



Achieving safe road traffic – the experience in Japan[☆]



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ABSTRACT

Japan has experienced an enormous increase of traffic accidents as a result of the country's rapid economic growth from the late 1950s to the year 1970. Observers in the early 1960s called the proliferation of traffic accidents the "Traffic War" as the annual traffic-accident fatalities exceeded the average annual fatalities during the First Sino-Japanese War in 1894–1895; the total eventually peaked at 16,765 in 1970. Annual fatalities then declined during 1970s and fell to 8719 in 1981, thanks to the Japanese national government's comprehensive, intensive efforts to reduce the number of fatalities. This paper summarizes these initiatives, which include road facility measures, regulations and law enforcement, education, vehicle safety standards, and emergency medical care.

Because the levels of car ownership and vehicle-kilometers traveled continued to increase even as organizations worked to reduce traffic safety risks, annual fatalities again trended upward starting in 1981 and reached 11,452 in 1992. Before 1992, the trend in annual fatalities always followed that of annual traffic accidents in general. After 1992, however, the annual fatality dropped while the annual number of traffic accidents actually rose. This unique pattern has roots in passive safety technology, the international enhancement of vehicle safety standards, and innovation in the emergency medical care, which have all helped save lives.

This paper compares Japanese annual trends with those of other developed countries to show that Japan has recently become risen to the top level of traffic safety. In hopes of achieving an even safer traffic society in Japan, the paper summarizes the key factors for consideration.

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1. Introduction

The aim of "traffic engineering" is to construct a comprehensive knowledge system to maintain and/or enhance traffic safety, efficiency, and environmental friendliness for vehicular road traffic. Before the popularization of automobiles, which began with the introduction of the Ford Model T in 1908, traffic accidents caused by automobiles and traffic congestion caused by high concentrations of vehicles were not severe social problems. After automotive mass-production triggered the rapid spread of automobiles, however, various types of road traffic accidents – single vehicle, vehicle-to-vehicle, and vehicle-to-person, for example – emerged and created the need for engineering sciences that would help reduce the numbers of accidents, severity of accidents, and corresponding fatalities. To do so, engineers study and standardize the physical dimensions of geometric road design, such as the minimum radius of horizontal alignment, maximum downgrade slope, and lane and/or roadway width allocation (including the introduction of pedestrian sidewalks). The introduction of traffic signal systems and the development of signal control algorithms, along with the establishment of traffic laws and traffic regulations, are also effective measures.

Other important components include the education of road users and the proper introduction of traffic law enforcement.

These days, statistics show that Japan is one of the safest countries in terms of not only crime but also traffic accidents. People in Japan have been struggling and working over the last several decades to reach these levels of traffic safety. This article illustrates the history of traffic safety in Japan, profiles the major efforts that organizations implemented at key junctures along the way, and compares Japan with several other developed countries.

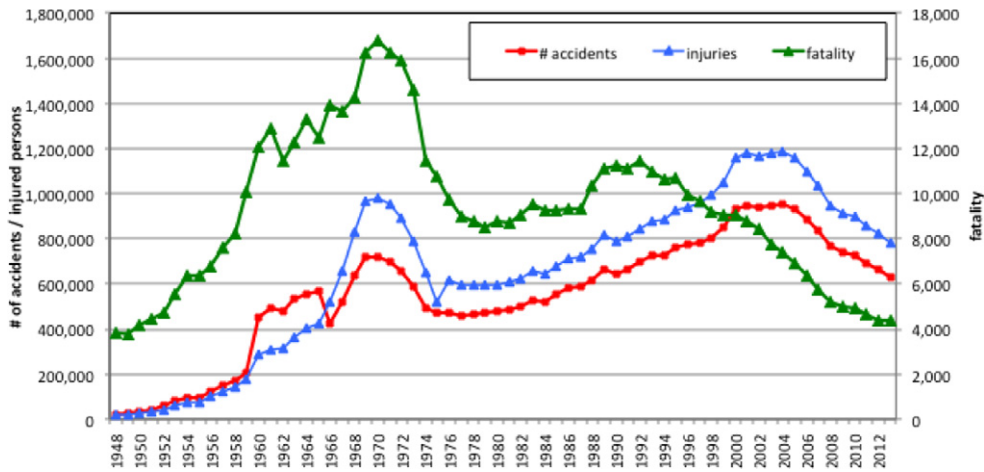
2. History

2.1. Accident statistics

Fig. 1 shows the overall trends in the annual number of traffic accidents, annual number of injuries, and annual number of fatalities. Note that "fatality" is defined as a death within 24 h of an accident, in accordance with the traffic safety statistics gathered by the National Police Agency (NPA) in Japan. This definition applies hereinafter.

Since "motorization" began in Japan after World War II, there have been four main eras of traffic accident fatality trends: up to 1970, from 1970 to 1981, from 1981 to 1992, and from 1992 to the present.

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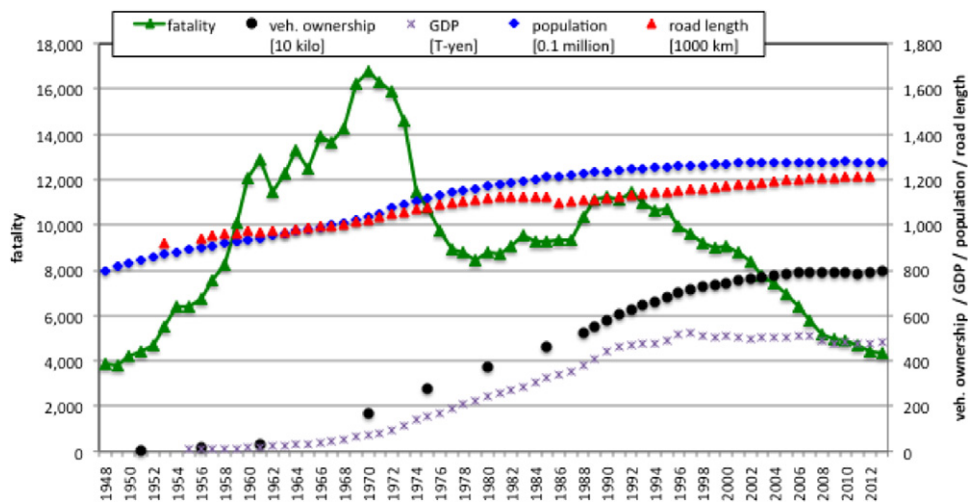
Source: Reference 1

Fig. 1. The history of road traffic accidents in Japan (source: Ref. [1]).

1. In the first era, annual fatalities increased rapidly and reached an annual total of in 1971. Observers called the last part of this period the era of the “Traffic War” because the fatality figure exceeded the total Japanese fatalities of the First Sino-Japanese War (1894–1895). The Japanese national government and the Japanese people, as well, considered the Traffic War to be an impending, serious crisis, and the government started to form comprehensive measures to reduce traffic accident fatalities.
2. After that, annual fatalities declined during the 1970s and reached 8719 in 1981. This period (from 1970 to 1981) constitutes the second era, when annual fatalities trended downward.
3. Despite substantial efforts to reduce traffic safety risks, annual fatalities increased again in the third era (1981 to 1992) and eventually reached 11,452.
4. In the fourth and final era, which began in 1992, the annual number of traffic accidents has shown increases while annual fatalities have dropped. This is a novel trend in comparison to the periods before 1992, when the trends in annual fatalities always generally followed those of annual traffic accidents. After peaking in the early 2000s, the number of traffic accidents has also been trending downward.

2.2. Major factors behind changing trends

In the first era (– 1970), the increasing fatality trends are obvious. Fig. 2 shows time series data for vehicle ownership in terms of the number of vehicles (unit: 10,000), gross domestic product (“GDP”; unit: trillions of yen), population (unit: 100,000), and road length (unit: 1000 km) versus annual fatalities. The annual fatality figures changed from 4429 in 1951 to 16,765 in 1970; in other words, the figure for 1970 was almost four times larger than in the figure for 20 years earlier. Vehicle ownership, meanwhile, rose from 413 (thousand vehicles) in 1951 to 16,528 (thousand vehicles) in 1970—a fortyfold increase over the span of just two decades. The population grew by 23% over the same period, increasing from 87 million to 103.7 million. The Japanese GDP changed from 8.5 trillion yen in 1955 to 75.3 trillion yen in 1970; in the span of only 15 years, the national GDP grew by almost nine times. The country’s rapid economic growth during the first era, evident in the GDP increase and the rapidness that occurred as a result of the enormous changes in vehicle ownership, was the main cause for the increasing fatality trends. In addition, facility development was unable to keep pace with the rapid economic growth and motorization. The time



Source: References 1, 2, 3, 4, 5, 6

Fig. 2. Social statistics and traffic accident fatalities (source: Refs. [1–6]).

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