# THE RELATION OF FACTORS AND CAUSES OF THE ACCIDENTAL ON TRUCK TRAILER IN THAILAND

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**ABSTRACT**

In Thailand, average number of road accidents occurs 75,000 times per year. Moreover, there are 13,000 casualties and more than 900,000 are injured annually, which costs approximately 100,000 million baht a year. Thus, it is defined that road accident is the most serious problem at the present time, which should be solved urgently. The accident statistics of Thailand go to top five of the world record. In the last decade, the amounts of loss are more than two hundred billion baht, representing 2.8% of GDP

According to this research on truck trailer accident and the accidental involvement founded that the most of researches and this research still based on the general concept of the road accident and same direction with others vehicle types accident research. The factors are the road accidents causes include Driver, Vehicle, Road and Environment which is considered as a fundamental model of road accidents. However, the truck trailer accident and the accidental involvement research showed that certain factors are more significant influence of the basic model. General, It also found that in the Driver which includes a variable that can be measured several variables are related, such as a variable in a demographic factors (gender, age, level of education) is associated with variations in the driver behavior factors (driving speed limit, alcohol/substance abuse, fatigue from work)

We summarized that, In this research, we focus on Driver factors, Vehicle factors, Environment factors, Fleet management factors, and Risky driving behaviors factors and finding a measurement variables of each factors which to be used for measuring and testing the consistency of the model with truck trailer accidents and the accidental involvement empirical data.

Keywords - Accident, Truck Trailer, Vehicle

## INTRODUCTION

In Thailand, average number of road accidents occurs 75, 000 times per year. Moreover, there are 13,000 casualties and more than 900,000 are injured annually, which costs approximately 100,000 million baht a year. Thus, it is defined that road accident is the most serious problem at the present time, which should be solved urgently. The accident statistics of Thailand go to top five of the world record. In the last decade, the amounts of loss are more than two hundred billion (THB), representing 2.8% of GDP (Health Systems Research Institute, 2006).

Aaccident's statistics in Police traffic department in years 2552-2553 found that three main causes of accidents include over speed limit, more than a third of all accidents causing or 34.77 percent (National Police Agency, 2554), consistent with United States study results. Accidents related to speed and have resulted in deaths, accounting for about one-third of all accidents. (National Institute of Health, 2549)

However, considering the type of vehicle involved in the accident. The motorcycle is a more frequency causes of accidents accounted for 37.15 percent. Passenger cars and truck trailer accounted for 28.37 and

 

21.87 percent. We found some issue is interesting, considering about the amount of property damages and casualties, it is found to be related to the number accidents causing by truck trailer (Royal Thai Police, 2011). This may identify that the accidents caused by rolling stocks affect the severity of accidents. Furthermore, the study of the severity of road accidents on highways in South Korea (Lee, Chung, & Son, 2008) found that trucks and trailers are related to each other in the same direction to the severity of accidents (number of fatalities, injuries, vehicles involved in the accident, and damaged vehicles).

On the other hand, Lemp, Kockelman, & Unnikrishnan (2011) indicate that the loss of life and serious injury in road accidents caused by truck trailer depend on the increasing number of trailers and trucks and are related to the size and weight of those truck trailer. What is more, the study of severity of injury of the driver in one-vehicle accident and a multi-vehicle accident on highway in a rural area reveal that rolling stocks are often involved in one-vehicle accident and multi-vehicle accident (Chen & Chen, 2011). It is not only found that the number of trucks trailer is counted as four per cent of the number of all registered vehicles, but 8 per cent of them are also involved in accidents with severe injury (Zhu & Srinivasan, 2011).

There are several aspects in previous researches which show various differences between private car accidents and truck trailer accidents (Eicher et al., 1982; Evans, 1991; Walton., 1999; Council et al, 2003; McCall & Horwitz, 2005 and Rosenbloom et al, 2009), including the differences of causes and factors involved in the accident. Accordingly, there should have a study and proposal of model of truck trailer accident and it should be separated from the model of private car accident(Chang & Mannering, 1999).

Road traffic injuries constitute a major public health and development crisis are predicted to increase if road safety is not addressed adequately by Member States. The World Health Organization (WHO) has been concerned with this issue for over four decades. As early as 1962, a WHO report discussed the nature and dynamics of the problem (Peden et al, 2004). The researches on road traffic injuries or road accident and road safety have been trying to reduce the number of accidents and the size of the damage (OECD, 2008) which have been studied extensively and continuously. The basis of the study focuses on three main factors (driver, vehicle, and eenvironments) which cause road accidents. The concept of study is divided into a single accident cause (Brenac1996; Baruya 1998) and a combination of several factors causing road accidents (Rumar, 1982; Rumar and Stenborg 1995; Bryer 1999; Cascetta et al. 1999; McKnight, 2004; Aworemi et al, 2010).

Traditional considerations of traffic safety focus on the physical environment, the vehicle and the road user. Improvements in road environment and vehicles have achieved major safety gains. However, less progress has been made in understanding the behavior of the road user (Rothengatter, 1997). Psychology has become more involved in the study of risk behaviour and traffic safety, focusing on the relationship between driving behaviour and accident involvement.

According to the results of research on road accidents, it indicates that 50 per cent of accidents mainly come from driver when combined with associate cause of accident (driver and vehicle or driver and environment) and when combines the driving factor with the other aspects of accident, the number is more than 90 per cent. (Rumar, 1982; Rumar and Stenborg, 1995; Bryer, 1999; Cascetta et al, 1999;; McKnight, 2004; and Aworemi. et al, 2010).

Subsequently, there are many developed concepts of road accidents. The popular concept is the study of the causes of road accidents which is used to present a model of road accidents (road accident causation model) and three main factors are included (Iversen & Rundmo, 2002; Sümer, 2003; Björklund, 2008; Verschuur & Hurts, 2008; Lee. et al, 2008; Wong et al, 2010; Hassan & Abdel-Aty, 2011; and Shi et al, 2011). The proposed model aims to create a model that can explain the causes of the accident as much as possible. However, the mechanism of accident is complicated. Furthermore, there are many causes and variations which is the nature and mechanistic of the accident (Aworemi, Abdul-Azeez, & Olabode, 2010). Thereby, the factors of risky

driving behavior are combined with the physiological factors of the driver (such as gender, age). These factors are combined as one variable in the same model to be consistent with the real accident which is complicated.

The model development may help us to have a better understanding about the road accidents. However, there are some arguments due to the results of many studies which indicate that physical factors variable of the driver (such as gender, age) and the risk of driving behavior are correlated significantly (Hagen, 1975; Wasielewski, 1984; Jonah, 1986; Mayhew et al., 1986; Reason et al, 1990; Levy, 1990; Laberge-Nadeau et al., 1992; Forsyth, 1992. ; Brorsson et al., 1993; Durkin, 1995; Harre et al, 1996; Vavrik, 1997; Preusser et al, 1998; Harre et al., 2000; Rhodes et al, 2005; Oltedal & Rundmo, 2006; Teese & Bradley. , 2008 and Scott-Parker, 2009).

As a result, the combination of physical factors variables of the driver (such as gender, age) and risky driving behavior is regarded as neglect the relationship between variables. This may affect the proposed model which is not consistent with the accidents in the real world.

From previous research, interesting issue was founded that the accident from a truck trailer and drive for working had a significant relation between accidents and wages (Monaco & Williams, 2000; Rodríguez et al, 2003). Therefore, the payment of wages depending on workloads or number of running trip increases the risk of road accident which consistent with the findings of Fort et al., (2010) It was founded that the risk of accidents were related in the same direction with number of working hours. In comparative research on severity injuries level from road accident between truck trailer accidents and private car accidents have a significant difference. The accident caused by a truck trailer had more severity injuries than accident caused by private car. The significant difference of the study results supports the contention that truck trailer and non-truck involved accidents should be modeled separately. (Chang & Mannering, 1999)

## CONCEPTUAL FRAMEWORK

The researcher was interested to proposed model of road accidents based on the truck trailer accident data due to the road accident by truck trailer cause the high damage, injured and dead. To comply with recommendations from the literature review, it suggested separating the Trucks trailer accidents model from the Private car accident model. Truck trailer accident model consists of the driver physical factors (e.g. gender, age), vehicle factors (e.g. motion of vehicle, age of vehicle), environment factors (e.g. number of lane, weather, road surface), fleet management factors (e.g. Wage, Employee type, Organization), risky driving behaviors (e.g. speed, drink driving, fatigue diving) and accident factors (e.g. number of injuries, number of vehicle involvements).

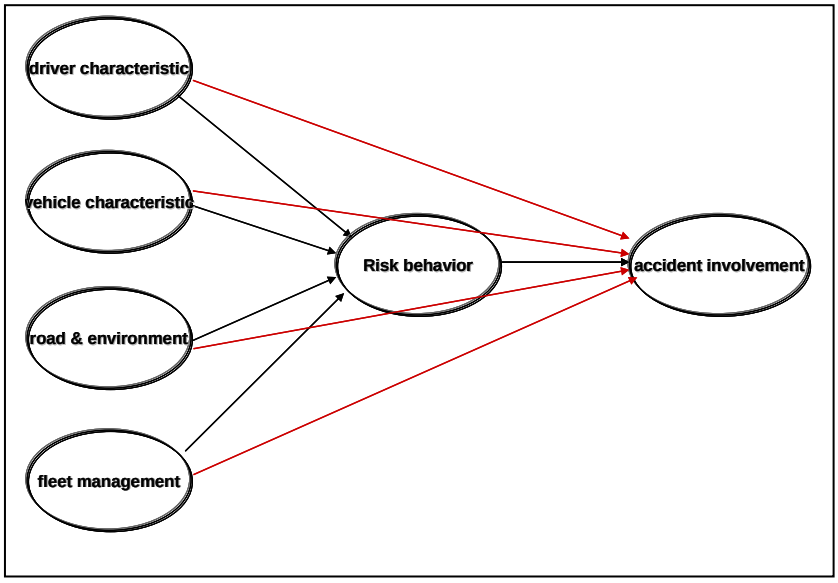


Figure 1. Conceptual model of Truck trailer accident model

From fig.1, the model was presented including the three main groups (Driver, Vehicle and Environment according to road safety approach) and fleet management factors (Wage, Employee type, Organization) which the mediator factors in the model is risky driving behaviors passed to accident factors. This model is complex because it consists of six latent variables (driver physical factors, vehicle factors, environment factors, fleet management factors, risky driving behaviors and accident factors) and fifteen measurement variables (gender, age, motion of vehicle, age of vehicle, number of lane, weather, road surface, Wage, Employee type, Organization, speed, drink driving, fatigue diving, number of injuries, number of vehicle involvements). In addition, it includes nine relations to examine. Structural Equation Modeling: SEM was adopted to verify the goodness-of-fit effects among the overall model, structural model and measurement model for this study because SEM can handle complex relationships among endogenous and exogenous variables simultaneously and furthermore it can also include latent variables in the model.

## RESEARCH DESIGN

A mixed method research, this study is intended to use qualitative and quantitative data collection techniques and analysis procedures sequentially. The using of qualitative and quantitative approaches in combination can provide a better understanding of research problems than either approach alone (Saunders et al., 2007). This research combines both of qualitative and quantitative data. The qualitative data are collect by means of written documents, interviews with expert truck drivers. The quantitative data were collected from truck drivers who have an accident experience.

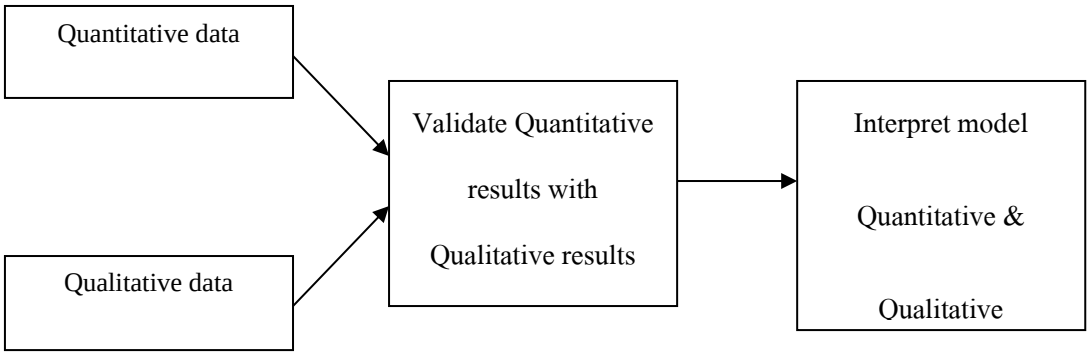


Figure 2. Triangulation Design: Validating Quantitative Data Model

## STATISTICAL METHODOLOGY

SEM methodology spread fast as a consequence of the development of specific packages, like LISREL (Joreskog and Sorbom 1988, 1989, 1995) and AMOS (Arbuckle & Wothke, 1995) the availability of these packages has encouraged several applications in different contexts. This approach allows the modeling of a phenomenon by considering both the unobserved "latent" constructs and the observed indicators that describe the phenomenon. Corresponding with Shah & Goldstein study which found that Structural equation modeling (SEM) is the measure for the relationships among various variables in the research process of human perceptions, behaviors or phenomena. (Shah & Goldstein, 2006)

SEM is a technique that consists of a set of equations that are specified by direct links between variables and hence it can be called "the simultaneous equations". However, in SEM, latent variables (unobserved or unmeasured variables) can be introduced (Lee et al., 2008). The advantages of using SEM include: (1) it can handle complex relationships among variables, where some variables can be hypothetical or unobserved (latent variables); (2) It estimates all coefficients in the model simultaneously and thus, one is able to assess the significance and strength of a particular relationship in the context of the complete model, (3) multicolinearity can be accounted for, (4) when using latent variables in SEM, measurement error is eliminated and thus more valid coefficients are obtained (Dion, 2008; Martinez et al., 2010). Therefore, SEM is an adequate tool to model the complex relationships such as those that are being modeled in this study.

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