



## Powered two wheelers in a changing world—Challenges and opportunities

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### ABSTRACT

Powered two wheelers (PTWs) come in diverse forms and are used for a range of purposes in very different parts of the world. In many parts of the world, the forms and uses of PTWs are changing, influenced by social, economic and demographic changes. Most of the challenges associated with PTWs relate to safety, while the majority of the opportunities relate to mobility. The challenges for improving safety relate to the PTW user, other road users, the road environment, the vehicle, data and research, and socio-political dimensions. The relative importance of particular challenges varies between developed and developing countries, and among developing countries according to whether PTWs are largely used for recreation or for transport. PTWs present a range of psychological, transport, economic and environmental opportunities to individuals and societies. The fun and excitement of riding PTWs is a major motivator for their purchase and use for recreational purposes, both off-road and on-road. The transport and economic advantages to the individual also need to be considered. At a societal level, research has examined the potential for increasing PTW volumes to reduce fossil fuel use and traffic congestion in busy cities. The future of PTWs may differ greatly between countries and environmental and technological changes are leading to an evolution in the form of PTWs to encompass new modes of personal transportation.

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### 1. Introduction

Powered two-wheelers (PTWs) play an important role in both transport and recreation around the world, but at considerable social cost. It is estimated that more than 180,000 PTW users die as a result of road crashes annually, with most deaths occurring in middle income countries (Naci et al., 2009). PTW users are certainly vulnerable road users, with death rates as a function of distance travelled generally found to be about 30 times greater than for car occupants (Johnston et al., 2008; National Center for Statistics and Analysis Research and Development, 2008). The number of PTWs is increasing in many developed and developing countries (Jamson and Chorlton, 2009; Paulozzi et al., 2007; Shankar and Varghese, 2006) and their usage is changing. This paper sets out to describe the pattern of use of PTWs, the challenges and opportunities they present, and to identify likely trends into the future.

#### 1.1. Definitions and scope

The term PTW is used to refer to mopeds, scooters, and motorcycles; and commonly includes similar three-wheeled vehicles. Mopeds and scooters are PTWs of 'step-through' design, usually with automatic transmission, while motorcycles must generally be

straddled by the rider and have manual transmissions. The use of mopeds is generally restricted to low speed zones in urban areas, by a combination of legislation and rider discretion, while larger scooters are typically capable of highway speeds and in some cases long distance touring. Many jurisdictions define mopeds in terms of engine capacity (usually lower than 50 cc) and top speed (often lower than 50 km/h). There is currently no official definition of a scooter in Australia or elsewhere (Haworth and Nielson, 2008), but a scooter is usually treated as a motorcycle in crash and registration data.

The focus of this paper is the on-road use of PTWs, but it is acknowledged that a large proportion of sales in many developed countries are for off-road use. For example, motorcycles for off-road use represent more than 50% of all PTW sales in Australia (FCAI, 2010) and 22% in the United States (Morris, 2009). Additionally, the number of off-road injuries can be almost as great as those sustained on-road (Henley and Harrison, 2009).

### 2. PTWs across the world

Most of the world's PTWs are in Asia. Fig. 1 (from [www.worldmapper.org](http://www.worldmapper.org)) shows the world in terms of the numbers of PTWs in each country. The land mass of each country has been adjusted to represent the percentage of the world's PTWs in that country as taken from World Bank Development Indicators 2005 (based on 2002 data). It shows clearly the importance of Asia with 65% of the world's PTWs. The motorcycle industry estimates that

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