The Priority Ranking Causes of Travelling Accidents in the One Large Private University Area by Applying Delphi Method Statistical Limitations

Kwanchanok Oonta-on[1*], Nutchapongpol Kongchasing[1],

Chakkarphan Sangsuwan[1], Anuruk Tappakron[1], Gritsada Sua-Iam[1]

[1]Department of Civil Engineering, Faculty of Engineering,

Rajamangala University of Technology Phra Nakhon (RMUTP), Bangkok, Thailand

Email : kwanchanok.o@rmutp.ac.th[1*], nutchapongpol.k@rmutp.ac.th[1], chakkarphan.s@rmutp.ac.th[1],

anuruk.t@hotmail.com[1], gritsada.s@rmutp.ac.th[1]

Abstract

This exploratory research aimed to study and prioritize the causes of automobile and motorcycle accidents in case one of the large private universities area. The primary accident causes reviewed by all data traffic accidents in Thailand and 5 large universities in Thailand. The suitable accident causes are suggested by 11 experts, working in a University case study. They will be added to the questionnaires and handed on to 331 students, 42 staff, and 9 sellers by face to face data collection. This research result shows to 13 suitable accidents causes by studying and divided into 8 priorities. Driving with alcohol intoxication feel is the most priority with a mean value at 4.59. The accident caused by reckless driving and insufficient illumination is obtained priority ranking in number 2 and 3 with 4.40 and 4.33 of average values respectively. The alcohol intoxication feeling is caused by careless driving, and less driving vision, in various accidents cause may be both directly and indirectly impacted by this problem. The results will help to guild the university manager to decide the key to improve the causes of traveling accidents in the university area. It should be more applied to other case studies and found out the differential way in the future.

Keywords: Accidents causes, Priority ranking, University area, Travelling

Introduction

The increased use of vehicles causes traffic congestion and frequent accidents, resulting in significant damage to both life and property. Some even to the point of disability is a burden to the family and society in vain. Traffic accidents have caused the deaths of Thai people skyrocketing in the top 10 in the world. The most common cause is due to careless driving without wearing a helmet and seatbelt, driving faster than the law, driving while intoxicated, and talking on the phone while driving.

In general, the causes of traffic accidents in many researches include the following major causes: 1) physical readiness of a person, 2) vehicle readiness, and 3) various environmental conditions [1]. The behavior of the person who drives the vehicle is one thing that should be solved [2]. However, several causes of traffic accidents were appropriately improved in various case studies [3].

The compiled all data on the causes of traffic accidents in Thailand about motorcycles and automobiles [4 - 7] are integrated on thirteen issues with common and different items. Nowadays, these problems occur in the university area. Many organizations tried to survey the vehicle accident cause in their areas. Thammasat University found out thirteen causes occurred in vehicle accidents [8]. Ubonrajathanee University collected the data with 390 bachelor degree students. They had 9 majors causes that were impacting [9]. Driving behavior (lack of knowledge or failure to comply with traffic rules) was an important factor for Srinakharinwirot University [10]. The five items led students in the Suranaree University of Technology had an accident with a motorcycle [11]. Including, Silpakorn University at Nakhon Pathom campus obtained 4 issues impacting traffic accidents in their area [12].

The case study of this research is one university affected by its area traffic accident. Most of the personnel, students, and others at the university travel by using auto and motorcycles. They have obtained a vehicle accident every year. Particularly, the accident was highest happened to many students. Therefore, the researcher finds out the causes of vehicle accidents to help administrators guide future decisions about safe travel on campus.

Research objective

This exploratory research aimed to study and prioritize the causes of automobile and motorcycle accidents in case one of the large private universities area.

Research methodology
Research procedure overview

This exploratory research has many steps conducting will be more described and showed to Figure 1.
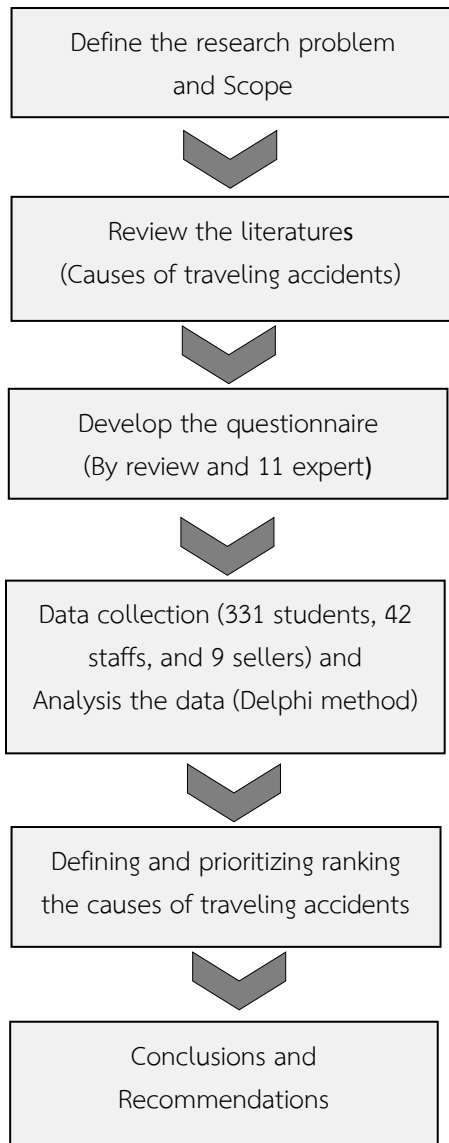
Define the research problem and Scope

Review the literatures (Causes of traveling accidents)

Develop the questionnaire (By review and 11 expert)

Data collection (331 students, 42 staffs, and 9 sellers) and Analysis the data (Delphi method)

Defining and prioritizing ranking the causes of traveling accidents

Conclusions and Recommendations

Figure 1 Flow chart of research methodology

Case study

One of the large private universities established for over 10 years with 16 faculties and 5 office buildings. They cover an area approximately 1200 Rai (474 Acre) and offered bachelor, master, and doctoral degrees. Including, there are 15 dormitories building to support its full student and staff. Mostly, they use automobile and motorcycle travel in the university.

Data related to vehicle accidents

The traffic accident causes of vehicles internal and external university will be integrated. The primary outcomes show to 12 factors are common and difference of the causes reviewed from all data traffic accidents in Thailand and 5 large universities in Thailand.

These 12 problems are offered to the 11 experts, working in a University case study. They are 3 transportation academicians, 1 head and 1 deputy of vehicle Division, 1 head and 2 deputies of analysis and Plan Division, and 1 head and 2 deputies of a security guard. They suggested to the suitable causes with the case study. There are 13 causes suggested in the list with easy abbreviations as below;

C1: Driving with alcohol intoxication feel

C2: Reckless driving, such as using a telephone while driving

C3: Driving experience

C4: Physical condition is not ready, such as having chronic illnesses, using certain drugs that cause drowsiness

C5: Violating traffic rules, such as turning at the prohibited sign

C6: Parkin prohibited areas

C7: No public relations signs

Such as, no signs are indicating different faculties

C8: Traffic line deterioration

C9: Lack of traffic facilities such as roads without traffic lines

C10: The availability of vehicle such as car tires leak

C11: Broken branches blocking the road

C12: Insufficient illumination

C13: Rainy and slippery roads

The experts changed the wording, added, and grouped more in some causes to be suitable for the university case study.

Population and sample

This research has calculated the number of samples by using the Yamane method [13]. The case study has 7,079 students separated to bachelor, master, and doctoral degree, 877 staffs covered lecturers as well divided to staff who are university alumni and not, and 183 sellers sell things in the cafeteria and flea market of university separated to the current student part-time and not. The totaling is 8,139 people. In various samples will be calculated suitable population to be the respondents of this research by using the Yamane formula.

$$n = \frac{N}{1+N(e)^2}$$

When;

n is the suitable population

N is the total populations each sample

e is the accuracy values where 95 percent as equals 0.05 of discrepancy

Resulting, total suitable respondents (n) are 382 people divided into 331 students, 42 staff, and 9 sellers respectively.

Data collection

This research used a questionnaire for data collection. They will be shown to the step as follows;

1. The suggested suitable 13 lists of traveling accidents cause by experts will be added to the questionnaires. And, experts have to check the quality by trying to evaluate these questionnaires.

2. The questionnaires are handed on to 331 students, 42 staff, and 9 sellers one person per set, and they must be those using automobiles and motorcycle on the campus only.

3. All questionnaires are collected data by face to face interview. In various questions have 5 scales for respondent choice assessment [14].

4. In various questions have 5 scales for the respondent choice. The scales 1, 2, 3, 4 and 5 are represented to the significance of automobile and motorcycle accidents in the university case study at the most important level, very important, middle level, less important, and least important respectively.

Data analysis

The answers of respondents are calculated and analyzed by applying the Delphi method statistical limitations [15]. The mean value should be not over experts determined at 3.00 (this value is from a coherent questionnaire assessment of all experts with a mean of no less than 3.00 each question which is within the fair

criteria from a full score is 5), the differential between mode and median (diff. Mo/Med) value is not exceeding 1, and Inter-Quartile Range (IQR) has to be not more 1.5. The limitations of these statistical values help to cut some accidents causes biased answer off. The item passed all consensus statistical limitations will be obtained priority ranking from average values. Higher mean values are ranked in order of importance. Data from the priority analysis will be presented as a guideline for the university case study in the next.

Results and discussions

This part represents the outcome comply with the research step, and the data will be received discussing in the sections of respondent answers and priority ranking of accident causes.

Respondent answers

The total suitable respondents are 382 people divided into 331 students, 42 staff, and 9 sellers. They have a similar perspective on the accident causes. Because, most of the sellers in the university case study are the part-time student, include the staffs who are university alumni. All of them drive the automobile and motorcycle in the university area, and there are extensive experiences with these issues.

Table 1 The percent of respondent general data

Sample	Group	Age	%
Student (331 people)	Bachelor (308 people)	18-29	80.63
	Master (17 people)	24-38	4.45
	Doctoral (6 people)	28-42	1.57
Total	86.65% out a total of 382 people		
Staff (42 people)	Alumni (34 people)	25-42	8.90
	Not Alumni (8 people)	57-65	2.09
Total	10.99% out a total of 382 people		
Seller (9 people)	Student part-time (8 people)	18-24	2.09
	Not Student part-time (1 people)	37	0.27
Total	2.36% out a total of 382 people		

Respondent age is around 18-65 years separated to students at 18- 42 years covered bachelor, master, and doctoral degree, staffs are 25 – 65 years covered who are university alumni and some not alumni and sellers are current student part-time and some outside seller at 18-37 years. These general data showed by percentage value in various respondent groups in Table 1.

Therefore, the discussion of this part results will explain covering all 3 samples which are most the student perspectives at 86.65%. Their responses are shown to an

overall statistical value with 13 accident causes in table 2.

Table 2 Accident Causes (AC) response

AC	Mean	Diff. Mo/Med	IQR	Consensus
C1	4.59	0	1.5	Yes
C2	4.40	1	1	Yes
C3	4.06	0	1	Yes
C4	3.95	0	2	No
C5	4.29	1	1	Yes
C6	3.89	0	1	Yes
C7	3.76	0	2	No
C8	4.06	0	1	Yes
C9	4.11	0	1.5	Yes
C10	4.08	1	1	Yes
C11	3.83	0	2	No
C12	4.33	1	1	Yes
C13	4.33	0	1.5	Yes

In table 2 showed average values by a respondent answer with 13 accidents causes. The ten items are passed all statistical limitations consensus consist of; C 1-3, 5-6, 8-10, 12, and 13 respectively. The outcomes showed to C4, 7, and 11 are not passing consensus values. Because the university case study has older students and staffs focused on physical condition is not ready (C4) [4], no public relations signs

(C7) [5], and broken branches blocking the road (C11) [4], are resulted to their accident situation [1].

Visibility and decision-making capabilities including their physical health are not very well with driving vision [6]. In contrast, some young people overlook accidents from these causes. Thus, the answer outcomes of C4, 7, and 11 earned partiality by respondents. They have to cut off from consideration.

Most people have an accident in university with alcohol intoxication feel in driving [11]. The camaraderie of seniors or alumni and juniors led them to have the party after finished work [7] and class [8]. Driving back into the university resulted in an accident. Therefore, the mean value of C1 is a very high response with 4.59. The alcohol intoxication feel is caused by careless driving, and less driving vision [3]. In various accidents, the cause may be impacted both directly and indirectly from this problem [9].

Priority ranking of accident causes
The ten items are passed all statistical limitations consensus consist of; C 1-3, 5-6, 8-10, 12, and 13 will be prioritized by mean values. They are showed priority ranking in table 3.

Table 3 The priority ranking of AC

Priority ranking	AC
1	C1
2	C2
3	C12
3	C13
4	C5
5	C9
6	C10
7	C3
	C8
8	C6

Driving with alcohol intoxication feel is the number 1 impacted by accident [2] in the university. Many causes of accidents occurred from drinking some alcohol [11]. The intoxication feel led driver has reckless driving [10] (C2) is ranked to 2. For example, using a telephone while driving may build a loss of concentration with normal people [7]. But, the people who have intoxication feel will be more loss of driving control. Their Lack of consciousness led to the causes of careless driving is most from the alcohol intoxication feeling [4].

Insufficient illumination [11] (C12) happens in the cause study at number 3. The entrance to the dormitory in the university will have the most accidents due to lack of lighting. Failure to install sufficient lighting at the right place may result in accidents at night [9]. The experts and respondents mentioned to the drinking people who are received so often accidents in this area when they back to the night with down

driving vision [2]. A rainy and slippery road (C13) [12] is number 3 as well. The road in front of the engineering faculty is so slippery, it will be more slippery when there is moisture from rain. A driver's lack of consciousness with alcohol intoxication feeling often occurs this accident cause [8].

Violating traffic rules in the university [9] (C5) ranked at 4. It prefers to accidents in the morning and afternoon hours before the class, rest for noon, and during the night. The rush of students sent them to violate traffic rules [11]. Particularly, the accident during the night is from alcohol intoxication people who careless and ignoring the traffic regulations of the university [9]. This accident caused is happened to staff as well [10].

Lack of traffic facilities [8] (C9) is number 5. Mostly, roads without traffic lines and the lack of a prohibition parking sign and lines often occur accident cause in the university [12]. People parked their automobile and motorcycle to over the road and conceal the vision of the people who travel [10]. Many drivers received the accident collided with a parked vehicle [5].

The availability of vehicles [1] (C10) is number 6. This accident caused happens with a provincial student. Most of them have to take the old motorcycle and automobile from their hometown to use in the university [9]. It lacks ongoing maintenance. Sudden accidents may cause them to lose driving control, such as tires leak [11]. And, the accident from lack of a

rearview mirror of a motorcycle often occurs with students [8] who are intoxicated alcohol.

Driving experience [4] (C3), and Traffic line deterioration [1] (C8) are together obtained to priority ranking in number 7. Uncertainty in making decisions because some traffic lines deterioration may cause an accident. Mostly, the unclear traffic dividing line is a major obstacle to the driver's misunderstanding in the decision [12]. It is similar to the cause of the lack of driving experience focused on decisions making of drivers [6]. This factor mostly still happens with alcohol intoxication driver.

Parkin prohibited areas (C6) [12] is the last ranking at number 8. The university has some area should not park the vehicle such as the curve area [11]. It has already red and white color lines. The cause of the accident is occurred from some driver park the vehicle temporarily [7]. This cause is not frequently happening due to a narrow turning path. The people in the university will be directing traffic jam when some drivers park in the prohibited areas [9].

Conclusions

To have eligible items with a University case study, the integrated accident cause is from all data traffic accidents in Thailand and 5 large universities are suggested by 11 experts, working in the case study. These research outcomes, thirteen items maybe only happened in a University case study by the perspective of its 331 students, 42 staff, and 9 sellers. It should be more applied to other case studies and found out the differential way in the future. The results will help to guild the university manager to decide the key to improve the causes of traveling accidents in the university area. 8 priorities are ranking with 10 AC passed consensus value. Driving with alcohol intoxication feel (C1) is the most significant factor impacted by other accident causes respectively.

References

[1] Z. Zhenjie., et al, "Determinants of the congestion caused by a traffic accident in urban road networks," *Accid. Anal. Prev*, vol.136, pp.105327, 2020.

[2] D. Lorenzo et al., "Travel time in case of accident prediction model," *Procedia Soc. Behav. Sci*, vol.53, pp. 1080-1089, 2012.

[3] Z. Li et al., "Traffic accident modelling via self-exciting point processes," *Reliab. Eng. Syst. Saf*, vol.180, pp. 312-320, 2018.

[4] T. Yordphol et al., "Traffic accidents in Thailand," *IATSS Res,* Vol.29, no.1, pp. 88-100, 2005.

[5] T. Yordphol, "Road accidents in Thailand: changes over the past decade." *IATSS Res*, vol.28, no.1, pp. 119-122, 2004.

[6] M. Sujin, "Current situations of road safety in Thailand," in *Intertraffic Asia* 2002, Bangkok, Thailand, 2002, pp. 1-4.

[7] ThaiRoads Foundation, Thailand Accident Research Center (TARC) and Asian Institute of Technology, *Key facts on road safety situations in Thailand 2012-2013*, Department of Land Transport Publisher, Bangkok, Thailand 2015.

[8] S. Darunee, *"A study for developing policy recommendations for road accidents reduction in the area of Bangkok metropolitan: A case of Sai Mai District,"* M.Pol.Sc. thesis (Politics and Governments), Thammasat University, Pathum Thani, Thailand. 2015.

[9] K. Paweena et al., "Traffic laws violation behaviors of motorcyclists in student of Ubonrajathanee University." *J. Manag. Sci. Ubon Ratchathani Univ*, vol.2, no. 1, pp. 59-75, 2012.

[10] S. Nipa, *"Factors effecting on motorcycle riders behavior at emergency department, Lerd Sin hospital*," M.S. thesis (Health Education, *Srinakharinwirot University*, Bangkok, Thailand, 2006.

[11] B. Pongsit et al., *Factors related to motorcycle accidents among students of Suranaree University of Technology*, Suranaree University of Technology Publisher, Nakhon Ratchasima, Thailand, 2012.

[12] Department of Social Sciences, *Guidelines for reducing traffic accident problems of students in front of Silpakorn University: Nakhon Pathom Campus*, Silpakorn University Publisher, Nakhon Pathom, Thailand, 2010.

[13] T. Yamane, *Statistics: An Introductory Analysis*, 2nd Edition, Harper and Row Publisher, New York, USA, 1967.

[14] L. Rensis, "A technique for the measurement of attitudes." *Arch. Psychol*, vol.140, no. 22, pp. 5-55, 1932.

[15] D. Norman et al., *An experimental application of the Delphi method to the use of experts,* The rand corporation Publisher, Santa Monica, California, USA, 1962.