Small	Medium	Large	Total	Small	Medium	Large	Cities Total
Coastal Provinces	88	18	6	112	3.2	11.5	48.8	63.5
Inland Provinces	174	39	3	216	6.1	19.5	10.9	36.5
Total	264	57	9	328	9.3	31.0	59.7	100.0
Developed Regions	107	31	6	144	3.6	17.5	49.0	70.1
Less Developed Regions	155	26	3	184	5.6	13.5	10.8	29.9
Total	262	57	9	328	9.2	31.0	59.8	100.0

Source: Data are from Table 3-4, Table 3-5, Table 3-8, and Appendix B, Table B-1, Yuan-li Wu, The Spatial Economy of Communist China (New York: Praeger, 1967), pp. 63-65, 225-234.

The Communist-built new railways may be divided into four categories:

1. Borderland lines. These lines are obviously designed to serve a potential trade purpose with the U.S.S.R., Outer Mongolia, North Korea, and North Viet Nam. These lines are also used for the development of China's borderland. They include lines to a point on the national border or to a seaport noted for commercial traffic.

2. Connecting lines. These railways are designed to complete an existing railway network. They include railways connecting two trunk lines or connecting a trunk line with a seaport or major river port. Lines replacing sections of existing railways are also included in this category.

3. Trunk lines. These railways are neither border nor connecting lines. Rather, they pass through two or more provinces or two or more large industrial, commercial, or agricultural centers in one or more provinces. They are usually over 100 kilometers long.[18]

4. Local lines. These railways include all other branch and special lines. They are usually less than 100 kilometers long. These were common in central

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[18]This figure is selected as an arbitrary minimum to screen out the lesser branches or spurs.

and north China. In 1960, more than 2,400 kilometers of such lines were in operation; another 694 kilometers were under construction.

If a comparison is made between railways constructed under the present regime and those planned by the Nationalists for postwar construction, the majority (63 percent) of the lines built by the Communists were not projected by the Nationalists. A larger portion of the Communist-built lines is located in the less developed regions than in the more developed regions. These findings suggest that the decision to build more railways in less developed areas to promote economic development--possibly without even a prior determination of the fixed resources to be exploited--was largely made under the Communist regime.

The evolution of the railways during the Communist Era can best be approached by an examination of several construction periods. These include the Rehabilitation Period, 1949-1952; the Period of the First Five-year Plan, 1953-1957; the Period of the Second Five-year Plan, 1958-1962; and the Period of the Economic Recovery, 1963-1966.

Spatial Pattern of the Rehabilitation Period, 1949-1952

When the Communists came to power in 1949, a large percentage of the rail network was inadequate and had deteriorated or had been destroyed. A very high priority was placed on the restoration of the rail system with greatest effort being concentrated on a few key lines that were of most strategic importance.[19] Three essential lines were begun during this period: the Laiping-Munankwan Railway in Kwangsi, the Tienshui-Lanchow Railway in Kansu, and the Chungking-Chengtu Railway in Suechwan.

Spatial Pattern of the First Five-year Plan Period, 1953-1957

Generally, during the First Five-year Plan there was little railway construction undertaken in the populous, eastern part of the country.[20] The industrial northeast already had a fairly well developed network which was able to carry the increasing production of that area without too great a strain. Apart from two lines of strategic importance, one from Yungtan to Amoy on the Formosa Strait and the other from Liuyang to Munankwan

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[19]Chi Yu, New China's Railway Construction (Peking: San-lien Book Company, 1953), pp. 3-7.

[20]Liu Tsai-hsing, China's Transportation Geography (Peking: New China Book Company, 1957), p. 27.

on the Viet Nam border, most railways were constructed in the west.[21]

The new lines built during the First Five-year Plan[22] include:

1. The Chining-Erhlien Railway, extended from Tsining on the Peking-Paotow line to Erhlien on the Sino-Mongolian border with a total length of 337 kilometers.[23] It shortened the rail distance between Peking and Moscow by 1,100 kilometers (700 miles).

2. The Lanchow-Sinkiang Railway extended the Lanchow-Haichow trunk line westward through Urumchi to Aktogay where it was planned to link up with the Soviet railway system in central Asia. This extension was ended at Urumchi and has not yet reached the Soviet border. It is extremely doubtful if the extension will ever be built as long as the Sino-Soviet dispute lasts. The line was designed to further shorten the rail distance between Peking and Moscow by more than 1,000 kilometers. Train service east of Yumen, the oil center, was opened in 1956.

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[21]Chang Kuei-sheng, op. cit., 535-536.

[22]The Chinese Communists had spent 41.7 percent of the JMP, 5,670,000 Yuan (total capital for railway construction in the First Five-year Period) to build new lines during this period. National Security Bureau, Reports on Railway Construction in Mainland China (Taipei, 1957), p. 24.

[23]Len Chao, The Chining-Erhlien Railway (Peking: New Knowledge Publishing Co., 1956), p. 2.

Upon completion this railway would be the longest identifiable railway in China--2,400 kilometers.

3. Work on the Paotow-Lanchow Railway of more than 1,000 kilometers was started in 1954. By the end of 1957, more than 400 kilometers of rail had been laid. The entire line was completed in 1958. It facilitated the building of the new iron and steel base at Paotow.

4. The Lanchow-Chinghai Railway was scheduled to be built during the Second Five-year Plan. Owing to the urgency of the development program in the Tsaidam Basin of Chinghai Province, work on the Lanchow-Sining section began in 1956.

With the construction of the Lanchow-Sinkiang, Paotow-Lanchow, and Lanchow-Chinghai lines, a railway network with Lanchow as its hub began to take shape in northeast China.

5. Work on the Paochi-Chengtu Railway, 668 kilometers long, linking northwest and southwest China, began in 1952. Track laying was completed in 1956, and it was opened to traffic early in 1958. As this line traversed the most difficult mountainous terrain, its completion was a real engineering feat. Owing to the sharp gradient between Paochi and Fenghsien, trains running on this ninety-one-kilometer section need to be driven by two engines. The railroad was electrified in the Second Five-year Plan.

In order to speed economic development of southwest China, work has started ahead of schedule on several lines involving great technical difficulties.

6. Part of the Szechwan-Kweichow Railway was a special line used by the local mines before 1949. It was completed in 1958. A new section was under construction in 1957, which extended from Kanshuicheng to Kweichow. After the bridge across the Yangtze at Chungking was completed, this line was linked with the Chungking-Chengtu line.

7. The Kweichow-Kwangsi Railway had the 308 kilometer Tuyun-Chengkiang section repair completed, and construction of the Tuyun-Kweiyang section (140 kilometers) was under way in late 1957.

The Szechuan-Kweichow and the Kweichow-Kwangsi lines greatly improved communications in Kweichow Province.

8. The Neikiang-Kunming Railway, which begins at Neikiang on the Chungking-Chengtu line, was developed through Tsukung and Iping and terminates at Kunming. Construction of this 700-kilometer line began in 1956. By the end of 1957, train service was opened on the section between Neikiang and Shuping, south of Tzekung. When completed, this line will provide a link between the Yunnan-Viet Nam line and railways in other parts of China.

9. The Yunnan-Viet Nam Railway was restored and opened to traffic at the end of 1957, forming yet another link with North Viet Nam. The other railway link with North Viet Nam is the Laiping-Munankuan line in Kwangsi Province.

10. The Litang-Chankiang Railway of 317 kilometers was completed in 1955. It connects Litang on the Hunan-Kwangsi line in the Kwangsi Chuang Autonomous Region and the port of Chankiang on the Leichow Peninsula in Kwangtung Province.

11. The Yingtan-Amoy Railway is 698 kilometers long. It linked Yingtan on the Chekiang-Kiangsi line and Amoy in Fukien Province and was completed in 1956. The Nanping-Foochow line (170 kilometers), also in Fukien Province, was still under construction at the end of 1957.

12. The Hsiaoshan-Chuanshan Railway in Chekiang Province was built between Hsiaoshan and Ningpo before 1949. However, the line had never been opened to traffic, and it became a highway during the Sino-Japanese War. In 1957 the Hsiaoshan-Ningpo section was restored and opened to traffic.

13. The Lantsun-Yentai Railway in Shantung Province begins at Lantsun on the Tsinan-Tsingtao Railway and ends at the Port of Yentai with a total length of

183 kilometers. It was opened to traffic on New Year's Day of 1956.

14. The Peking-Chengteh Railway was an old line, the greater part of which was destroyed during the civil war. The section between Miyun and Chengteh will not be restored because the road bed contains many sharp gradients and curves. A new section through Yingshoy, Yingtzu, and Shangpancheng was placed under construction in 1957.

15. Other railways constructed in China since the First Five-year Plan included several hundred kilometers of light forest railways in the lumbering areas of the Great Khingan Mountains and in the Little Khingan Mountains north of Ichun in Manchuria.

From 1953 to 1957, many branch lines were also built for factories, mines, and timber areas.[24] About 7 percent of China's railways are double tracked. The completed double-tracked lines at the end of this period were: Peking-Mukden, perhaps the most heavily traveled of all China's railways; Harbin-Dairen; the north-south Manchurian trunk line; and Mukden-Antung, which extends to North Korea[25] (Table 32).

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[24]The total mileage of new branch lines in this period was about 800 kilometers. National Security Bureau, op. cit., p. 26.

[25]Jen Yu-ti, A Concise Geography of China (Peking: Foreign Languages Press, 1964), p. 57.

TABLE 32

RANKING OF DOUBLE-TRACK CONSTRUCTION BETWEEN 1950 AND 1962 IN COMMUNIST CHINA

Railway Line	Terminals From	To	Length (km)	Rank	Region
Lung-hai	Hsinhailien	Lanchow	1,736	1	East-central
Ching-han	Peking	Wuhan	1,211	2	North-central
Yueh-han	Wuhan	Canton	1,115	3	Central-south
Ching-pu	Tientsin	Pukow	1,014	4	Northeast
Ha-ta	Harbin	Lu-ta	953	5	Northeast
Tung-pu	Fenglingtu	Tatung	869	6	North
Shen-shan	Mukden	Shanhaikwan	429	7	Northeast
Ching-shan	Peking	Shanhaikwan	417	8	North
Sui-chia	Suihwa	Chiamussu	381	9	Northeast
Hu-ning	Nanking	Shanghai	311	10	East
Shen-an	Mukden	Antung	277	11	Northeast
Cheng-tai	Shihchiachwau	Yutzu	204	12	North
Man-sui	Harbin	Imienpo	161	13	Northeast
Ha-sui	Harbin	Suihwa	125	14	Northeast
Feng-sha	Fengtai	Shacheng	104	15	North
Pen-liao	Penchi	Liaoyang	69	16	Northeast
Lien-ho	Lienchiangkow	Hokang	54	17	Northeast

Sources: Length and terminal data are from Communist China Monthly (Taipei), Vol. V, No. 7, July, 1962, pp. 38-45; Railways in Communist China Taipei: Bureau of Communications Research, Ministry of Transportation, 1961), p. 37; Geographical Knowledge (Peking), January 14, 1958, pp. 16-20; China Weekly (Tokyo), No. 146, October 10, 1962, p. 17; New China Agency (Peking), February 19, 1964.

Spatial Pattern of the Period of the Second Five-year Plan, 1958-1962

After 1958, railway policy underwent a change. Much more attention was given to the needs of the east.[26] Existing tracks were improved. The entire stretch north of Harbin to Changsha, via Peking and Wuhan, was double-tracked. Also double tracked were the Lunghai Railway from Chengchow to Paochi and the Peking-Suiyuan Railway from Peking to Paotow. Double tracking has helped to relieve the congestion of traffic in the east. The problem of keeping pace with increasing traffic remained acute, and rail transport, in spite of all that has been done, still proved to be inadequate. The north-south route from Peking to Canton has been improved. By building the Wuhan Bridge over the Yangtze in 1958, the trip from the capital to Canton was shortened by a day. The Yangtze was also bridged at Chungking in 1959, and another bridge was completed during this period to link Pukow and Nanking, providing uninterrupted rail service to Shanghai.[27]

Under the Second Five-year Plan three railways were scheduled for electrification: Paochi-Chengtu;

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[26] Foreign Languages Press, The Second Five-year Plan Fulfilled in Two Years (Peking, 1960), pp. 36-41.

[27] V. P. Petrov, op. cit., p. 76.

Peking-Paotow in the Central Mountain region, and lines on the Loess Highlands.[28]

A unique feature of the railway construction program was the part which the local communities were asked to contribute. Distinct from the national trunk lines--which were planned and built under central government direction--many branch or feeder lines serving mines, forestry work, and local needs were built and managed by local authorities or communes. About 6,000 miles of this kind of feeder line were planned by 1962.

New lines built in 1958 exceeded 1,200 kilometers, surpassing any previous year in mileage and capital investment.[29] The constructed goal was a nationwide railway network. The north-south trunk lines, the east-west trunk lines, and the trunk lines connecting the northeast with the southwest and northwest with the southeast were designed to form the backbone of this network. The major trunk lines were to be supplemented by regional trunk lines in the various regions, provinces, and autonomous

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[28] Ibid.

[29] The total planned state investment in communications in 1953 and 1960 are as follows: 1953--rail 13.3%, other 3.8%, total 17.1%; 1960--rail 15.5%, other 5.4%, total 20.9%. From T. R. Tregear, A Geography of China (Chicago: Aldine Book Company, 1965), pp. 197-198. In the years 1952, 1957, and 1958 the gross national products carried by railway and other transportation in China are as follows: 1952--2.4%; 1957--4.2%; 1958--4.9%.

areas. With such an integrated railway system, not only was it hoped that the links between the central government and the provinces would be strengthened, but it was anticipated that the various provinces and the special administrative regions and counties within the provinces would be brought closer together politically. The political administration in the country, especially in the areas inhabited by the national minorities, would be greatly accelerated.[30]

China's railway equipment industry, beginning from practically nothing in 1949, was able to manufacture about twenty locomotives and six thousand carriages a year after 1952[31] (Table 33). Moreover, the country has started producing electric and diesel locomotives.

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[30]It should also be noted that during this period there were seven projected lines listed in the Second Five-year Plan on which construction was started two years earlier than the planned date. They are: (1) Neikiang-Kunming line, section between Neikiang and Iping, (2) Kwangsi-Kweichow line, section between Kweiyang and Tuyun, (3) Anhwei-Kiangsi line, section between Wuhu and Kweichi, (4) Hunan-Kweichow line, section between Hsiangtan and Hsinghua, (5) Lanchow-Chinghai line, section between Lanchow and Sining, (6) Yunnan-Viet Nam line, between Pishechia and Hokow (Hanoi), (7) Szechuan-Kweichow line, section between Kanshuichang and Kweiyang. People's Daily News, Peking, Feb. 3, 1956; Ta Kung Daily News, Tientsin, Jan. 26, 1957.

[31]The annual production of locomotives in Communist China was as follows: 1949--0, 1951--0, 1952--0, 1953--21, 1954--52, 1955--98, 1956--184, 1957--267, 1958--350, 1959--555, 1960--835. T. R. Tregear, op. cit., p. 197.

TABLE 33

RAILROAD ROLLING STOCK IN SERVICE AND ANNUAL CONSTRUCTION (1952-1957)

	Rolling Stock		
	1952	1955	1957 Plan
Locomotives	3,310	3,600	3,860
Freight Cars	65,330	84,130	99,050
Passenger Cars	2,448	3,838	3,885

	Annual Construction	
	1952	1957 Plan
Locomotives	20	200
Freight Cars	5,792	8,500
Passenger Cars	6	300

Source: Theodore Shabad, China's Changing Map (New York: Frederick A. Praeger, 1956), p. 88.

By 1960, new railways connected all provincial capitals except Lhasa in Tibet and Kunming in Yunnan. By 1962, the end of the Second Five-year Railway Construction Plan, only Lhasa remained to be connected.

Railway mileage in China had more than doubled--to 25,000 miles with the addition of new railways since 1949. During the same period highways increased in length by five times--to 270,000 miles.[32] The combined capacity of railways and highways still fell far behind the economic needs of China. By contrast, the United States had 259,000 miles of railways and 3,510,000 miles of highways. China, with a land area larger than that of the United States, still had less than 230,000 miles of railway in 1966.[33] Railway transportation remained China's greatest weakness when compared statistically with other more highly developed countries.[34]

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[32]Annual increase of railway mileage (by thousand miles): 1952--15.1, 1953--14.4, 1954--15.9, 1955--16.8, 1956--18.2, 1957--18.7, 1958--19.5, 1959--21.3, 1960--24.5. T. R. Tregear, op. cit., p. 197.

[33]Included about 9,000 kilometers of new railways at the end of the Second Five-year Plan. For the mileage in the United States, see Charles Luna, The Handbook of Transportation in America (New York: Popular Library, 1971), p. 7.

[34]For instance, in comparison with the Communist countries, the land area of China is about 75 times larger than Czechoslovakia, but Czechoslovakia has almost the same mileage of railways as China. The Soviet Union has 120,000 kilometers of railways and, therefore, China needs 20,000 kilometers more railway to match the Soviet Union level of railway mileage per person.

Spatial Pattern of the Economic Recovery Period, 1963-1966

The political unrest prior to the "Cultural Revolution" stymied China's economic development. The stagnation of railway construction was a direct result of this unrest. Not only were railway administrators involved in the political conflicts, but the workers as well were forced to join the "revolution." Accordingly, new projects were almost completely stopped (Table 34). For example, construction of the Lanchow-Sinkiang Railway planned to connect the Soviet Central Asia Railway system was ordered stopped. The Sining-Lhasa project was delayed. The only construction activities during this period were on the Yunnan-Kueichow Plateau where the lines connecting Chungking to Kueiyang and Neichiang to Kunming were expanded.[35]

Summary

The spatial pattern provides an external expression of a railway's characteristics. The Chinese pattern is very unequally distributed throughout the country. It not only changed from period to period, but much of the spatial pattern was not justifiable solely on economic grounds. In general the spatial pattern of the Imperial Era concentrated railways in the relatively well-developed

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[35]Lines completed after 1966 were: Chungking-Kueiyang, Kueiyang-Kunming, and Neichiang-Anpien (southwest China), and Wuhan-Kuanghua (central China). Theodore Shabad, China's Changing Map (New York: Frederick A. Praeger, 1972), pp. 91-93.

TABLE 34

RAILWAY PROJECTS DELAYED IN COMMUNIST CHINA, 1966

(Not Including Double-track Lines)

	Name of Railway	Date Started	Length (km)
1.	Lanchow-Chengtu	January, 1958	750
2.	Neikiang-Kunming (Anpian-Huanwei section)	March, 1958	537
3.	Yunnan-Kweichow (Huanwei-Anshun section)	June, 1958	566
4.	Hunan-Kweichow (Lantien-Tuyun section)	January, 1959	828
5.	Chuanchow-Changping	January, 1958	400
6.	Fuchow-Amoy	April, 1959	460
7.	Yushan-Fuchow	December, 1958	568
8.	Hohsien-Yingtan	May, 1958	330
9.	Canton-Lienkiang (Shanshui-Muoming section)	June, 1958	560
10.	Lanchow-Sinkiang (Urumchi-Alashan pass sect.)	February, 1961	771
11.	Lanchow-Chinghai (Haiyen-Monyah section)	May, 1958	1,095
12.	Chengtu-Kunming (Chentu-Opian section)	April, 1958	251
13.	Chengtu-Kunming (Yilangping-Tali section)	December, 1958	102
14.	Szechuan-Kweichow (Chungking-Kweiyang section)	May, 1956	490
		Total	7,708

Source: Mainly from Communist China's Railway Transportation, unpubl. rept. from Mainland China, National Security Bureau, Taipei, Formosa, 1966.

coastal areas. These fragmented lines were the legacy of colonial rail construction. Individual segments were frequently without connecting linkages. During the Republic Era, concentration was shifted to Manchuria, the South Yangtze Hills, and various other lines in the areas of concessional developments. The government aspired to connect these fragmented lines into a network wherever possible. The spatial aspect of the Communist Era was different from the previous eras. Construction was directed first towards the west and north, and then it shifted to the eastern coasts and southwestern plateaus. The regional distribution of the railway network, while improved, remained uneven.

Individually, the spatial aspects of the Conservative Period (1866-1894) were in two directions. These were in the metropolitan regions along the coast and in the densely populated rural regions of the North China Plain. Manchuria, the Si Delta, the Yangtze Valley, and the eastern coastal region were the focus of concessions occurring during the Scramble for Concessions Period (1895-1905). During the Self-strengthening Period (1906-1910), the densest railway distributions evolved in the southeastern coastal and the Two-lake regions, and the least dense distribution of railways occurred in the Loess Highlands and on the Manchurian Plain. In southern

China, only the line on the Yunnan Plateau was developed. During the Nationalization Period (1911), the completed lines were all limited to the well-developed east coast and to connecting existing urban centers.

The geographic distribution of the completed lines during Dr. Sun Yat-sen's Planning Period (1911-1914) again emphasized coastal regions. Minor distribution links developed along the Great Wall in Inner Mongolia and on the Central Manchurian Plain. The spatial aspects of the Japanese Capital Penetration Period (1915-1920) stressed the significance of southern Manchuria, the Shantung Peninsula, and Inner Mongolia developments. The distribution of completed lines during the New Four-power Consortium Period (1921-1926) were equally important in Manchuria and central China. Some short lines also were built along the southeastern coast. Two concentrations were of primary concern during the National Government Control Period (1927-1935): the region of Manchuria and the South Yangtze Hills. Railway construction during the Sino-Japanese War Period (1936-1945) was limited to the southwestern mountain regions and northwestern China. More widespread construction took place in the southwest, the northwest, and the South Yangtze Hills during the Postwar Period (1945-1949).

During the Rehabilitation Period (1949-1952), the new Communist regime placed a very high priority on

the restoration of railways, but efforts were concentrated on a few key strategic lines in southwestern and northwestern China. During the First Five-year Plan (1953-1957) almost no railway building occurred in the populous eastern part of the country. Most railway efforts were concentrated in the west. After 1958, railway policy underwent a change and much more attention was given to the needs of the east. On the Loess Highlands and in the central mountain regions, the electrification of several old lines was a significant development. Local railways and feeder lines were constructed in many provinces during this period. During the Economic Recovery Period (1963-1966) almost all railway projects were stopped, except for some desultory activities in southwest China where the lines were finished to connect Chungking to Kuiyang and Neikiang to Kunming. Thus, at the end of a century of development, China's railway construction was undergoing a dark and stagnant period. The future, however, continues to suggest possibilities even greater than existed a century previously. After a gradual rise of rail-transport work in the early 1960's, another temporary decline seems to have occurred during the disorders associated with the Cultural Revolution in 1966 and its following years, but the railway construction was again reported to be improving by 1972.

CHAPTER V

THE ROLE OF RAILWAYS IN CHINESE ECONOMIC DEVELOPMENT

The Subservience of Economic Goals

The choice of railways as the principal method of mechanized movement in China was, in part, related to the availability of coal reserves. The lack of petroleum and of developed hydroelectric facilities forced China's developers to place greatest emphasis on a system of transportation for which fuel was abundantly available. Although not always economically viable, railways have provided a means of implementing modern, economic development in China. Given the frequent political and military interruptions to railway construction and maintenance, it is surprising that the existing network functions as economically as it does.

It is clear in reviewing the development of the Chinese rail network that considerations other than economic ones frequently took preference in development decisions. The scarcity of capital, the awareness of existing centers of production, and the need for internal linkages would seem to suggest that development of selected routes and a coordinated traffic pattern was needed. Unfortunately, railway construction in China since 1866 does not demonstrate a pattern of spatial economic maximization.

Before 1949, errors of design, location selection, management, technology, and investment added to the uneconomical quality of Chinese rail transport. These errors are strongly reflected in the low index of mobility, poor services, low volume of traffic, inadequate connections on the network, low market value of commodities transported, and high operation costs in China. Passenger traffic, reflecting political interests, has dominated the use of railways for the movement of people. Fortunately, the situation has improved under the Communist administration.

Index of Mobility

Measurement of rail lines per one hundred square miles, rail lines per ten thousand population, ton-miles per capita, and passenger miles per capita enable one to compare country by country rail performance. Collectively these averages can be used as an index of mobility[1] for classifying the nations of the world.

Using 1965 data, China's accomplishments in developing a rail system can be compared with that of other countries. Generally, the nations of the world may be classified into two groups--the mobile and immobile. Those countries with a freight mobility index

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[1]United Nations, Statistical Yearbook, 1958-1966.

above thirty have been considered as effectively connected. In evaluating China's score of less than ten--a score also achieved by Iran, Thailand, India, Burma, Indonesia and Pakistan--it is seen that China must be considered immobile. By contrast, Australia, Canada and the United States--all countries with relatively high per capita income[2]--have high scores varying from 189 to 223 on the mobility index.

Similarly, China along with Indonesia, Burma, and Pakistan have a value of under ten based on a passenger mobility index. This low level of mobility needs to be contrasted with the indices of over 100 achieved by Canada, Belgium, and the United States.

The tasks lying ahead for China are roughly indicated by these low indices of mobility which would be repeated if one examined ton-mileage, freight value, and similar data. After one hundred years of development, China remains essentially an immobile nation, at least according to indices of comparison similar to those used above.

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[2]Per capita GNP (gross national product) computed from U.S. Congress, Amendment to the Constitution of the International Labor Organization (Washington, D.C.: Government Printing Office, 1962), No. 179, pp. 24-25. Thirty was used as the standard index to separate mobile and immobile countries, according to Wilfred Owen, Strategy for Mobility (Washington, D.C.: The Brookings Institution, 1964), pp. 13-15.

Services

Poor Services in the Past

Railway equipment in pre-Communist China was old, unsafe, uneconomical, and uncomfortable. Trains were invariably slow and overcrowded. Low fares for passengers coupled with an inability to collect fares had contributed to the magnitude of railway deficits. One out of three passengers rode without paying because of governmental status or dictate. The obvious need for new equipment and modernization of the service remained unmet because of the political obstacles retarding upward rate adjustments needed to reduce passenger service losses. Railways suffered a cycle of poor service, low fares, increasing deficits, and poorer service.

The solution to these problems did not lie solely in more realistic fares. Even if modern passenger equipment could be financed, poor service would still result from the slow speeds imposed by inadequate road beds and light rails. Most Chinese railways were not designed to accommodate high-speed, heavy-load trains. In addition, where the movement of goods was heavy, it was frequently difficult to avoid interference between passenger and freight schedules. The economy of rail transport was often counterbalanced by slow deliveries and service deficiencies. Delays in delivery and scheduling of trains had resulted in high rates of spoilage. The inadequacy

of proper terminal facilities compounded the difficulties of storage, spoilage, and movement of goods.

Post-1949 Corrections

The Communist regime did try to improve the railway services in China by reorganization of railway administration, revising the fare and freight schedules, retraining and expansion of staff, providing for better amenities for the passengers and increasing the carrying capacity to reduce overcrowding and other matters relevant to offering better service. Administration has been unified. Operations of the different sections and the territorial units have been coordinated. Planning techniques have also been embodied in the new organization. Freights and fares have been revised and increasingly nationalized. Freight schedules are purposely being used not to maximize revenues, but to serve the ends of economic policy. Unnecessary cross transportation of goods is being avoided and zonal rates have been developed which are intended to achieve this object.[3] The rates, as a rule, increase rather than decrease with the length of haul and long-distance transport of goods is permitted only when it is necessary in the interest of economy.

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[3]Audrey Donnithorne, China's Economic System (New York: Frederick A. Praeger, 1967), pp. 252, 259, 267, 268, 451, 462, 498.

Rates have been reduced to about one third of what they were in 1937.[4] Railways are keeping the need of the nationalization of commerce in view and adjusting the rate structure to it. Every effort is being made to promote self-sufficiency in regard to the production of rolling stock, locomotives, and all other equipment needed for constructing and maintaining railways. Considerable success has been achieved in this endeavor. Passengers are being treated with more courtesy and consideration, and staff is being trained to cultivate personal contact with the passengers.[5]

Volume of Traffic

For overland freight railways provide the most economical way of carrying heavy bulk materials over long distances. Yet, it is apparent from figures of traffic carried and levels of national income that the volume of transport operations is closely related to economic progress. China's economy is so underdeveloped that there is always a low, uneconomical volume of movement. In the total network there are only a few routes that can be served economically on a volume basis. Many lines

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[4]Yuan-li Wu, An Economic Survey of Communist China (New York: Bookman Associates, 1956), p. 344.

[5]Gyan Chand, The New Economy of China (Bombay: Vora & Co., Publishers Private Ltd., 1948), p. 258.

must schedule departures at intervals sufficiently separated in time to permit the accumulation of an economical load. In addition, single tracking handicaps the rapid movement of goods. A rule of thumb is that a railway needs 1,000 tons per mile per day to be profitable.[6] Unfortunately, in China, there are only a limited number of routes that do or can be expected to carry this much traffic. Given the low volume of shipment, many double-track lines built by the Communists for strategic or political reasons will continue to be uneconomical for some time.

Railways have not adequately served the four main routes utilized by agricultural products moving to extra-local markets. These primary routes include rice and wheat from the Two-lake Region to the coast; tung oil, eggs, silk, and hides from the Szechwan Basin to the coast; hides, skins, and wool from Inner Mongolia to north China ports and to Shanghai. Even where lines traversed these areas, they tended to carry only small amounts of these unprocessed agricultural goods.[7] The effect of railway building on the less industrialized

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[6]Wilfred Owen, Strategy for Mobility (Washington, D.C.: The Brookings Institution, 1964), p. 96.

[7]Ministry of Communication, Chinese National Railway Statistics (Nanking, 1936), p. 71.

areas was economically discouraging. The line from Haiphong to Kunming, for example, never carried more than 270,000 tons annually in its thirty years of service.[8] It is clear that railway construction in China could not economically sustain development in other sectors of the economy to justify their continuing expansion. Obviously, low-cost transport facilities are an essential part of such development, but they cannot wholly precede nor produce it.[9] Government cargoes, while of large volume and always heavy, consist mainly of military goods and personnel. Goods for service and maintenance are not included in conventional haulage figures. Low volume of freight traffic characterizes the country as a whole.

Inadequate Network System

The pattern of railway networks is related to the number, orientation, and arrangement of routes. Differences in the structure of networks can be determined and measured by the examination of route segments and the places that are interconnected.[10] In a general

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[8] Chi Chao-ting, The Wartime Economic Development of China (New York: Institute of Pacific Relations, 1941), p. 246.

[9] Rhoads Murphey, "China's Transport Problem, and Communist Planning," Economic Geography, XXXII, 1 (Jan., 1956), 25.

[10] K. J. Kansky, Structure of Transportation Networks, Department of Geography Research Paper, No. 84 (Chicago: University of Chicago Press, 1963), pp. 1-5.

geographic sense, a network is considered to be an arrangement of routes with many interconnected route segments and many junction points or intersections.

An adequate railway network produces a more even distribution of routes across a nation. The railway network in China is an inadequate pattern--composed of five small separated networks. The densest networks are characteristic of northeastern China and the North China Plain, while the open network is to be found in northwestern China, southwestern China, and along the Southeastern Coastal Region. The regional networks are only now being interconnected by a system of interregional linkages.

Three patterns of railway networks can be recognized worldwide. The attenuated pattern consists of one principal route from which short segments depart at irregular intervals. The fragmented pattern exists primarily to connect the forms of transportation other than railway. The trunkline pattern consists of one or several roughly parallel routes that connect production areas and display little interconnection.[11] China does not belong in any one of the three categories but is rather a

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[11]Richard M. Highsmith, Jr., and Ray M. Northan, World Economic Activities, a Geographic Analysis (New York: Harcourt, Brace & World, Inc., 1968), p. 444.

conglomerate of the three patterns. This mixed pattern reflects the primary stage of economic development in China including errors of design and location selection. The primary stage of economic development consists of the exploitation of natural resources from ever more distant sources. Railways were constructed to connect the interior production centers with the coastal shipping points or nodes of population. As new natural resources centers are encountered even more distant from the coastal areas, railways have been extended further inland and have become more and more attenuated. In a more recent period railways were pushed toward the interior from the coastal focus. These lines eventually joined and thus created some trunk lines which traversed the area. The building process of the various periods has produced fragmented patterns in some regions. The existing mixed network pattern has handicapped China in her economic development over the years.

Low-market Value of Commodities Carried by Railway

In the early states of development, low-income countries are frequently producers of staple commodities with a low market value. If the difference between the value for a commodity and the cost of production is small, the amount remaining for covering transport costs must

also be small.[12] Economical methods of transport are important, therefore, if a nation is to produce and move great quantities of low-value products profitably. Given the low margin of surplus, railways are frequently non-competitive when considering the movement of low-value, large-bulk commodities. Unfortunately the logical direction of commodity movement in China has been mainly north-south.[13] Accordingly, water transport is frequently employed wherever possible. River systems were oriented west to east. The rivers thus did not enable cheap transit and, more importantly, retarded rail construction across them. The necessary use of high-cost railways to carry cheap-value commodities makes the railway system an uneconomical method of transport.

The Chinese railways have traditionally carried bulk materials and unprocessed agricultural products (Table 34, Map 14). Coal contributes by far the largest item of railway freight, accounting for some 40 percent of the total volume in 1960.[14] The uneven distribution of coal resources necessitates long hauls, especially

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[12] W. Owen, op. cit., p. 90.

[13] Food crops and manufactured products from Manchuria to North China Plain, and mineral products and food crops from South Yangtze Region to North China Plain.

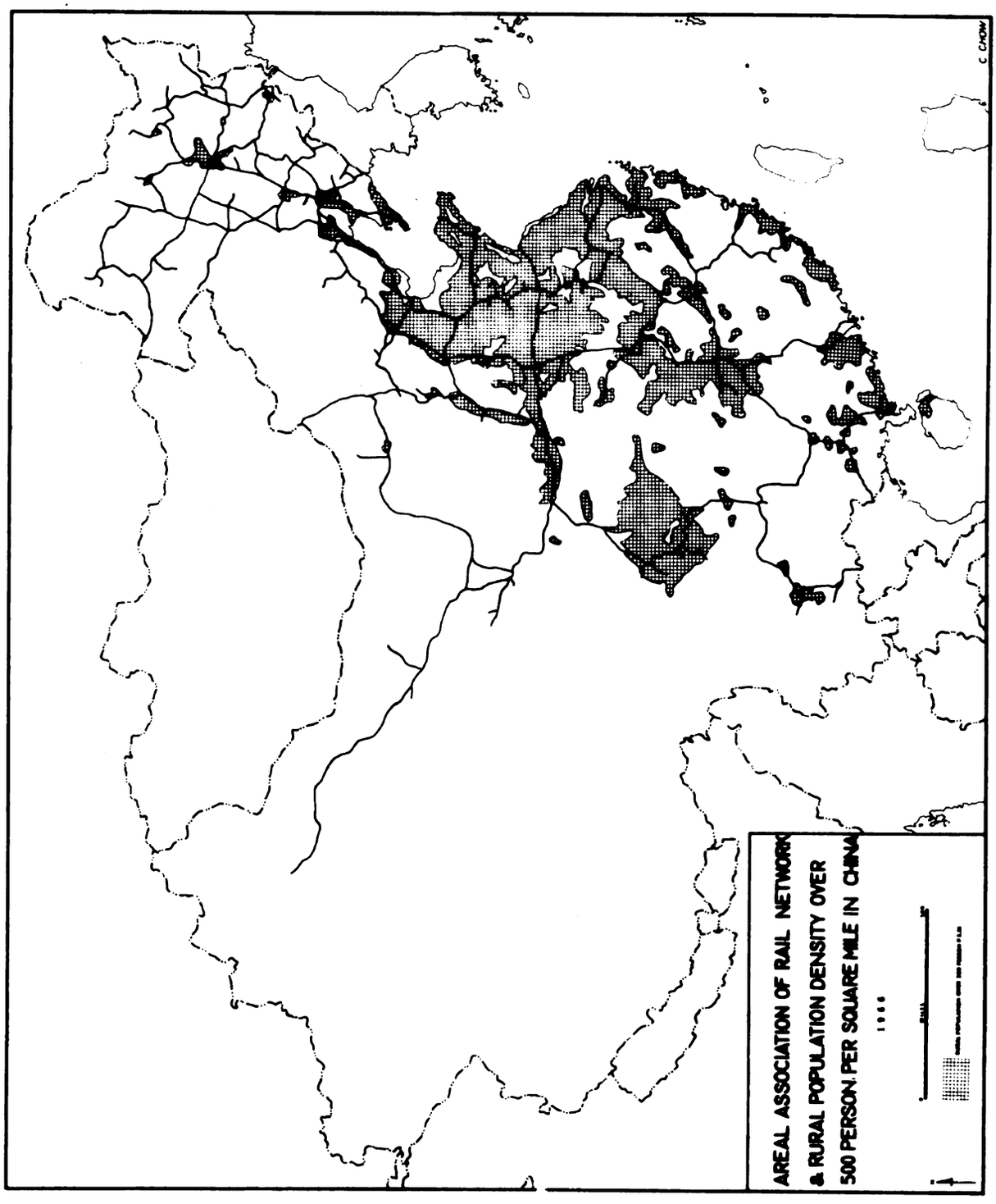
[14] A. Donnithorne, op. cit., pp. 247, 259, 264.

TABLE 35

STATISTICAL SUMMARY OF MOVEMENTS ON CHINESE RAILWAYS, 1936

Products of	Metric Tons Carried (%)	Ton/Miles Hauled (%)	Revenue (%)
Mines	56	54	28
Agriculture	14	16	14
Forests	1	0.2	1
Animals	1	0.8	3
Manufacturing	12	10	14
Government Cargoes	4	8	4
Goods for Service and Maintenance of Railways	12	11	3
Passengers	--	--	33
Total	100	100	100

Source: R. Murphey, Economic Geography, XXXII, 1956, "China's Transport Problem and Communist Planning," 17-28.


C. CHOW
AREAL ASSOCIATION OF RAIL NETWORK
& RURAL POPULATION DENSITY OVER
500 PERSON PER SQUARE MILE IN CHINA

Map 14

from north to south. Pig iron is second in volume shipped, followed by building materials of mineral origin.[15] Unprocessed agricultural products were the main commodities for export purposes before 1949. Foodstuffs, forest products, finished and unfinished manufactured goods were not commonly carried by Chinese railways during the pre-Communist periods. Since low-value commodities are carried by high-operative-cost railways, it seems that the heavy governmental investment in railway transportation will never be redeemed. Rarely had a profit been shown by the Chinese railway system since the inception in 1866. Since 1949, the financial position of the railways has been improved through careful budgeting, cost accounting, efficient administration and reduction of costs through emulation and cooperation of the employees. For the first time railways are now bringing some surplus to the treasury.

High Cost of Operation

The high cost of operation has been the consequence of the high cost of facilities, inefficiency in management, and difficulty in obtaining investment capital. Before 1949, all locomotives, rolling stocks and

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[15] Ibid., p. 259.

tracks were imported.[16] The transportation input was therefore unusually high. The inefficiency in management also added to the cost of operation. In a capital-poor country like China the main source of capital for railway construction was obtained through loans and grants from foreign governments. In some instances the conditions under which such monies could be used were more political than economic.

Loans and grants were also available from organizations set up specifically for this purpose. The foreign investors naturally wanted to make certain that they would profit from their investments and tried to control the lines in which they had invested wherever possible. Since freight volume has been generally low, the rates charged to transport products had to be unusually high to accommodate the rapid repayment of the investment loans. The cost of maintenance also proved to be high. Having suffered cyclic costs of this nature, the Chinese railway system has remained an uneconomical operation for more than one hundred years. In 1958, the cost of operating the railway was 1.191 yuan per "cumulative ton-kilometer." It was double the cost of highway

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[16] Ministry of Communications, op. cit., p. 40; Cheng Lin, The Chinese Railways Past and Present (Shanghai: China United Press, 1937), p. 6.

transport (0.653),[17] and four times higher than movement by inland waterway.

Passenger Traffic

In developing countries, rail transport has often involved as many passenger-miles per year as ton-miles of freight service. Indeed, passenger travel exceeded the movement of freight in many of the developing countries including Pakistan, Burma, Malaya, India, China, and a number of Latin American countries.

In 1960, the freight traffic in China was 326.63 billion ton-kilometers, and the per capita index was about 410. In the same year, the passenger traffic was 62,540 million passenger-kilometers (Table 35), and the per capita index was 142.[18] The density of railway lines was 8.6 miles per 1,000 square miles which resulted in 0.3 miles of railway for every 10,000 persons in China.[19] The function of railways in China has more often connected urban centers (Map 15) by passenger service than it has

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[17] International Union of Railways, International Railway Statistics (Paris: General Secretariat of the U.I.C., 1962), p. 76.

[18] United Nations, op. cit.,

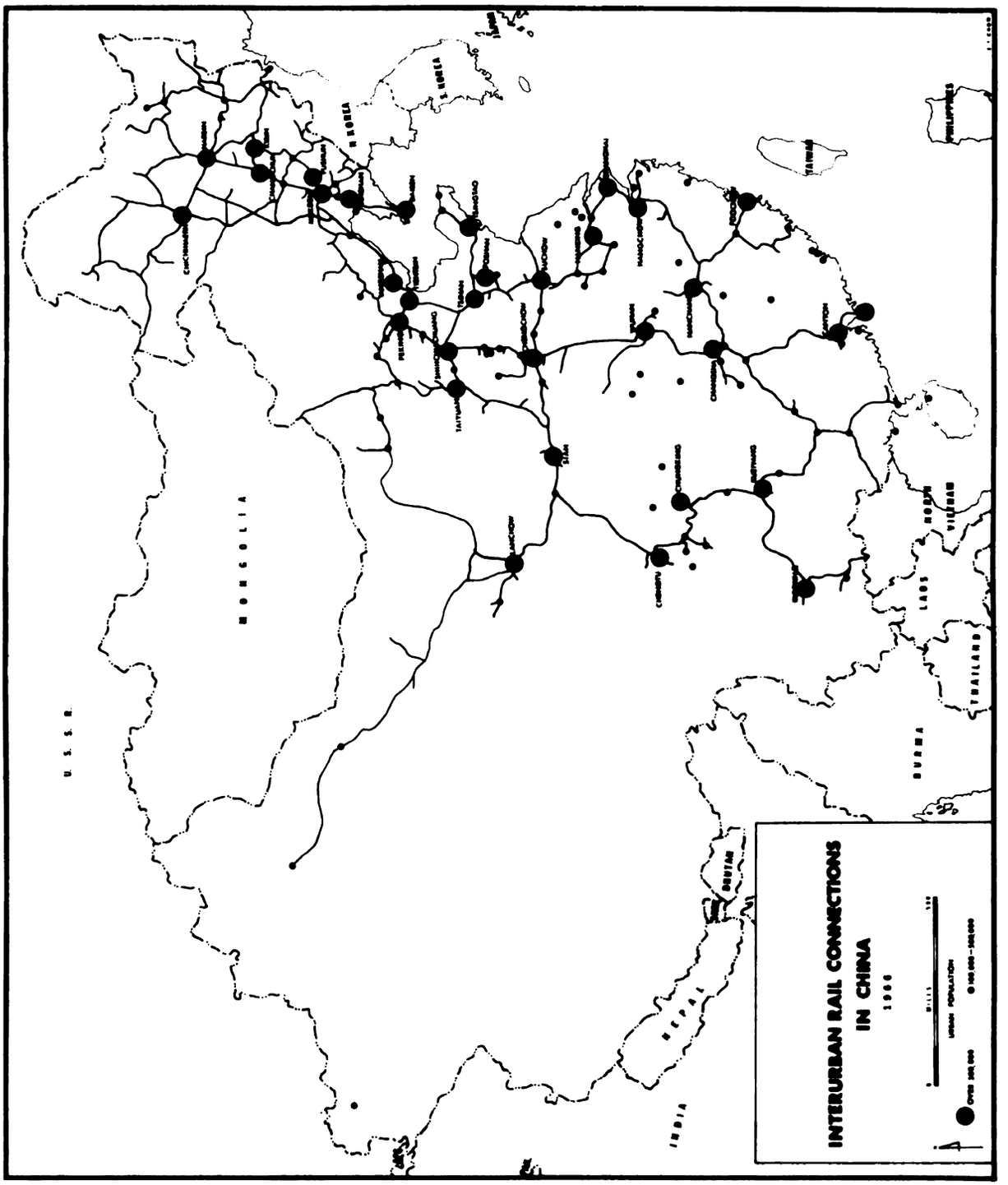
[19] Directory of Railway Officials and Yearbook (London, 1960-1961), pp. 506-508; United Nations, op. cit., pp. 542-544.

TABLE 36

COMPARISON OF PASSENGER TRAFFIC AND VOLUME OF FREIGHT TRAFFIC BY RAILWAYS FROM 1949 TO 1960

Year	Passenger Traffic (million passenger-km)	Volume of Freight Traffic (billion ton-km)
1949	13,000	18.40
1950	21,240	39.41
1951	23,052	51.56
1952	20,060	60.16
1953	28,170	78.14
1954	29,470	93.24
1955	26,740	98.15
1956	34,380	120.35
1957	36,130	134.59
1958	40,920	185.52
1959	56,700	265.58
1960	62,540	326.63

Sources: The Great Ten Years (Peking: 1959), pp. 129-133; People's Handbook (Peking, 1960), pp. 448-449; Yuan-li Wu, The Spatial Economy of Communist China (New York: Praeger, 1967), pp. 176, 182.


INTERURBAN RAIL CONNECTIONS
IN CHINA
1955
MONGOLIA
U.S.S.R.
N. KOREA
S. KOREA
TAIWAN
PHILIPPINES
LAOS
VIETNAM
THAILAND
BURMA
BHUTAN
NEPAL
INDIA

Map 15

connected productive centers for movement of freight. Railways are the most important transportation system for passenger movement in China because the lack of competitive highway and air services.

Specific Examples

The Chinese railway system has had serious problems of solvency. Of the chronic problems that confronted the railway administrators in China, one of the most difficult has been keeping the lines on a sound financial basis. This problem involved not only mere techniques of administration but also, and more importantly, the economic development of the areas surrounding a railway. Insufficient income has for years plagued government and private railways alike. The Tao-ching Railway in Honan suffered from insufficient revenue from its beginning. Since 1905, when the line was redeemed by the Peking government on a loan basis, an annual subsidy had to be paid to it in order to keep the line in operation.[20] The eighty-mile-long Nanchang-Kiukiang Railway in Kiangsi, originally built with a mixed capital of private Chinese investment, local tax levies, and Japanese loan funds, remained in private hands until 1928.

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[20]The Board of Posts and Communications, Memorials of the Board of Posts and Communications (Peking, 1908), Vol. II, pp. 202-204.

Then it was found that the income of the road was too low, due partly to the competition of water transport, and partly due to mismanagement. Japanese interests nearly obtained the entire line through default. This "critical situation" was resolved by making this line a Chinese state railway. It was accordingly placed under the ownership and direct control of the Ministry of Railways in January, 1929.[21] The history of these two railways graphically illustrates the obstacles faced by railway development in China. Frequently, the volume of goods to be transported remained more or less stationary. Railways, instead of bringing greater productivity and commercial exchange to an area, merely became a competitor --and often an unsuccessful one--to other existing modes of transportation.

The most serious factor in this situation was that the revenue from freight traffic, which should have constituted the greater part of any railway's income, often lagged far behind its passenger service. The Shanghai-Nanking Railway had depended on passenger traffic as its chief item of income all along; as late as 1936 the administrators of this and the Shanghai-Hangchow-Ningpo Railway complained that the competition of river

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[21] Cheng Hsin-cheng, History of Modern Chinese Communications (Shanghai, 1937), p. 125.

transportation seriously affected the freight rates of these lines.[22] The two north-south trunk lines, the Tientsin-Pukou and Peking-Hankow Railways, also were handicapped by low volumes of freight traffic, although to different degrees. The data indicate that in 1927, when both lines were disrupted by war and the total income of both railways had decreased by two thirds from the high point of 1923, the Tientsin-Pukow Railway reported that 20.5 percent of its total revenues came from freight and 68.2 percent from passenger service, while the Peking-Hankow line derived 28.5 and 66.8 percent from freight and passenger traffic respectively.[23] Aside from the fact that the operation of the Tientsin-Pukow line was seriously disrupted during the Northern Expedition, the persistently low freight traffic of this railway can reasonably be explained by the proximity of the coastal shipping between the south and north China ports. The Peking-Hangchow Railway, on the other hand,

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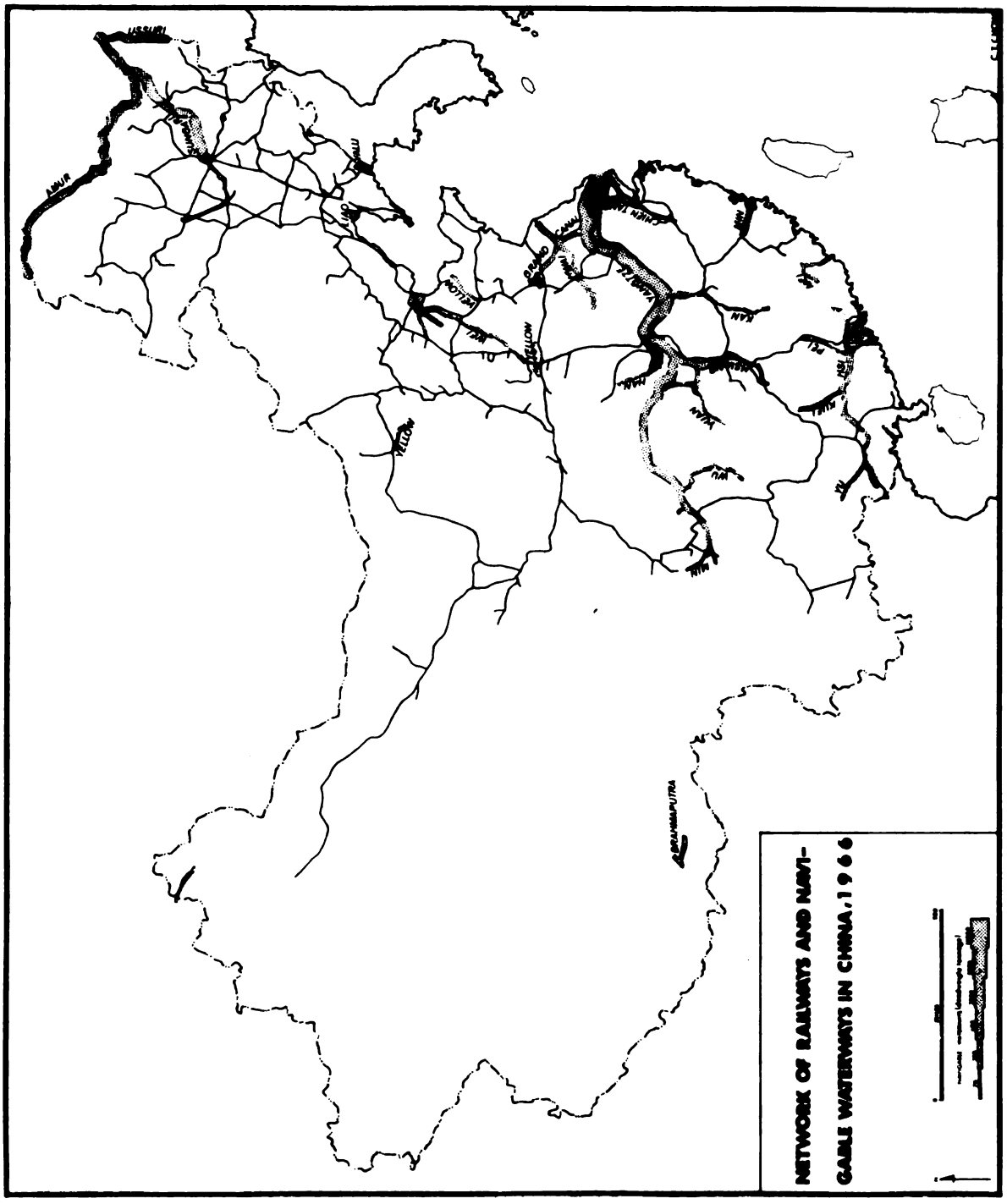
[22]The Shanghai-Nanking Railway suffered from an additional imposition in the early period of its operation in the form of likin levies: The entire line was divided into nine sections, with the likin duties for each section set at 1.5 percent ad valorem; passing through all nine sections on the railway, therefore, a shipper would have had to pay 13.5 percent ad valorem on his goods; this drastically reduced the volume of freight for this railway.

[23]Ministry of Communications, op. cit., p. 15; ibid., 1927, p. 15.

lies inland and away from major parallel water routes. It was therefore able to realize maximum income from freight services.

Complaints of water competition (Map 16) and insufficient freight loads have appeared to be prevalent and chronic circumstances among the country's railways. As a result various measures were adopted to remedy the situation. Freight rates for all the principal lines--including the Hankow-Canton, Peking-Hankow, Chekiang-Kiangsi, Lunghai, Shanghai-Nanking, and Shanghai-Hangchow-Ningpo Railways--were carefully reconstructed and reconsidered and regulated with reference to the freight rates of the competing water transportation. The Hankow-Canton Railway administrators, for instance, decided on having different rates for the three sections of the line in accordance with local conditions. While the rates of the southern and northern sections were set quite low owing to competition from shipping, the middle section, lying mostly in the mountainous country of southern Hunan, charged a higher rate for freight sufficient to compensate the losses incurred over the other sections.

Another example of competitive role structures is provided by the Chekiang-Kiangsi Railway which dropped its freight rates on the transportation of rice between Kiangsi and Shanghai by more than 50 percent in 1935, to


NETWORK OF RAILWAYS AND NAVI-
GABLE WATERWAYS IN CHINA, 1966
AMUR
YELLOW
BRAHMAPUTRA

Map 16

a level which was slightly below the rate charged for river transport over the same distance.[24] Periodic reductions in freight rates, especially those affecting foodstuffs, were relatively frequent.[25] In addition, the policy of "responsible transportation" was adopted by a number of railways after 1930. Under this system the condition of the goods on arrival was guaranteed by the railway, thereby encouraging shippers to send their cargoes directly by railway instead of through transportation firms as was the previous practice.[26]

Besides the problem of solvency, the Chinese railways often suffered from political and military forces that tended to obstruct their normal operations. This was another important factor for the formation of the uneconomical transport system of railways in China. However, these obstructions came from different quarters. The local gentry in the early years of railway history frequently collected tolls from passing traffic. Indeed, over 3,000 tolls were paid in 1906 to a number of local

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[24]The river competition for the Hankow-Canton Railway was fiercest between Hankow and Changsha in the northern section, Canton and Shaohou in the southern section. Ministry of Railways, Railway Gazette (Nanking, 1928), No. 1558, pp. 2-8.

[25]Ibid., No. 1587, p. 5; No. 1594, p. 7; No. 1604, p. 8.

[26]Ministry of Industries, Chinese Economic Yearbook (Nanking, 1934), Vol. II, p. 55.

influential personages along the route of the Pinghsiang-Hsiangtan line as salary for "protecting the road," in return for permission to lay the tracks throughout their districts. Another disastrous influence was the destruction caused by civil war. Fighting in Honan, for example, stopped all rail traffic in the province throughout 1925.[27] The most far-reaching and serious effects, however, were wrought by the warlords and their armies in the early Republican Period. Warlords regarded railway passage through their territories as nothing more than a source of revenue, and often directly interfered with the administration and finances of such railways. Rolling stock of the railways was commandeered by the armies and then was retained by the troops indefinitely. Long after the northern expedition, the Ministry of Railways still found it necessary to dispatch numerous appeals to the military authorities and the Ministry of War for the return of rolling stock.[28]

The railways also were asked during the northern campaign to "assist in providing military supplies" out of their monthly revenues. Agents of the local armies

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[27]Chen Ming-hsun, The Problem of Chinese Industries During Economic Reorganization (Shanghai, 1928), p. 85.

[28]Ministry of Railways, op. cit., Vol. I, pp. 89-92, 93-94, 107-111; Vol. II, pp. 93-94, 110-114.

were sent to the railway stations to make collections on the spot. The money thus taken from the major railways in a three-month period in 1928 amounted to $3,693,800, despite the fact that the railways at that time were short of operating funds. The workers' wages of the Peking-Hankow Railway at this time were in arrears. While the National government proceeded to abolish the system of "assistance in military supplies," it was not easily or immediately accepted by the militarists in the provinces. It was some months later before the military was reconciled to the new situation; henceforth all military expenditures were formally made the responsibility of the Ministry of Finance.[29]

Another method of gaining tribute from the railways reached its height during the last days of the civil wars. Armies contracted for commercial freight transportation and used engines and cars requisitioned from the railways. This practice gradually disappeared after the Ministry of Railways repeatedly protested to the army leaders in 1928 and 1929.[30] The willful imposition of heavy transit duties on freight transported by railways, particularly the Peking-Hankow Railway, sometimes

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[29] Ibid., Vol. I, pp. 112-113; Vol. II, pp. 81, 95-97, 98-100, 103; Vol. III, pp. 116-117.

[30] Ibid., Vol. I, pp. 89-90; Vol. III, pp. 91-92.

increased the shippers' tax burdens as much as twentyfold, which resulted in nonuse of the railway facilities and added to the general economic confusion of the time.[31]

Railway finance was, of course, directly affected by all these encroachments. From 1928 to the eve of the Japanese war the accounting and fiscal administration of the state railways were studied by central government agencies, with a view to (1) establishment of an "independent" branch of railway finance separate from the general fiscal administration of the government and (2) setting up a unified accounting system that would be handled by experts from outside the ordinary administration of the railways. The fight against the military inroads on the railways' revenue was one of the first steps taken.[32] Unfortunately, the eight-year Sino-Japanese War stopped this improvement. The railways were entirely assigned to military uses during the war.

The growth of the through-traffic arrangements among various railways and between the railways and water and highway transportation systems can be taken as an index of the better integration of the railway system and of the generally greater stability in China. Inter-railway

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[31] Ibid., Vol. II, pp. 77, 102, 151.

[32] Ibid., Vol. I, pp. 142-143; Vol. II, p. 16.

traffic was initiated in 1912, but application of the system was intermittent for the next sixteen years until, in 1928, it was halted altogether. During the years of its greatest efficiency, the aggregate income of the railways having through-traffic connections rose from $2,600,000 in 1919 to over $13,000,000 in 1923.

Through-traffic was revived after the establishment of the National government. By 1932 most of the major lines provided through service at least with regard to certain kinds of commodities, including salt, coal, flour, textiles and tea.[33] In the same years the railways also achieved sufficient operational efficiency so that it was possible to proceed with through-traffic arrangements with a few highway systems, beginning with those of Chekiang, Kiangsu, Anhui, Hunan, and Shansi. Regulations for railway-highway through-traffic were drawn up under the direction of the Ministry of Railways in 1936, and further development of integrated through-traffic using both inland and coastal waterways was encouraged by the government.[34]

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[33] Ministry of Industries, op. cit., Vol. II, pp. 60-62.

[34] For the Shanghai-Nanking Railway, through-traffic arrangements with river transport on the Yangtze was a way of increasing its own freight load. Ibid., Vol. II, p. 63.

On the eve of the Sino-Japanese War China's railway development had just achieved a modest measure of economic stability and administrative efficiency, with foreign capital still in a dominant position. However, in 1936 a Five-year Railway Plan was announced which aimed at constructing over 5,000 new miles (8,500 kilometers) of railway between 1937 and 1941, primarily in the southwest, the northwest and the southeast.[35] The Sino-Japanese War soon intervened with the attendant loss and destruction of much of the country's existing mileage. By 1941, only 15 percent of the lines still remained in Chinese hands, while reliance on imported building material and rolling stock made the construction of new lines in unoccupied areas extremely difficult. Even so, a few hundred miles of new railways were built with imported and salvaged materials.[36] The significant element in this situation was not the actual mileage added but rather the increasing realization on the part of the articulate public from the 1930's on, that the building of the railways must be integrated with the development of the nation's economic resources. Nevertheless, the Communists

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[35]Leonard G. Ting and R. Q. P. Chin, "War and Transportation in China," Nankai University Social and Economic Quarterly, XII, No. 1-2 (January, 1941), 8.

[36]Ibid., 15-20.

have built many new lines since 1949, emphasizing political and strategic purposes together with economic considerations. The improvement of railway services and operations has advanced accordingly. Yet rail operations during the Communist regime seem to have remained as an uneconomic enterprise because of low volume of traffic, low market value of commodities transported, and high operation costs for the railway systems.

The Role of Railways in China's Economic Development

The role of railways in China's economic development can best be understood using the following circumstantial stages:

1. Before the involvement of the Western powers with the Chinese, China was largely self-sufficient in food supply. Transportation was very primitive and inadequate. Rather than possessing a linked pattern, China had a segmented economic pattern with a regional emphasis --either regional sufficiency or regional deficiency. Though wealthy regions usually had abundant food, there was always the problem of the lack of suitable transportation for the needy regions. Before the railways were introduced into China, animals, human carriers, and inland waterways played the major transportation roles. Because of the lack of railway services for heavy-bulk and

long-distance hauling, agriculture was limited to a subsistence level, either self-sufficiency or insufficiency, and never reached a commercial level. Markets were localized by serving only the individual regions.

2. After the conflicts between China and the Western powers, China's economy was altered by colonial politics. The Western powers used China as a source of raw materials for their overproduced industrial goods. As a result of their differing economic purposes, each of the Western powers built its own individual transportation system in China. Since the colonial transportation system constituted only the railways, it was during this period that China's railway backbone was formed. Railways provided a means of connecting seaports and hinterlands and played a transitional function in transporting raw materials from the colonial land to the mother country. Railways served as the major land transportation system complementing the ocean carriers waiting at the seaports. Economically, China's seaports and railway transportation system never benefited her directly. These systems served as the collective agencies for Western economic aggression. In fact, under the colonial railway pattern as it was established by the Western powers, China became even more regionally separated. Economic regions, isolated from one another, produced local

political authorities which gave rise to continual civil war. The artificial pattern of colonial rule is stamped on much of the rail system, with its different gauges. In some cases, routes conformed to the borders between the spheres of the ruling powers rather than between economic partners.

3. After the Republic was established in 1911, China had a chance to unify itself both economically and politically. Railway transportation was nationalized and was placed under Chinese control. It remained under Chinese authority until the Sino-Japanese War stopped the possibility of any further economic achievement. The railways, almost completely subjugated by the Japanese, were used by the enemy militarily to control occupied territories in China. Though several rail lines were projected to southwest China during the war period, none of them actually was placed under construction until 1949.

From the economic point of view, the pre-Communist railways represented only the smallest beginning of an adequate system in a country of this size. The freight traffic was mainly outward-bound minerals. Products of animals hauled by the railways were almost entirely hides and wool and their small importance is again a reflection of local markets. A few manufactured goods reflected their ability to pay railway rates, their need of bulk

shipments, and the concentration of the railway network in the more industrialized eastern lowlands. The long-distance passenger traffic was very important in pre-Communist China because of the lack of air and automobile services. Thus, the railways in pre-Communist China did not play a role in promoting the Chinese economy from the primary stage to a secondary level. Unable to supplant the established water routes, the railways did not precipitate a commercialization of agriculture, nor did it markedly stimulate industrialization, except in the Japanese-built Manchuria.

4. After the Communists assumed power in China, industrialization was emphasized. Seven "Economic Cooperation Regions" were established, based on an idea borrowed from Lenin. Industries were relocated for the purpose of upgrading regional self-sufficiency to national economic development. For the purpose of reaching this goal, railway transportation was particularly emphasized in mainland China. The spatial economy was changed as follows: (a) Economic Cooperation Regions with their own centers were established in northeast, north, northwest, central, south, east, and southwest China. (b) Medium-sized cities sprung up in former undeveloped regions with either manufacturing or transporting functions. (c) Agricultural lands were created in central and northwest

China. (d) The profile of the Chinese economy was radically altered by railway construction in northwest and southwest China, although the expansion of the railway network did not take place evenly.

The changes of the spatial economy generally resulted from the planned economy. Railway transportation played a central role in supporting the planned economic policy. The reasons for emphasis on railway transportation in China's economy can be attributed to the following: (a) Internal accessibility was urgently needed to achieve the socialistic goal. (b) The industrial complex plans needed railways to connect all industrial centers. (c) The self-sufficiency regions were dependent upon railway transportation for interregional trade. (d) Railways served as the backbone of the planned national transportation networks. (e) New railways connected the borderlands and China proper. (f) New railways in former undeveloped areas brought about a conspicuous change in the distribution of China's new industries. (g) Railway connections between the primary and secondary markets were a necessary condition for the system of agricultural production and distribution. (h) New railways have served as a major tool to relieve congested population areas and as the major influence in increasing the urban population of the new railway centers.

(i) China's mining economy is an independent system. China's manufacturing is somewhat power-oriented and raw-material-oriented. Railway transportation is needed for such economic conditions. (j) Since the railways are subsidized by the Communist government, they carry what needs to be carried. Therefore, both the passenger and freight traffics are growing faster than in any comparable period in pre-Communist China.

The improvements and reorganization of railway transportation in Communist China has been carried out with an understanding of its changed role in China's economy. At the present time, the railway transportation network in China is serving as the bridge between agriculture and industry. Railway construction is ending the colonial economic aspects and is increasing the national economic achievements. It is linking region to region inlandward instead of coastalward. It is making urban communities the markets for agricultural products and rural communities the markets for goods manufactured in urban centers. It is balancing the uneven distribution of the population as a tool of national policy. In addition to freight traffic, it is handling most of the long-distance passenger traffic. Economically, it is connecting the border areas with China proper. It is helping to build up an independent system of industry in

China and is trying to connect all the industrial centers --both old and new, light and heavy--for the goal of a complex industrial plan. China's industrialization, therefore, has begun its first important step.

Summary

In summation, railway development in China during the period from 1866 to 1966 has not contributed significantly to the economic development of the country. Although recently much has been achieved in improving the overall network or pattern of railways, the system has remained operationally uneconomical. After a century of development, China's railways must be considered still in a primary stage of development. Political and military factors have been responsible for retarding the economic benefits to be obtained. Indeed, the railroads of China contrive, even today, to reflect a political-strategic stature rather than to operate solely on an economic basis.

Errors of design, location, management, technology, and investment have caused the rail-transport system to remain uneconomical. In a capital-poor country such as China, it has been difficult to raise investment capital throughout the period examined. Unfortunately, strategic railways cost money and have exhausted valuable resources which were necessary for the construction of

more economic routes. In retrospect, even those few lines in China which appear to be economically sound prove to be uneconomic when measured against commonly accepted transport principals. The low volume of traffic, high cost of bulk movement, and the low market value of commodities transported have tended to reinforce the non-profitability of the railway operation.

The railway system in pre-Communist China had not precipitated commercialization of agriculture, nor has it stimulated industrialization. Given a period of political stability and national commitment to the overall development of the country, it is quite likely that railways will contribute more directly to economic development in the future under the Communist planning. Perhaps the experience of the next decade will provide some indication of the role Chinese railways are to play in changing patterns of development in this part of the world.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Transportation is a true form of production because it increases the value of goods by its "place utility." Its function is quite different from other economic activities in that it is derived from other goals and designed for service. It is a necessary but not sufficient condition for a country's economic development. Selection of an appropriate transport system can serve as a key to economic development. Transport development affords unparalleled opportunity to make mistakes, including errors of location, technology, design, management, choice, and investment.

Railway transportation has its advantages and disadvantages. Railways can assist an economy by carrying more goods in less time at a cheaper rate than can any other type of mechanized movement on land. The existing railway networks of the world indicate that countries differ in their achieved stage of economic and transport development. It is sometimes difficult to realize that railways, in the more developed parts of the world, were once no better and frequently were much worse than are the railways in most underdeveloped countries today. It is to be expected, therefore, that

railways will continue to provide new opportunities for underdeveloped countries to achieve their individual economic and social goals.

In Asia, India, Japan, the Soviet Union, and China, transport today is railway-oriented, but each demonstrates a different stage of development. Railways encouraged China's attempts to achieve economic development. However, after a century railways must be considered only in a primary stage of achieving this goal.

The major characteristic of Chinese railways is one of changing patterns as a result of varying purposes in building the railroads. From an historical view, such changes demonstrate aspects of conflict between foreign control and internal self-strengthening. Fourteen variables within three political eras can be recognized. Comparatively speaking, passive construction, strategic function, and foreign control of management characterized the Imperial Era. Passive construction, military function, and foreign capital penetration characterized the Republic Era. Finally, rapid construction, economic considerations and political functions, and the combination of state control and self-supporting capital characterized the Communist Era.

The spatial pattern of railways provides an expression of the underlying characteristics regulating

their development. The Chinese pattern is one of very unequal distribution. It has changed from period to period, and much of the spatial change in growth or lack of growth has not been related to economic considerations. The spatial distribution of railway construction during the Imperial Era emphasized development in the commercially well-developed coastal areas. During the Republic Era concentration was shifted to Manchuria, the South Yangtze Hills, and various scattered locations among the unconnected colonial sectors. Concentrations developed during the Communist Era first in the west and north and then in the east and southwestern areas of China. The geographic distribution of the railway network--while improved--has remained fragmented and uneven in coverage.

The internal structure of the railway network can be described as a multinuclear composition. The complex structure has resulted from the interaction of factors such as geography, colonial intervention, strategic consideration, political experience, foreign trade, domestic economy, and available investment capital. One or more of these items occur in various combinations in each of the fourteen periods; usually one factor has dominated all others.

The combination of factors has had important economic consequences including a delay in the era of the

railway in China's economic development, the formation of an uneconomical system of railway transport, and the creation of a role for railways in China's economic development quite dissimilar from the expected norm. Unable to supplement and supplant the established existing transport routes, the development of a rail system before 1949 had not precipitated a commercialization of agriculture, nor had it markedly stimulated industrialization.

From a centennial view, the construction of railways in China has in a sense been a politico-economic phenomenon. However, it is postulated that only an economically-based railway system can give China's economy a promising future.

The question to be faced in any transportation study must be what is the appropriate transport system for a specific country's stage of economic development? The conclusion of this study clearly is that an appropriate transport system is one which stimulates economic development by its suitability for a given country's circumstances. It is not the method of transport that determines the type of economy for a country, but rather, a country's type of economy that will often limit the selection of transport modes. A type of transportation derived from economic characteristics within a country

must be flexible enough to be altered whenever the economic circumstances change. If the system of transportation remains unchanged after the economic development level has changed, it is no longer appropriate.

For instance, the railways contributed significantly to the growth of the American economy, but nevertheless were forced to share large volumes of traffic with competitive highway and airway modes. The difficult economic circumstances in China today prevent a shift in the method of transport to systems of highways and airways used by many advanced countries. China is a railway-oriented country, but unfortunately its economic potential has been interrupted by political, strategic, and other factors during the past one hundred years of railway development. It is seen that the transport problems facing China, while historically specific, conform to generalizations inhibiting transportation development in other countries. The Chinese transport development experience is not unique but part of a larger shared transport experience.

Additional interpretation of the characteristics of China's railways during the one-hundred-year period is needed. Further detailed research might include the examination of the purpose of construction, function of existing conditions of operation, and value for

economic development of individual lines. The changed economic pattern of China over a century of observation requires a clear and critical analysis of its impact upon political and diplomatic strategy. There is need to apply the quantitative techniques and theoretical tools of modern economic geography to this subject matter. Escape from the confines of the past is never easy; it has been particularly difficult in China. The evidence that must be re-examined is vast, and the economic significance of railways is intricately intertwined with a host of social, political, and strategic issues. To evaluate the past is much easier than to predict the future. Accordingly, a continuing re-evaluation of China's transport system will be necessary to demonstrate the universality of China's transport experience.

APPENDIX

EXPLANATORY TABLE ON CURRENCY CONVERSION

1. The following rates were used in the adjustment and resumption of Chinese Railway Loan Service, 1911-1937.

   £I = Chinese National Dollar 16.56958(CN$)
   = US$4.9248
   = Belgian Francs 147.456
   = French Francs 74.496
   = Guilder 7.1616

2. Until October 1, 1941, the Chinese National Dollar was maintained at the following rates with Sterling and the gold dollar:

   CN$1 = US$0.29722

   1s = $\frac{231d.}{64}$

3. On October 1, 1941, the exchange rate of the Chinese Dollar was changed to:

   CN$1 = US$0.528125

   = $\frac{35d.}{32}$

4. On July 10, 1942, the exchange rate of the Chinese National Dollar was changed to:

   CN$1 = US$0.50625
   = 3d.

5. The "Tael" was an old Chinese currency designation in the early part of the Manchu regime, and was equivalent to about US$0.40.

Source: Chang Kia-ngau, China's Struggle for Railroad Development (New York: The John Day Co., 1943), p. 322.

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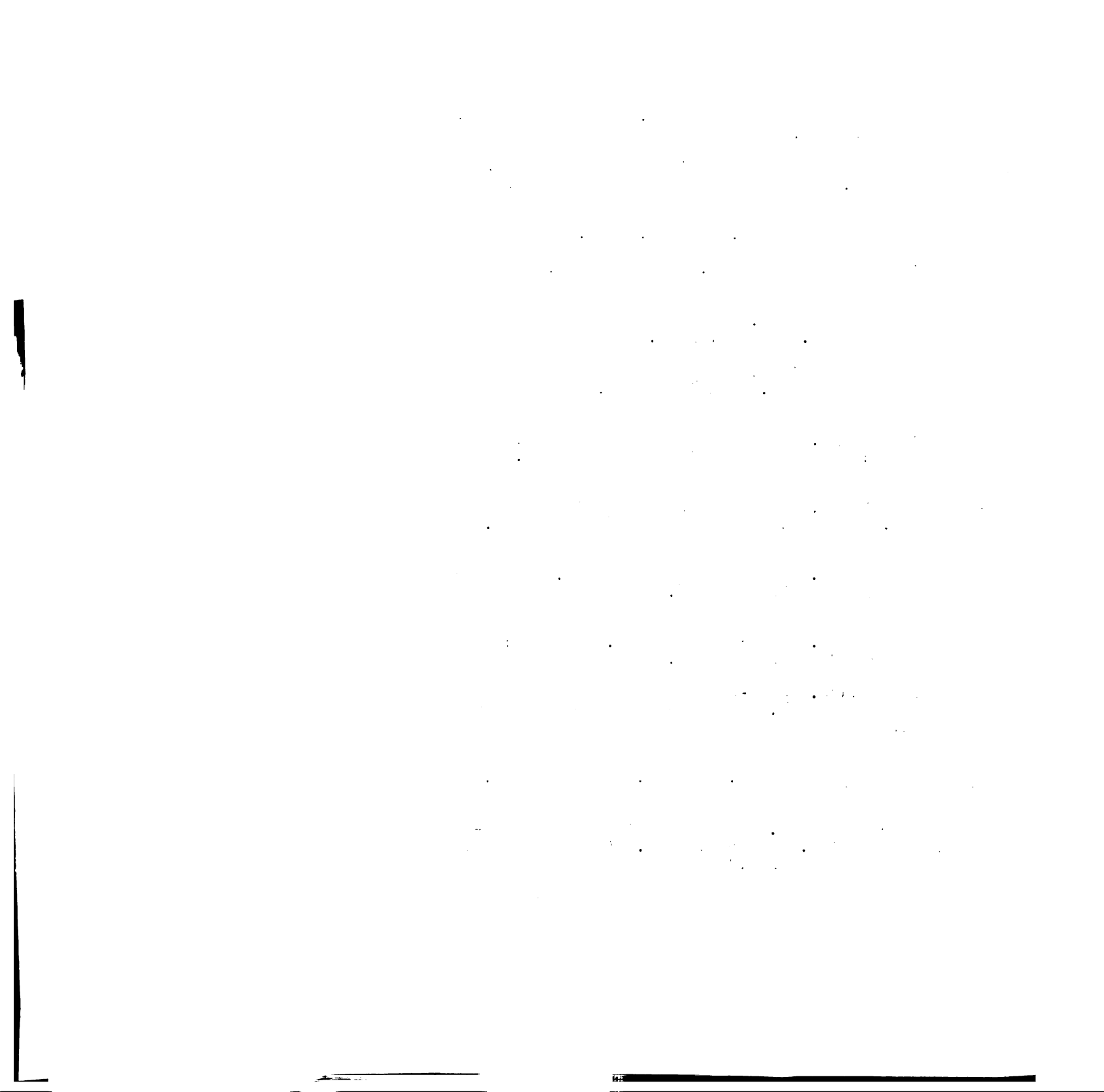

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