Road Accident Analysis Factors

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ABSTRAK

Masalah kemalangan di jalan meningkat di negara-negara membangun. Masalah kajian telah dan sedang komited untuk topik ini, sebagai sebuah carian masa lalu dan saat ini menunjukkan kajian. Road kemalangan di negara-negara membangun telah berkembang selama sepuluh tahun terakhir. Ini mungkin kerana peningkatan hunian kenderaan dari masa ke masa atau fakta bahawa jenis kemalangan tertentu jauh lebih umum sekarang daripada sepuluh kes tahun lalu. Misalnya untuk kenderaan komersial saat ini digunakan untuk mengangkut pekerja ke dan dari tempat kerja mereka mereka. Ketika seperti kenderaan terlibat dalam kemalangan, sejumlah besar kematian sering terjadi. Tesis ini mempelajari pemodelan dan pelaksanaan sistem koordinasi di dalam persekitaran simulasi untuk menganggarkan tahap kemalangan di masa depan. Pendekatan analisis yang digunakan harus Sejalan dengan kuat dan objektif untuk menilai tahap kemalangan. Untuk membandingkan perubahan pemilikan kereta, kami berharap untuk menggunakan data ini untuk mengetahui faktor-faktor di balik perubahan ini. Beberapa contoh adalah pengaruh laba rugi, perubahan kerja, perubahan struktur rumah tangga dan perubahan dalam perumahan dan lokasi kerja. Mereka seharusnya tidak terlalu sensitif terhadap penyimpangan dari asumsi model atau kehadiran sejumlah besar outlier. Mengingat sifat tercemar data, biasa paling regresi kuadrat tidak sesuai, oleh kerana itu, regresi robust teknik ini dianjurkan.

ABSTRACT

The problem of road accident is increasing in developing countries. A matter of research has been and is being committed to this topic, as a search of past and current research shows. Road accidents in developing countries have progressed over the last ten years. This could be because of increasing vehicle occupancy over time or to the fact that a particular type of accident is much more common now than was the case ten years ago. For instance commercial vehicles are currently used to transport workers to and from their places of their work. When such a vehicle is involved in an accident, large numbers of mortalities often occur. This report investigates the modelling and implementation of a coordination system within a simulation environment to foresee future accident rate. The approach of analysis used must be correspondingly robust and objective to evaluate accident rate. To comparing changes in car ownership, we hope to use these data to investigate the factors behind these changes. Some examples are the effect of income, changes in employment, changing household structure and changes in residential and work location. They should not be too sensitive to departures from model assumptions or the presence of a substantial number of outliers. Given the polluted nature of the data, ordinary least squares regression is not suitable, therefore, robust regression techniques are recommended.

Key words: Vehicle ownership, accident rate, public transport usage, robust regression

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LIST OF ABBREVIATIONS

EU	Europe Union
ITS	Intelligent Transport System
VMT	Vehicle-Miles-Travelled
UK	United Kingdom
SMMT	The Society of Motor Manufactures and Traders
SORN	Statutory Off Road Notification
DVLA	Driver and Vehicle Licensing Agency
DFT	Department for Transport
LEX	Learner Experience
RAC	Recovery Audit Contractors
GB	Great Britannia
DUI	Driving under the influence
DWI	Driving While Intoxicated
USA	United State America
HES	Household Expenditure Survey
ABS	Australian Bureau of Statistics
GES	General Estimates System
FARS	Fatality Analysis Reporting System

HSIS	Highway Safety Information System
CDS	Crashworthiness Data System
PAR	Police Accident Report
OECD	Organisation for Economic Co-operation and Development
FORS	Freight Operator Recognition Scheme
ATSB	Australian Transport Safety Bureau
MVC	Motor Vehicle Census
VFACTS	Vendor Field Analytical and Characterization Technologies System
DE	Differential Equation
LMS	Least Median of Squares
LTS	Least Trimmed Squares
OLS	Ordinary least squares
LOWESS	Locally Weighted Scatter plot Smoothing
MAE	Mean Absolute Error

LIST OF SYMBOLS

t	-	Time
X (t)	-	Car ownership level
α	-	Saturation level of ownership parameter
κ	-	Ownership growth rate parameter
γ	-	Time parameter arising
β_0	-	Intercept
β_1	-	Gradient
θ_1	-	Rate of Income per 1000$ in accident
θ_2	-	Rate of Registered vehicles per 10000 number in accident
θ_3	-	Rate of Population per 100000 people in accident
Y	-	Accident rate
SSR	-	Sum of squares
TSS	-	Total sum of squared variations
R2	-	Coefficient of determination
F	-	The Mean Square Model divided by the Mean Square Residual
ρ_c	-	kernel function

Chapter I

INTRODUCTION

1.1 Background

Human life with a variety of health risks faced was threatening. More interesting however that industrial life is more improved; equipment and operating amenities for him are new dangers. Contaminations growth and increased the one hand vehicles, rising car ownership ratio per capita in society, increased travel demand in household size, to double traffic volume and usage of personal belongings as the root causes of driving accidents and mortalities in come. Pedestrian, bicycle riding, motor bike riders and drivers compared to motor vehicle drivers and passengers and motor vehicles larger, more risk and high risk as the users learn to roads.

Transportation operating human life as a society always problems and issues and the frequency will be. Equality of supply and demand, inappropriate hospitalization and Transport facilities and above all the risks are left in this system, including Transport problems are all communities. Studies conducted show that unfortunately, the result of

road casualty's risks and third world countries and some developing countries are very high and worrying the whole world, and also road casualties is now the ninth director of mortality is that in 2020 will climb to third.

Cosmopolitans and large cities and major population increase in most countries, too many crucial problems and had to have. Increasing raise of population vehicles results ownership in cities is such problems that are difference from the abundant factor. Interestingly, considering the increase of various transportation methods is currently in Europe 80 percent of EU consumption goods by the road transport system. Increased density, delay, auditory and air pollution, accidents and loss of vehicles is increasing complications that way cause harm to economic, social, cultural and etc. Unfortunately, the situation in third world countries and developing countries much more than the other eye eats. According to the International Federation of Red Cross and Red Crescent populations, road accidents in 1998 about 500 thousand death and 15 million not wounded, and if social effects to delete about 53 billion dollars of economic damage have left. This study aims to find relationship between vehicle ownership and accident rate in developed country to predict future and make plan to reduce economic damages and death.

1.2 Definitions of the problem

In last forty years the countries of Western Europe and North America have had to acknowledge the fact that road accidents are main cause of death and injury. Over this period substantial sums of money have been spent on trying to contain the road safety problem.

Driving old vehicles, automotive technical defects, not being a standard vehicle and thousands of other problems such as instrument cases, vehicles are incident.

Fortunately, road and vehicle can be put under complete control and man with regard to proper supervision can be risks of their rate reduced. But the human being due to anonymous characteristics and their various reactions always has been the cause of many problems. If vehicle ownership increases a lot without any limitation, in next year's a lot of congestion and accident happened without any control; Hence, by prediction of vehicle ownership growth and relation between its factors and accident, some factors describe are influenced on limitation of accidents in the future by controlling them. Therefore, increase in ability of household cause to buy vehicles unreserved and growth accident probability. Furthermore, people aim to buy vehicle to do their works comfortably and it makes essential to predict registered vehicle to avoid accidents because of unsafe facilities.

1.3 Objectives

The data available from vehicle ownership to the City comes from the vehicle register. Generally, data from administrative sources contain a large rate of outliers. Moreover, vehicle ownership data are a time series with a significant degree of autocorrelation, in violation of last squares assumptions. These deficiencies are usually overcome by the manual removal of outliers. The main shortcoming of such a procedure is that it is subjective. This can lead to ad hoc influences on inferences, most dangerously in the direction of preconceived beliefs. Therefore, the methods of analysis used must be correspondingly robust and objective to measure accident rate. They should not be too sensitive to departures from model assumptions or the presence of a substantial number of outliers. Given the contaminated nature of the data, ordinary least squares regression is not suitable. Robust regression techniques are recommended.

Beside vehicle ownership, the survey includes a wide-range of socio-economic and demographic variables for the individual countries. In addition to comparing changes in vehicle ownership, we hope to use these data to investigate the factors behind these changes. Some examples are the influence of income, changes in employment, changing household structure and changes in residential and work location.

The second objective of this study is to examine and compare the distribution of vehicle ownership, particularly in relation to accident rate, but also in relation to other factors such as residential location, age and household structure. Finally, the dynamics of vehicle ownership will be analysed by considering changes in the distributions over time.

On the other hand, finding accident rate from last10 years, help to make a program to predict next 5 years accidents but it is reasonable to find relation between vehicle ownership and accident rate. Accident models are also important in estimating the impact of ITS on safety despite the fact that this is a relatively new topic.

Therefore the main objectives are:

A) Determine the relationship of accident rate with vehicle ownership factors.
B) Determine the regression equation of the ownership factors and accident rate.
C) Forecast accident rate for next 2 years.

1.4 Scope of study

- Determine factors of vehicle ownership.
- Identify and describe possible factors that may affect on accident rate.
- Collect reliable information of vehicle ownership in case study to analysis obtain data with statistical method.

1.5 Importance of the study

1.5.1 Number of vehicles per households

The number of vehicles per household is linked with public transport apply, with low rates of use among residents of households that have two or more cars. In 2006, 70% of adults living in dwellings with no registered cars used public transport for their usual journey to work or study, although only one in twelve (8%) of all adults lived in such dwellings. The rate of public transport use for journeys to work or study for those living in dwellings with two or more cars (12%) was less than half that of those living in dwellings with one registered vehicle (28%). Not only is the rate of public transport use lower in households that have two or more cars, but people in these households comprise a much larger share of the overall population (60% compared with 32% in one-car households).

The number of adults in the household clearly is important for car availability. Single-person households are highly and significantly less likely to have a car than are 2-adult households (the reference group) in all countries.

1.5.2 Accident factors

Include accident event or action performed on the street, road, alley, square, and level of passages which the car, the driver, people, animals, books, buildings, etc.

come and cause damage is leading to death or physical injury. Road transport system three human vehicles and roads are the main components that any traffic type in the quantity and quality and handling of role playing and they are also causing danger. Inadequate capacity in roads, inadequate and unsafe pavement, geometric design dangerous, harsh and long vertical slopes and slope surface of problematic cases are in road building.

Simple statistics citing total numbers of accidents, involvements, injuries, and deaths can be quite misleading, as they ignore the base from which they arise. An increase in the number of highway fatalities in a specific jurisdiction from one year to the next must be matched against population and vehicle-usage patterns to make any sense. For this reason, many accident statistics are presented in the form of rates.

1.5.2.1Population-Based Accident Rates

Accident rates generally fall into one of two broad categories:

Population-based rates and exposure-based rates.

Some common bases for population-based rates include:

- ✓ Area population
- ✓ Number of registered vehicles
- ✓ Number of licensed drivers
- ✓ Highway mileage

These values are relatively static (they do not change radically over short periods of time) and do not depend upon vehicle usage or the total amount of travel. They are useful in quantifying overall risk to individuals on a comparative basis. Numbers of registered vehicles and licensed drivers may also partially reflect usage.

1.5.2.2 Exposure-Based Accident Rates

Exposure-based rates attempt to measure the amount of travel as a surrogate for the individual's exposure to potential accident situations. The two most common bases for exposure-based rates are:

- ✓ Vehicle-miles travelled
- ✓ Vehicle-hours travelled

The two can vary widely depending upon the speed of travel, and comparisons based on mileage can yield different insights from those based on hours of exposure. For point locations, such as intersections, vehicle-miles or vehicle-hours have very little significance. Exposure rates for such cases are "event-based" using total volume passing through the point to define "events."

True "exposure" to risk involves a great deal more than just time or mileage. Exposure to vehicular or other conflicts that are susceptible to accident occurrence varies with many factors, including volume levels, roadside activity, intersection frequency, degree of access control, alignment, and many others. Data requirements make it difficult to quantify all of these factors in defining exposure. The traffic engineer should be cognizant of these and other factors when interpreting exposure based accident rates.

Reliable data exist for the stock of passenger vehicles over a long period, making it possible to establish a relative good forecast based on time series analysis. There are many relationships between vehicle ownership and household characteristics. The probability that a household owns one or more cars is affected by income, employment, age, sex, education, geography, children etc. It is possible to estimate models on cross-sectional data for a shorter period of time. But it is problematic to forecast, e.g., the relationship with income over time from cross-sectional data. For this reason it is chosen to establish a time series model for the total stock of passenger cars over a long period.