Factors affect the number of deaths from accidents : Case study of commercial trucks in Thailand.
ปัจจัยที่ส่งผลต่อจำนวนผู้เสียชีวิตจากอุบัติเหตุของรถบรรทุกสินค้าในประเทศไทย

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Abstract

The study of factors affecting the number of deaths in cargo truck crash in Thailand aims 1) to better understand the mechanism of cargo truck crashes in Thailand and 2) to be the guideline for specifying accident reductive measure. The 196 road carrier companies were a sample. They were collected data in order to test the relationship among functional factors, benefit factors, work safety factors, and the number of cargo truck crashes in Thailand. The data were gathered from questionnaires and analyzed with Pearson Chi-Square test ($\chi 2$).

The study results indicated that the functional factors, especially volume of driver, driver personality, the number of working hours per day, the number of working days per week, and overtime, had the relationship to the number of deaths in cargo truck crash. Moreover, the benefit factors, such as daily allowances, diligence fees, social insurance expenditure, and tuition fees and the work safety factors, such as annual physical checkup, pre-placement physical examination, vehicle speed control system, and work period also correlated with the number of cargo truck crashes. The results, however, found some interesting facts that employment status, wages, bonus, and alcohol test had no relationship to the number of deaths in cargo truck crash.

Keywords: number of deaths; commercial truck; Thailand

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บทคัดย่อ

การศึกษาเรื่องปัจจัยที่ส่งผลต่อจำนวนผู้เสียชีวิตจากอุบัติเหตุของรถบรรทุกสินค้าในประทศไทย เป็นการศึกษาโดยมีวัตถุประสงค์ 1) เพื่อทำความเข้าใจต่อกลไกการเกิดอุบัติเหตุของรถบรรทุกในประเทศไทย และ 2) เพื่อนำมาใช้เป็นแนวทางในการกำหนดมาตรการในการลดอุบัติเหตุ โดยเก็บข้อมูลจากกลุ่มตัวอย่างเป็นผู้ประกอบการธุรกิจรับขนส่งสินค้าทางถนนจำนวน 196 ราย เพื่อทดสอบความสัมพันธ์ระหว่างปัจจัยด้านการทำงาน ปัจจัยด้านรายได้และผลตอบแทน ปัจจัยด้านความปลอดภัยในการทำงาน และจำนวนผู้เสียชีวิตในอุบัติเหตุจากรถบรรทุกสินค้า โดยใช้การวิเคราะห์ความสัมพันธ์ด้วยค่าสถิติเพียร์สันไคส์สแควร์ ($\chi 2$).

ผลการศึกษาพบว่า ปัจจัยด้านการทำงาน โดยเฉพาะ จำนวนพนักงานขับรถ ลักษณะส่วนบุคคลของพนักงานขับรถ จำนวนชั่วโมงการทำงานต่อวัน จำนวนวันทำงานต่อสัปดาห์ และการทำงานล่วงเวลา มีความสัมพันธ์กับจำนวนผู้เสียชีวิตในอุบัติเหตุจากรถบรรทุกสินค้า รวมถึงปัจจัยในกลุ่มรายได้และผลตอบแทน เช่น เงินรายวัน เบี้ยขยัน เงินประกันสังคม และทุนการศึกษา และปัจจัยในกลุ่มความปลอดภัยในการทำงาน เช่น การตรวจสุขภาพประจำปี การตรวจสุขภาพก่อนเข้าทำงาน ระบบควบคุมความเร็วในการขับรถ และช่วงเวลาในการทำงาน มีความสัมพันธ์กับจำนวนผู้เสียชีวิตในอุบัติเหตุจากรถบรรทุกสินค้า เช่นเดียวกัน อย่างไรก็ตาม ผลการศึกษายังพบข้อเท็จจริงที่น่าสนใจคือ สถานภาพการจ้างงาน เงินเดือน เงินโบนัส และการตรวจวัดแอลกอฮอล์ ไม่มีความสัมพันธ์ จำนวนผู้เสียชีวิตในอุบัติเหตุจากรถบรรทุกสินค้า

คำสำคัญ : รถบรรทุก; จำนวนผู้เสียชีวิต; ประเทศไทย

1. Introduction

Road accident is a serious problem for every country and will be discussing about how to prevent the road accident throughout 50 years ago. Globally number of death caused by road accidents are 500,000 cases per year and more than 50% occurred in the Asia - Pacific region. According to the World Health Organization report 2015, indicate that from 2010 to present the number of deaths from road traffic accidents increased by 84 percent for all countries, and 68% occur in low and middle-income countries. The result of Institute of Transportation Studies, University of Michigan, USA shown that the low-income countries groups have a higher road accident mortality rate than high-income countries with 2 times. The study result of Institute of Transportation Studies, University of Michigan, USA shown that the number of deaths from road accidents average of 18 people from 100,000 people per year in global.

Table 1

World ranking top 100 number of death on road accident

Rank	Countries	The number of death on road accident (per 100,000 people)
1	Namibia	45
2	Thailand	44
3	Iran	38
4	Sudan	36
5	Swaziland	36
6	Venezuela	35
7	Congo	34
8	Malawi	32
9	Dominican	32
10	Iraq	32

From Table 1, The most of the countries with number of deaths from road accidents, in the world top 10 ranking have a five countries from Africa, Thailand is only country in Asia where world top 10 ranking and have number of death on road accident was 45 per 100,000 people, record in ranked second in the world (Sivak & Schoettle, 2014).

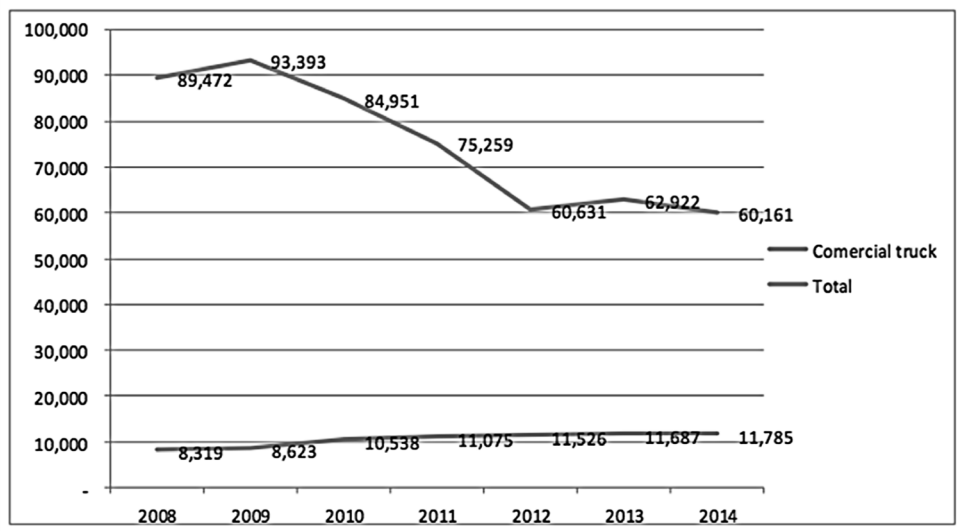

Figure 1

Commercial truck accident per year (2008-2014)

For the record on road accident in Thailand have a declining trend. However, when considered in detail about the types of vehicles that are significantly findings with a number of accidents in commercial trucks (pickup trucks, 6-wheel trucks, 10 wheel truck and more) has increased significantly and positively correlated in the opposite direction to the overall data on road accidents in Thailand by the data presented in Figure 1.

2. Literature Review

"A road traffic crash results from a combination of factors related to the components of the system comprising environment, vehicles and road users, and the way they interact. Some factors contribute to the occurrence of a collision and are therefore part of crash causation" consistent with the results of Rumar. (1982); Rumar & Stenborg. (1995); Bryer. (1999); Cascetta et al. (1999); Blower & Campbell.(2002); McKnight. (2004); Aworemi et al. (2010)

The beginning of road safety research which had interesting published such as Treat et al. (1977) more than 2000 accidents were examined on site between 1971 and 1974 for causal factors.

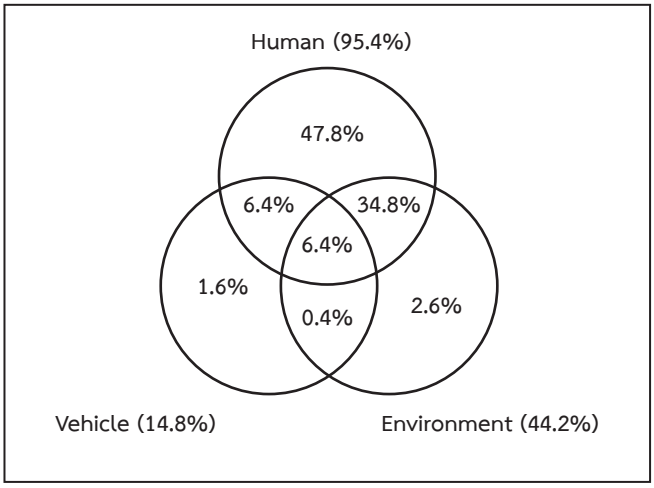

Figure 2

Proportion of accident causation factors according to Treat et al (1977)

A road accident results from a combination of factors related to the components of the system comprising environment, vehicles and road users, and the way they interact. (Figure 2) To achieve goals of road safety policy was reduction risk of an accident and number of injured or the number of deaths in accidents, at the first important stage, it was necessary to understand the causes and mechanism of the accident occurrences that complicated and each time had causes combination consistent with the results

of Rumar & Stenborg. (1995); Bryer. (1999); Cascetta et al. (1999); Blower & Campbell. (2002); McKnight. (2004); Aworemi et al. (2010). For the next, Treat's model has been doing a research prototype in the road accidents research for classification of causal factors.

In 15 years ago, the important issue was founded that the accident in truck 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. Therefore, the fleet management (wage, benefits, and work safety) is an important factor in road accident research

3. Conceptual framework

As mentioned above, the researcher was interested to proposed research conceptual framework of road accidents based on the Thailand commercial truck. The conceptual framework finds out the relationship between a number of death from road accident per year and internal factors which consists of the functional factors, benefits factors and work safety factors.

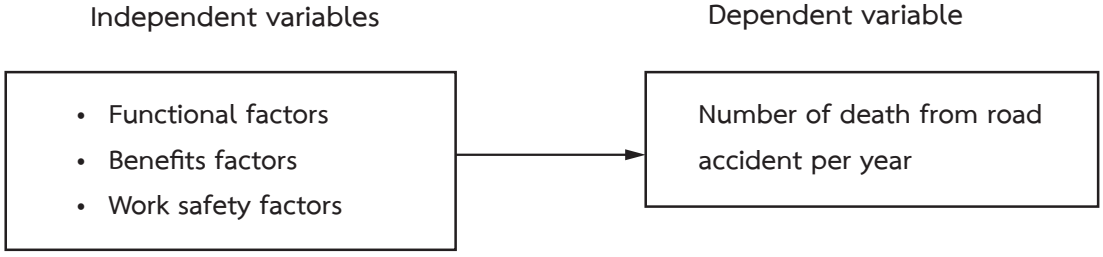

Figure 3

Research conceptual frameworks

4. Methodology

This research is a study of road accidents in Thailand, focusing on commercial truck comprising pick-up trucks, 6 whell trucks, 10 wheel trucks and more. The content of this research focused on the different perspective in the past. The 196 Cariere companys is a unit of analysis, they be collected data about internal factors included functional factors, benefit factors and work safety factors. The data were collected from questionnaires and analyzed with Pearson Chi-Square test ($\chi 2$) to find the relationship between functional factors, benefit factors work safety factors and the number of road accidents per year.

5. The relationship of internal factors and number of road accidents per year.

The carrier 196 companies were collected data and analyzed found that 177 companies have a data record about road accident accounted for 90.31%. And 9.69% (19 carrier companies) have not road accident record data. Data were analyzed with the Pearson Chi-square test ($\chi 2$) indicated that the number of driver in relation to the number of accidents which the large company who many driver will have the highest number of accidents as detailed in Table 2.

Table 2

Relation analysis of function factors, benefits factors, work safety factors and accident per year.

Factors	Related	Non-related	$\chi 2$	Sig.
Functional factors				
Number of driver	✓		1.38	0.02
Driver personality	✓		0.95	0.03
Employment status		✓	1.81	0.10
Working hours per day	✓		3.25	0.01
Factors	**Related**	**Non-related**	**$\chi 2$**	**Sig.**
Working day per week	✓		0.23	0.03
Overtime	✓		1.01	0.02
Benefits factors				
Wage		✓	2.23	0.19
Bonus		✓	9.27	0.11
Loans		✓	0.85	0.23
Daily expense	✓		0.93	0.03
Diligence	✓		0.88	0.01
House rental		✓	5.32	0.09
Social insurance	✓		0.91	0.02
Tuition fee	✓		4.08	0.04

Table 2 *(Continous)*

Work safety factors				
Medical examinations	✓		1.03	0.03
Annual medical checkup	✓		2.56	0.02
Safety manual guide		✓	5.19	0.07
Safety training		✓	4.04	0.10
Alcohol test		✓	8.45	0.07
Vehicle speed control	✓		0.98	0.01
Work period	✓		1.03	0.04

5.1 Functional factors

In the functional factors group, the most of factor correlated with number of accident per year. The results of this study indicated that the volume of driver has a positive relationship with the number of accidents per year and driver personality (male, under junior high school and driving experience less than three years) related in the same way. In addition, hours of work per day and number of working days per week and overtime is related to the number of accidents per year. In Thailand, 55 percent in the drivers work on average more than eight hours a day, making driver fatigue and accidents. On the other hand, the employment status (temporary or full time) have no relationship to the number of accidents per year.

5.2 Benefits factors

In the group of benefits factors, which includes wages, bonuses, loans and house rental there was no relation to the number of accidents per year, despite daily allowances, diligence fee social insurance expenditure and tuition fee for children are available relation to the number of accidents per year. For Thailand carrier companies, 80 percent is paid daily allowances depending on workloads or number of running trip to serve as an incentive for employees to work hard and lack of sleep to increase the risk of accidents. For diligence fee, social insurance expenditure and tuition fee for children is pay based on the number of driver. Thus, when number of driver increasing resulting cost about diligence fee social insurance expenditure and tuition fee for children increase and correlated in the same direction with number of accidents per year increase. Details are shown in Table 2.

5.3 Work safety factors

Safety factor is important issue to prevent road accidents and decrease number of death. The result of this study shown that, the safety manual guide, safety training

and the alcohol test have no relation to the number of accidents per year because the carrier companies in Thailand to focus on the matter until the relationship is not able to demonstrate the difference clearly. However, there are medical examination, annual health check, vehicle inspection, control vehicle speed, work period that is associated with the number of accidents per year. The results of this study shown that number of road accidents per year correlated with the health of drivers. The vehicle speed, working hours and fatigue (if the driver runs over a set time period to cause fatigue) is a mixing cause in road accident. These are all key factors that contribute to accidents on the road.

6. Summary and Conclusion

The study of the relationship between internal factors of carrier companies in Thailand which including functional factors, benefits factors, and work safety factors and number of accidents per year. The important finding is the number of drivers and benefits to the driver have a positive related to

number of accidents. This is consistent with the research of Monaco & Williams (2000) and Rodríguez et al (2000). Male, under junior high school and driving experience less than three years are factors that increase the risk of accidents on the road. The results of this study have a same direction with findings of Aworemi et al (2010), they found that sex

education experience are a factors to increasing road accident risk in Nigeria. On work safety related to the number of accidents encountered two interesting issues in the health of the driver and the exhaustion from lack sleep are the key factors that cause accidents. This findings are consistent with Smolensky et al (2011) has found that impaired the health of the driver and the exhaustion from lack sleep increases risk of road accidents. And consistent with Brown (1994) which suggests that exhausted from the work causes the accidents on the road for commercial trucks.

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