FACTORS AFFECTING THE COMPETENCY OF ROAD CRASH INVESTIGATION IN THE CONTEXT OF THAI POLICE [1]

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Abstract

The study examines causal factors affecting the competency in forensic evidence analysis for traffic accident investigation in the context of Thai Police. Data were obtained from a total of 400 police investigators from nine provinces under the control of the Provincial Police Region 1 Headquarters. The researcher employed a systematic random sampling technique to select the research participants. The Multiple Regression Analysis was adopted to analyze the data collected from each respondent. This was conducted in sequential order to establish relationships between working time, experiences, knowledge, work support, the achievement and competency in road crash investigation within the study areas. Based on research findings, it has been concluded that knowledge and working time in the Thai Police have made a significant contribution to 65.7 of the competency in road crash investigation.

Keywords: Road crash; investigation; competency; Thai Police

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Introduction

The transportation safety issues are the most serious problem in Thailand. Accidents encompass people who travel by all modes of transportation no matter how their economic levels and transport purposes are. Indeed, the roadway has been the dominant mode of transportation which contains the major number of fatalities, injuries and crashes in Thailand. The information on traffic accidents recorded in Thailand over a five-year period between 2011 and 2015 shows that 330,025 cases of traffic crashes resulted in 38,698 deaths (Central Information Technology Center, 2014). The international statistics also illustrate that Thailand ranked the first among forefront nations, especially the Asian and ASEAN nations, and it has placed the third highest road fatality rate in the world. (World Health Organization, 2015).

Many people agree that traffic accidents on highways or roadways happen not only because of a matter of luck or misfortune, but also because of a combination of multiple conditions or actions. Most of these conditions and actions are predictable occurrences, and thus should not be considered an "accident". In this study, the term "crash" will be used in lieu of the term "accident".

The solution to the problem of road crashes requires validity and reliability of the investigation, along with the purpose of finding conditions and combinations of factors that lead to undesirable traffic crashes. Generally, the causes of crashes are categorized into four basic groups; person, vehicle, roadway and environment. A person is defined as a vehicle operator, a vehicle passenger, a pedestrian, or a bystander. A vehicle is a conveyance such as an automobile, a truck, a van, a recreational vehicle, a train, a motorcycle or a bicycle. A roadway is viewed as a total infrastructure of pavement, shoulders, signs, signal marks, safety devices, rights-of-way, including the maintenance of each in addition to prevailing traffic conditions. An environment is defined as weathers and lighting conditions, which affect visibility and traction at minimum (Aworemi et al., 2010). This empirical research was conducted by data analysis of the investigation of 262 road crash cases, and found that police simply focus on human errors: the accusation of human carelessness rather than

other factors leading to the road crashes such as risky vehicles, roads and environmental factors disappearing in their explanation.

"Killing on the Road" in Thailand has placed one of the highest road fatality rates in the world. It is therefore essential to construct a body of knowledge in term of police professionalism to prevent and solve the problem of road crashes in the country.

The context of police investigators that reflects professionalism requires high competence in forensic evidence collection and analysis as well as professional knowledge, and sufficient support for road crash investigation.

Police investigators play a key role in preventing and solving road crash cases, which are a matter of great concern in Thailand. The complete procedures for road crash investigation can provide useful and fully-detailed data for cause and effect analysis of road crashes in multi-level governance including district, provincial and national levels. Road crash investigation is, therefore, the starting point for developing effective problem-solving approaches to road crashes.

However, the major questions have emerged from traffic crash investigation in Thailand. First, why is road crash investigation in Thailand ineffective and untrustworthy? Second, why does Thailand rank the top road fatality rate in the world? Last, what are the ways of thinking and procedures of police to collect and analyze forensic evidence for road crash investigation?

Research Questions

In relation to this study, the following research questions will be answered;

a) What is the joint contribution of working time, experiences, knowledge, work support, achievement and competency in road crash investigation in the chosen provincial areas in Thailand?

b) What is the relative contribution of each of the variables mentioned above to the prediction of police competency in road crash investigation in the study areas?

Police on the Way of Seeking Forensic Evidence in Road Crash Investigation

In a part of this research, the qualitative study employed data collection methods including focus group discussion, in-depth interviews and

documentary research. Focus group and interview data were obtained from a total of 67 key informants, consisting of 60 police investigators and 7 forensic scientists in the Provincial Police Region 1. The documentary research derived from the analysis of 262 road crash investigation cases. Content analysis was adopted for data interpretation.

Research findings demonstrate three ways of thinking relating to forensic evidence in road crash investigation, which are: (1) transient & complex: transient evidence at a road crash scene and the complexity of investigation, (2) justice & survival: the belief that investigators' survival skills are more important than justice delivery in road crash investigation cases, (3) a focus on human behaviors: the accusation of human carelessness rather than other factors leading to the road crashes. These three paradigms result in a low rate of achievement in road crash investigation which indeed needs to concern about risky driving behavior, vehicles, road and environmental factors.

In addition, the results from this qualitative study found that the definition of "professionalism" does not fit in the Thai Police context regarding forensic evidence collection for road crash investigation due to the four factors including: (1) the need for support from internal and external experts in the investigation, (2) the acknowledgment of many questions relating to the reliability of those who engage in the investigation, (3) insufficient support in police work and most importantly, (4) the lack of systematic and continued knowledge training provision. Most of the investigators from this research opine that they desire educational support in work which has a considerable influence on professionalism in police investigators.

This part of analysis consequently results in the related independent variables, including working time, experiences, knowledge, work support and achievement in road crash investigation.

Literature Review

According to the literature review, the four major factors contributing to road crashes consist of risky driving behavior, vehicles, road and environmental factors (Ratanavaraha and Suangka, 2013., Sattrawut et al., 2010., Aworemi et al., 2010). These research papers provides the key issues

on police work context associated with their achievement in road crash investigation which has substantially improved our understanding of the factors affecting investigation competency.

Ratanavaraha and Suangka (2013) conducted a study focusing on the factors affecting accident severity on expressways with the aim to provide benefits to responsible authorities for issuing road crash prevention policies or effective measures to protect or alleviate unexpected losses from road crashes. The findings verified that the speed on a road section is the only factor influencing the severity of crashes on an expressway. Hence, speed limits on expressways should be mandated for drivers by carrying out rigorous inspections of expressway-speed regulations. Also, the awareness of accident severity caused by driving over the speed limit should be promoted by authorities to potentially reduce the risks and levels of accident severity. Ponboon, Sattrawut et al. (2010) studied road crash investigation and reconstruction which have encircled all aspects of road safety. The main purpose of an in-depth analysis of accidents was to determine causal factors in the road crash and to answer how and why it happened. The study involved road crash scene investigation which inspects road crash sites and gathers all related evidence. Then, all information and evidence collected from the scene had been reconstructed in order to determine significant factors in traffic crashes. After two years of the implementation of an in-depth study of road crashes in Thailand, several important issues of road crashes in Bangkok and other provinces had been identified and grouped into different categories. Those findings were summarized as follows:

1) Human errors were considered the main contributing factors in the road crashes. Among these errors, the greatest proportion was the condition of decision-making errors (54%), i.e. improper driving practices and evasive driving techniques, followed by error recognition (21%), performance (action) errors (9%), and critical non-performance (8%).

2) Alcohol had a direct impact on driving/riding performance in two categories; critical non-performance and error recognition. For critical non-performance, the drivers/riders were unable to maintain a normal driving task since they dozed off prior to the crashes and no evasive actions performed. For error recognition, the drivers/riders delayed in perception indicating an

inconsistency in the downstream traffic flow. None of them successfully performed evasive actions to avoid the road crashes.

3) The proportion of head injury of the motorcyclists (20%) was less than that of the car occupants (31%). Indeed, most of the car occupants (45%) suffered from superficial head injuries. On the other hand, there were 36% of open-head wounds and 29% of intracranial injury on the motorcyclists.

4) A collision with a fixed object was considered as the most harmful situation, and the injury was generally more severe than car-to-car crashes. Since the fixed objects are narrow and solidly stuck in the ground, the vehicle needs to absorb all of the impact energy from a relatively small area.

5) Most of the rollover cases were considered as a single vehicle crash. They are commonly misunderstood to conclude the causation originates from drivers' errors. The four main contributing factors in rollover crashes in this study were found, including loading, tipping, panic-like steering, and roadside slopes. Pickups, buses, and trucks were more likely to involve rollover cases than passenger cars. Sometimes, tipped rollover and effect of a cargo load influenced the Static Stability Factor (SSF) which in turn caused roller over to those vehicles. In addition, there was a significantly different for the injury outcomes between belted and unbelted occupants for this type of crashes. For belted occupants, there were 8% of suffered serious injury and 33% of the occupants were slightly injured, with no fatality. In contrast, unbelted occupants were reported 13% fatality, 46% serious injury and 39% slight injuries.

6) Bus occupants are the most vulnerable as there was no seatbelt installed inside the buses mostly observed in Thailand. Aworemi, Joshua Remi et al. (ibid) examine the causal factors in traffic crashes in some selected states in South Western part of Nigeria. Data were obtained from a total of 352 respondents, from four out of six states that made up of southwestern Nigeria using stratified random sampling techniques. Regression Analysis was adopted to analyze the data obtained. This was done in order to build relationships between human characteristics, vehicular characteristics, roadway appearances, environmental factors, and road traffic crashes in the study areas. Based on the findings, it was concluded that human, vehicle, roadway and environment had

significant contribution of about 79.4% to road traffic crashes in the study area. Also, human, vehicle, environmental and roadway characteristics are the salient factors leading to road traffic crashes in South Western States of Nigeria. It was suggested that road crashes can be ameliorated by embarking on various crash prevention and reduction strategies, such as education and training, traffic law enforcement, transport coordination enhancement, road capacity expansion, and drivers' enlightenment.

Most researchers have addressed this problem by framing the understanding of contributing factors of the frequency of crashes – the number of crashes occurring in some geographical spaces (usually roadway segments or intersections) over a specific period. Gaining a better understanding of the factors that affect the likelihood of a vehicle crash has been a focal area of research for many decades. However, filling an intellectual gap that a road crash resulting from inappropriate forensic evidence investigation and a lack of competency of Thai Police will help improve the identification of cause-effect relationships for the implication of prevention and protection approaches to road crashes.

Research Methodology

The conceptual framework in this research was predetermined by literature review on prior qualitative studies before conducting a multiple regression analysis between independent and dependent variables originating from fieldwork study. The framework includes a dependent variable (road crash investigation competency) and independent variables which are working time, experiences, knowledge, work support, and achievement in road crash investigation.

The study was carried out from 133 police stations in the Provincial Police Region 1, covering nine provinces in Thailand. The selection of these police stations was based on their road traffic situation consisting of;

1) the highest road fatality rates between 1 September 2015 and 31 August 2016 (Road Safety Team, 2016)

2) the geographical proximity in a large volume of traffic and road crashes in Thailand.

Data collection adopted a survey conducted by the authors between January and September 2017. By means of structured questionnaires, data were obtained from police stations in the Provincial Police Region 1. The 400 respondents were selected through systematic sampling techniques. The areas are provincial police of Pranakorn Sri Ayutthaya, Samutprakarn, Nonthaburi, Pathumthani, Saraburi, Lopburi, Singburi, Angthong and Chainat. Information was solicited in respect of courses of competency in road crash investigation.

Regression Analysis was adopted for analyzing the data obtained. This was conducted in sequential order to establish relationships between working time, experiences, knowledge, work support, the achievement and competency in road crash investigation.

Results

In order to examine the factors affecting competency in road crash investigation, the following variables involved working time, experiences, knowledge, work support and achievement in road crash investigation.

The model is specified as:

$Y=a0 +b1\ X1 +b2\ X2 +b3X3 ...+bnXn+Ui$.....Equ.(1)

Where

a0= Constant

Xi.....Xn = Explanatory variables

bi.....bn = Parameters to be estimated (i = 1, 2, 3, - - - - - n)

Ui = Error term or disturbance term

Y = Dependent variable (road crash investigation competency)

X1= working time

X2= experiences

X3= knowledge

X4= work support

X5= achievement in road crash investigation

The summary output of multiple regression estimation technique is shown as:

$Y = 32.647 + 2.237\ X3 -0.298X1 + Ui$ .....(II)

Research question 1

What is the joint contribution of working time, experiences, knowledge, work support, achievement and competency in road crash investigation in the chosen provincial areas in Thailand?

The data from Table 1 indicates that a combination of independent variables; working time and knowledge factors yielded a coefficient of multiple Regression (R2) of 0.657, accounting for 65.7% of the variance in investigation competency of the Thai police. Table 2 shows that the analysis of variance for the multiple regression data produced F-ratio value of 379.730, which is significant at 0.000(P<0.000). While table 3 shows the variables in the equation.

Research question 2

What is the relative contribution of each of the variables mentioned above to the prediction of police competency in road crash investigation in the study areas?

Table 1: Correlation coefficient of variables

Variable	X1	X3	D.V
X1		.300*	.139*
X3			.803*

*p < 0.01

Table 2: multiple regression analysis of contribution of independent variables

Independent variables	
Multiple R	0.810
R Square (R2)	0.657
Adjusted R Square	0.655
Standard Error	9.407

Table 3: Analysis of variance

	DF	Sum of Squares	Mean Square	F-ratio
Regression	2	67217.009	33608.505	379.730
Residual	397	35136.991	88.506	

Sig. F (3, 396) = 379.730 ; P<0.000

Table 4: Variables in the equation

Variables	B	Std.Error	Beta	t	Sig.	VIF
Constant	32.647	2.924				
X1	-0.298	0.082	-0.111	-3.615	0.000	1.099
X3	2.237	0.082	.837	27.147	0.000	1.099

Discussion

This research paper provides the key issues on police work context associated with their road crash investigation competency which has substantially improved our understanding of the factors affecting Thailand's road crash situation. Thailand ranked the first among the forefront nations, especially the Asian and ASEAN nations, and it has placed the third highest road fatality rate in the world.

The results obtained from statistical analysis of the research questions indicate that working time and knowledge factors make a joint significant contribution of about 65.7% to the investigation competency of police in Thailand. The joint contribution could not have come by chance because the F-ratio value of 379.730 lends credence to the effectiveness of the two explanatory variables in causing investigation competency in the study areas. Consequently,

it could be inferred that 65.7% of the variance in the investigation competency is accounted for by the combination of the two factors.

Due to traffic law and regulations, road crash investigation usually focuses on drivers' errors and ignores the proof of other causes of road crash. In fact, road crashes are led by a number of factors rather than a single factor. According to the literature review, the four major factors contributing to road crashes consist of risky driving behavior, vehicles, road and environmental factors. (Ratanavaraha and Suangka, 2013., Sattrawut et al., 2010., Aworemi et al., 2010).

If an investigator knows how to acquire evidence at a scene, he will have the ability to seek forensic evidence in road crash investigation. This will lead to an outcome which comprises sufficient data of driver performance, vehicle characteristics, roadway appearances and environmental factors for solving road crashes.

Law enforcement plays a vital role in improving road safety. Police actions will be effective when technological aids along with professional skills in road crash investigation are available to prevent and solve traffic cases. The law should also be strictly enforced to all drivers.

Research suggests that public administrators and policymakers should be responsible for improving professionalism in forensic evidence analysis for road crash investigation by developing knowledge training and organizational culture for police investigators. This is the way to deliver justice and reduce the rate of road accidents, fatality and injuries.

Conclusion

In conclusion, working time and knowledge are the salient factors that affect the competency of Thai Police in road crash investigation. Investigation competency and reliability can be ameliorated by embarking on strategies in pursuit of police professionalism such as knowledge enhancement, working support, and road crash investigation achievement. Most importantly, the solution to this problem is the delivery of justice and the reduction of fatality and injuries.

This research puts forward the need to change the police's ways of thinking by law rectification, work support, training and controlling road crash investigation in terms of professionalism to reduce the number of road crashes, deaths, and injuries.

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