

## Foreword

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権利	Copyrights United Nations University
journal or publication title	Technological Innovation and the Development of Transportation in Japan
page range	viii-xi
year	1993
URL	<a href="http://hdl.handle.net/2344/00051015">http://hdl.handle.net/2344/00051015</a>

## Foreword

This book is a product of a research project on development and technology that the United Nations University (UNU) entrusted to the Institute of Developing Economies (IDE), Tokyo. This project on the Japanese experience, which achieved its industrial revolution by transferring technology from industrialized countries, was designed at the very beginning to include the issues of transportation technology.

In addition to such civil engineering aspects as surveying and bridge-building, railroads are vast modern systems of great complexity and precision that also embrace such components as the design, manufacture, and repair of rails, roadbed, and rolling-stock and the operation of equipment, communication devices, and stations. Railroads are also inseparably linked with such other industrial technologies as those for the supply of water, coal, and electricity. It is thus that the railroads can be used as an index in testing and evaluating the content and standards of a country's entire technological system.

Although the "Black Ships" of Commodore Matthew C. Perry symbolized to the Japanese the terrors of the modern era, the railroads provided the conveniences and prosperities closest at hand of what came to be known as the "flowering of civilization." That was what attracted the dreams of youth and what made the young Togo Heihachiro (the future admiral) want to be an engineer of railroads.

The role played by the railroads in the history of modern Japan's technological development is as important as that of shipbuilding, steel production, mining, or textiles. Special attention should be given to the effect that the railroads' machinery and equipment sections had in the development and modernization of the metal and machine industries throughout the country. The city of Hamamatsu is the first example of a so-called technopolis, an urban area in which are concentrated many industries using advanced technologies. Although the area's industrial history includes wood-working and textiles, the modern musical instruments, electrical equipment,

and motor cycle industries there would not exist if it had not been for the stimulus provided by the railroads' machinery and equipment departments.

Technology that has as its basic character the construction of regional networks, as railroad technology does, must be conceived as something that extends uniformly over the nation. It must be implemented as part of government policy, but must also be backed by national consensus: the support of the entire nation.

Moreover, because it was the "age of railroad imperialism" that first opened Japan's eyes to the railroads, the development of policy in regard to railroads has significance for all problems of technology from the viewpoint of advantages and disadvantages to a nation's citizens. Its meaning is as decisive to subsequent technological progress as the law that forbade foreigners from mining Japan's underground raw materials.

Government-constructed and -operated railroads were the ideal of the new technocrats, an ideal that was eventually frustrated (except for countries that Japan colonized, where it did achieve high technical levels). However, the railroad bureaucracy's unification of standards nationwide wrought enormous economic and social benefit. This can be confirmed simply through a comparison with the history of railroad development in India.

Similarly, the question as to whether we can cleanly divide the periods of contemporary transportation history and say that the railroad era has ended and that we are now in the era of motor vehicles is probably best answered by examples from those developing countries that have made motor vehicles the pinion of their post-World War II transportation policy and are now grappling to introduce interurban and underground railways.

Discussions in the industrialized countries claiming that the sun has already set on the railroads are rebutted by such systematic concentrations of advanced technology as the Shinkansen (lit., New Trunk Line; often referred to as "bullet train") that reconfirm the railroad's functions both old and new. However, these developments are confined for the time being to passenger transport, even though the railroads still have the potential to carry large amounts of freight. We could of course achieve even greater economies of scale through the use of large ship transport.

When I hear discussions on transport and communication by third world scholars and those involved in the practical aspects of development, I recall that in Japan's case the preconditions for development had been laid hundreds of years before. The feudal governments of shogun and *daimyo* (feudal baron) had constructed a network of five main highways and many other large and small roads connecting all of Honshu. The only thing technology-transfer-induced modernization did was to widen the roads and make them passable in all kinds of weather and at any time of the year. Oliver Statler presents an excellent case-study of road management and amenities in his *Japanese Inn* (1961).

All those interested in Japan's transportation problems will want to turn their attention also to river transportation, where a once splendid network of boat transport flourished and now only the local company names re-

main. One example of how important boat transport was is seen in all of Tokyo's major freight stations, which were built in the same places as terminals for barge transport.

The US forces occupying Japan after World War II were flabbergasted at the horrendous state of the roads, but those roads had by no means been built for motor vehicle traffic. As Professor Yamamoto points out, this lack of good roads was a result of Japan's approach to dealing with a situation where there had been no era of transportation by horse-drawn vehicle, and the modernization of roads took place as part of the attempt to modernize all transport, including rail and water, at one time.

One of the features of modernization in its initial stage was the mixed nature of transportation, what Yamamoto calls a patchwork system. At the beginning of the period of modernization, the only way the long-distance traveller could get to his destination was through a combination of horse-back, boat, and shank's mare. The addition of the railroads made travel faster and their ability to transport large volumes of passengers and goods eventually made possible a railroad-linked transport system. However, one must remember that the road network had yet to be built.

One of the features of mixed transport in the initial period of modernization is seen in urban transport, where appeared rickshaw, horse-drawn cart, and horse-drawn railway in a span of a little more than 10 years. Each of these was the newest development in transportation technology and was an answer to a wide range of needs. Through changes in the source of energy, horse-drawn railroads were replaced by trams and rickshaws and horse-drawn carts were replaced by bicycles and motor vehicles.

Partial electrification in 1909 of Tokyo's Yamanote (loop) Line, the prototype of modern urban transport, and completion of this transit loop in 1925 were the fruits of Japan's first period of self-reliance in industrial technology. However, this was still the railroad era and it would be more than 40 years, with the Second World War intervening, until the second road (motor vehicle) era.

At the beginning of the 1960s, I stared in wonder when I first saw the magnificent colonial roads of Asia. The changes in Japanese transportation problems during the last quarter of a century have again clarified the differences and similarities in content in our mutual problems of development and transport. The 1984 general conference of the United Nations organization ESCAP, held in Tokyo, assigned stages to the next 10 years in the problems of development and transportation-communications.

The work of the IDE-UNU research group should provide grist for the mills of the North-South debate on development and some assistance in getting that debate on track. But that also places some obligations on the authors. It was due to their efforts that this book is of a type never before seen in scholarly works. It is the first to encompass the more than 120-year history of networks and policies in modern Japan's transportation. The book is a joint academic effort that could only have been completed by scholars who are authorities in the history of transportation, geography, the history

of technology, and highway engineering, a cooperative effort totally unprecedented in Japan. The coordinator was unable to include the work of Ichiro Ishii because of its highly specialized nature as an engineering work, but much of the essence is contained here in the other authors' contributions, although in a much simplified fashion. I would like to thank Professor Ishii and the authors for their efforts.

The absence in this book of a comprehensive treatment of the issues of aircraft and airlines may appear to constitute an important omission, and this is one area in which Japan is said to have insufficient technical competitiveness (particularly in large planes). However, it is an area that is inseparable from the development of military technology, which is outside our realm of interest, and for that reason, leaving these issues out presents no obstacles to a project such as this that has focused on development and technology, and gaining self-reliance in technology for national development.

The efforts of Hirokazu Tada, Akiko Akemine, and other of my colleagues are greatly appreciated. I would also like to thank Takeo Uchida of the United Nations University and Shigeo Minowa, formerly of the UNU, for everything they have done.

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Project Coordinator