WATER TRANSPORT IN CHINA

BY

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Two essential features of civilization are the association of men in co-operating groups and the sub-division of labour. Hence we find that in the hunting stage there are small mobile camps; in the nomad pastoral stage there are large mobile camps; in the agricultural stage there are numerous small fixed villages with field paths; in the agricultural-commercial stage there is a system of villages, towns and cities, connected by roads and rivers; and in the modern condition with international relations there is a complex of villages, towns, cities and ports, connected by roads, railways, rivers, canals and ocean routes. In each case the "centres" are places for the redistribution and reconstruction of bartered goods. The modern state forms a living group in which all the individuals are more or less co-ordinated. The farmers supply all the others with the surplus production of food and raw organic materials, and they in exchange provide the farmers with their surplus of manufactured goods or enable the farmers to forward agricultural products to remoter individuals, with whom a similar exchange is made. There is thus a steady flow of goods to and from the various centres, and as civilization advances the volume of flow increases. Every aid to easier inter-communication benefits both producer and consumer. As H. G. Wells showed nearly thirty years ago in his book "Anticipations," there is a close relation
between the methods of transport and the spacing of the group centres. Villages are situated within convenient walking distance of fields worked by the residents. A country town is located within one day's convenient access of the group of villages which surrounds it. The larger centres are determined by geographical and political conditions, but the number and spacing is also dependent on the economics of transport and distribution. The easy and continuous flow of commodities is thus an essential factor in the vitality of a civilisation, and improvements in communications have tremendous influence on the wealth of a country. The steam locomotive in the last century entirely transformed the activities of Europe and America, and the motor-car is now creating another similar drastic change. The steamship similarly has transformed international commerce, and aviation is beginning to produce analogous results. Back of all these is the economic factor. The new methods of transportation (excepting aviation) are cheaper than the old ones, and therefore enable more goods to be exchanged over the same distances, or the same goods to be exchanged over greater distances, and in both cases more rapidly, thus saving labour. In the growth of China, starting from the first nucleus in Western Honan, the reclamation of the marsh land from the migrating rivers played a very large part, and in this connection the superiority of water transport over land transport on natural routes early become apparent. As a result we find that the whole of the plains of China are traversed by navigation routes, which are in most cases tremendously more effective than the land routes. In modern times the railroad (and to a very small extent in China the motor road) has competed with water routes, but it is only where the water routes are naturally poor or the appliances are antiquated that the railroad or motor routes successfully rival the water routes of similar length. Thus the Grand Canal has been much more affected by ocean transport than by the Tientsin-Pukow Railway.

The reason for this superiority of the water route is not far to seek. The resistance to motion in water is minute compared with that of the best land transport except at high speeds, and diminishes per unit weight of cargo with the size of the fully-loaded ship. For short journeys the question of extra handling to and from the ship, together with the delay of the ship during loading or discharge, enters into the question, but for long journeys the differences are enormous. Ocean transport is particularly economical.

Transport in small cargo boats in the neighbourhood of Shanghai may be less than three Mexican dollar cents per ton mile, and can be reduced appreciably below this with larger vessels and long hauls.

Ocean transport may be as little as half a Mexican dollar cent per ton mile for long journeys.

Motor truck transport works out at about 15 Mexican dollar cents per ton mile, but is dearer than hand cartage for very short routes.

Rail transport in China is rarely less than one Mexican dollar cent per ton mile.

Wheelbarrow transport may be as high as twenty or more Mexican dollar cents per ton mile.
Camel and bearer transport is still more expensive. These figures are all very approximate, as in each case the handling charges and the length of transport affect the figures in contrary ways. It will, however, be seen that motor transport cannot in general compete at all with water transport unless the water route is very much longer or there are some special conditions (such as urgency in regard to perishable goods). Rail transport can and does compete successfully with inefficient water transport, and has the further advantage of speed (reducing wages per mile and causing other indirect economic benefits), but it cannot compete with good water transport on moderately large vessels.

There is hence a saving in water transport which may be partially anticipated and warrants expenditure on improvements. Improvement of water transport may take two forms:

(a) Improvement of the waterway by mechanical dredging or controlling the currents so that they wash out obstructions.

(b) Improvement of the vessels.

The first is a matter for careful study, and in some instances is very advantageous, but in others the costs involved are so enormous that they would exceed the anticipated savings.

The second is chiefly a matter of size. Mechanical propulsion is generally cheaper than wind power, provided that cheap fuel is accessible, because of its certainty, superior average speed and controllability.

Very high speeds are not economical, since the resistance to the motion of a ship varies as the square of the speed, but the saving in wages per mile due to speed does make a very fair speed economical.

The resistance to a ship depends on the wetted surface area, so that for similar proportions it varies as the square of the dimensions, but the cargo-carrying capacity varies as the cube of the dimensions, so that the resistance per ton of cargo diminishes with the size of the ship. This is the reason why ocean transport in large full ships is so cheap, and indicates that, other things being the same, the largest possible ships, with the greatest draughts that the channels will permit, are preferable.

There are many factors to consider in regard to the future development of transport in China, but the above general ideas show clearly why every effort should be made to improve the water routes within economical limits and to enlarge the ships which use them.

The services for irrigation and drainage of the various water courses are frequently reconcilable with improvements for navigation. The development of water power (which is usually only economical in the upper reaches of a river) is generally unfavourable to both navigation and flood control, by reason of obstruction of the dams, but in some cases by means of locks navigation may be aided.

There are few countries in the world where the natural and artificial water-courses provide such possibilities for water transport as China does, and all those who have the Min Sheng at heart should endeavour to get the maximum use of those possibilities.