IMPROVING AUTOMOTIVE SAFETY:
THE ROLE OF INDUSTRY, THE GOVERNMENT, AND THE DRIVER

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ABSTRACT

This paper identifies three groups that can improve automotive safety. The three groups are the automotive industry by designing into cars such safety devices as seat belts, roll bars, or air bags; the government by taking such measures as improving road conditions, enforcing seat belt usage laws, or enforcing stricter anti-drunk-driving laws; and finally, the driver by modifying driving habits such as wearing seat belts and not driving while intoxicated.

Of the seven strategies we define for improving automotive safety, this paper argues that "as low as reasonably achievable" (ALARA) is the most applicable risk reduction strategy within the context of improving automotive safety. By applying the ALARA principle to past and proposed safety improvements, we demonstrate that the most lives saved per dollar spent would occur if drivers modified their driving habits.

KEY WORDS: Automotive, Safety, Regulation, Design, Driver habit, Air bags, Seat belts, and Drunk driving

PREFACE

This paper is written in briefing format and is intended to serve two purposes. First, it was presented at The International Society of Risk Analysis meeting (October 1985, Washington, D.C.), and second, it supports a Rand Graduate Institute course and a University of California at Los Angeles tutorial entitled Risk and Uncertainty in Public Policy Decisions.

The paper examines alternative means of improving automotive safety.

1. OBJECTIVES

The purpose of this paper is to attain the following four objectives:

- Review generic risk reduction, or safety improvement, goals;
- Select one particular goal to examine in detail;
- Apply this goal to improving automotive safety; and
- Discuss how three distinct groups can implement this goal.
The goals will be discussed later. With regard to our fourth objective, the three groups that can implement our selected goal are industry, the government, and drivers themselves. Industry can improve safety by adding protective devices such as seat belts and air bags to automobiles [1-8]. Government can improve safety at each of three levels: federal, state, and local administrations [2, 3, 6-12, 13].

Each level of government must play its respective role to the fullest to attain the highest possible automotive safety standards. For example, the state must maintain highways and roads sufficiently. State and local law enforcement agencies must strictly enforce laws against speeding, moving violations, and drunk driving. Judicial systems must strictly punish lawbreakers to prevent recurrent offenses as well as to deter prospective offenders. Last, each driver can influence safety through good driving habits. Buckling seat belts, obeying speed limits, and not driving while intoxicated are several positive habits that will improve automotive safety [2, 3, 6-8, 14-17].

2. DEFINITIONS

Identifying Alternative Risk Reduction Goals

Although the safety level of any technology can always be improved, there is no unique approach or philosophy for making such improvements [18-20]. Several prior studies have identified a number of distinct philosophies for reducing risk associated with various technologies. Seven measures to reduce risk and achieve specific safety levels are discussed below [18]. Imbedded within this discussion are examples specific to automotive safety.

What Are Some Alternative Risk Reduction Goals?

Minimizing maximum accident consequence is one method to reduce the risk associated with automobile operation. For example, we can eliminate all accidents involving a large number of fatalities in a single transportation event. This could be achieved, for example, by preventing all fully occupied buses from driving on any highway or road. Because the maximum number of passengers on board a bus could be 50 or 60, the worst possible accident would cause the death of 50 to 60 people. This particular philosophy seeks to reduce total risk by minimizing the maximum number of people that could be killed in any single accident. Another application of this philosophy is to require that not more than two people occupy any one car at a time, and that cars be positioned far enough apart to eliminate the possibility that two cars could ever be involved in an accident. We would minimize the maximum number of fatalities per accident to four in this case. Of course, this is neither a realistic nor a feasible risk reduction goal when applied to automotive safety. The impracticality of trying to reduce the number of people riding in any one vehicle at a given time outweighs any benefits gained.

Minimizing the probability of occurrence for the most probable types of accidents is a second method of improving safety which thereby reduces risk. Because rear-end collisions are a common type of accident, an extreme application of this approach would seek to eliminate all rear-end collisions [2, 3, 9-13]. To fully ensure that all rear-end accidents are eliminated we would have to permit only one car on the road at a time, an obviously impracticable solution. A more practicable one requires the use of center-mounted, high positioned brake lighting. Use of such a light would reduce rear-end collisions by more than half [2, 3, 10-12] and avert as many as 1800 fatalities per year. We would also try to identify other