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ASIAN TRANSPORTATION RESEARCH SOCIETY

Road Traffic Accidents caused by the increased number of delivery service riders during the Pandemic: An Empirical Study in Bangkok Metropolitan and Vicinity

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List of Abbreviations and Acronyms

ACCIDENT	Experience with road traffic accidents
AGE	Age
AL	Unbalanced or awkward loads
EDU	Education
INCOME	Monthly income
KMT	Kilometers travelled per day
RRB	Reckless riding behaviors
TRAINING	Road safety training
WHOUR	Working hours

CHAPTER I INTRODUCTION

1.1 Rationale

The Covid-19 pandemic has forced and changed people' behaviors to order food and other related products online. Hence, rider profession has become an important actor for the Thai economy since there is a lot of demand for the platform, especially fresh food products must be delivered immediately. The food delivery business for the whole year 2021 is expected to be worth 5.58 billion baht, or about 10 billion baht increase accounting for 24.4% compared to the year 2019. The total order volume is expected to reach 120 million in 2021, equal to three times the number of orders in 2019, there were approximately 35-45 million orders (Kasikorn Research Center, 2021). The Kasikorn Research Center (2022) estimates that the market value of food ordering in 2022 (recalculation base, including restaurants, bakeries, and beverages) will be approximately 7.9 billion baht or expand by 4.5%, slowing from a high accelerating base in 2021. However, the Umicron pandemic may result in the food delivery market to accommodation expanding more than expected.

Interestingly, motorcycle sales in 2021 are expected to return positively, after three years of negative sales volume, many motorcycle campers admitted that the market was becoming saturated because of the number of motorcycle registrations with the Department of Land Transport, around 21 million vehicles nationwide. In 2021, the motorcycle market has recovered, with the first eight months of this year, motorcycles have sold 1,092,326 vehicles or grew by 7.90%, expanding significantly better than cars. This can be implied that the rider profession is a major factor boosting the sale volume of motorcycles.

A rider or motorcyclist transports goods as needed or called as a messenger who sends documents but currently preferable to deliver food. This career is rising rapidly in line with economic growth. Some make it temporary, and most of them stretch into mainstream occupations. According to Chulalongkorn University, it says this is one of the most economically expanded professions. In the COVID-19 era and most riders, 80% are mainstream occupations, with the remaining 20% seen as an auxiliary occupation (TNNOnline, 2021). The age range of the majority of riders is between 18-29 years old, followed by the 30-44 aged group, and the last group is late workers, including the elderly, which are the smallest. The rider's highest education levels are mostly high school and undergraduate levels.

Statistics indicate that more than 45% riders work more than 60 hours a week because there are conditions for each platform to require more work in exchange for insurance or bonuses, for example, which is higher than the labor statutory period of 48 hours per week. This inevitably results in road traffic accidents. One-third of riders have had accidents during work, more than 40% of them are serious injuries, some of them fatal, which is a very risky occupation, and when they are hospitalized, they will result in no income or lower income (TNNOnline, 2021).

Of course, rider remains an important engine for the economy duringCOVID-19, including the future. While workers remain vulnerable and not as protected as they should be, it is no surprise that scholars have called on the state to help outlines on the protection of these workers. Otherwise, if the economy improves, there may be a few people who turn their backs on rider's career, a popular career in 2021. However, study on road safety among riders is quite rare.

There are various factors leading to accidents among riders. Reckless riding behavior is one of the most important factors which is supported by the study of Zheng et al. (2019) who found a positive relationship between reckless riding behaviors and road traffic accidents among riders. Vijayasankari et al. (2020) added that the most important cause of accidents among food delivery workers was mobile phone use while driving. Bernama (2021) added that rushing to reach destination on time could lead to accidents since the riders may perform risky riding. Some studies found that long working hours could cause accidents among food delivery riders. Zheng et al. (2019) conducted a study entitled “crash involvement and risky riding behaviors among delivery riders in China: The role of working conditions.” They collected the data from 824 delivery riders. The findings revealed that the workload was associated with the crash. According to a study in Thailand, workers had to work on average 10–12 hours a day to obtain a basic level of income (Teerakowitkajorn & Tularak, 2020). They also added that “the longer that riders are on the road, the greater is the chance of an accident.” Zhou (2018) found that riders had great pressure during the bad weather conditions, as well as long periods of work. Sami et al. (2013) found that education level was significantly correlated to mortality rate. Age was associated with traffic accidents among riders. Ayun et al. (2019) conducted a study entitled “effects of age and violations on occupational accidents among motorcyclists performing food delivery.” They analyzed 1,317 injured couriers regarding rider-related factors and crash-related factors according to rider's age or violations. The findings indicate that all types of injury decreased with age, but the death or disability' accidents increased with age. Several studies also found that younger age was one of the most common risk factors (Vijayasankari et al., 2020: McKinlay et al., 2022). Kilometer-travelled per day is also important since riders may spend longer time on the road. The

longer the time on the road, the more likely they are exposed to road traffic accidents. A survey conducted by the Transport Workers Union in Australia indicated that riders has no or least training (Zhou, 2018). The European Agency for Safety and Health at Work (2010) also mentioned risks among riders resulting from lack of training. European Agency for Safety and Health at Work (2010) mentioned that unbalanced or awkward loads are also an important factor leading to road traffic accidents.

According to the previous studies, 7 causes of traffic accident among food delivery riders are selected. Hence, the conceptual framework is proposed as follow.

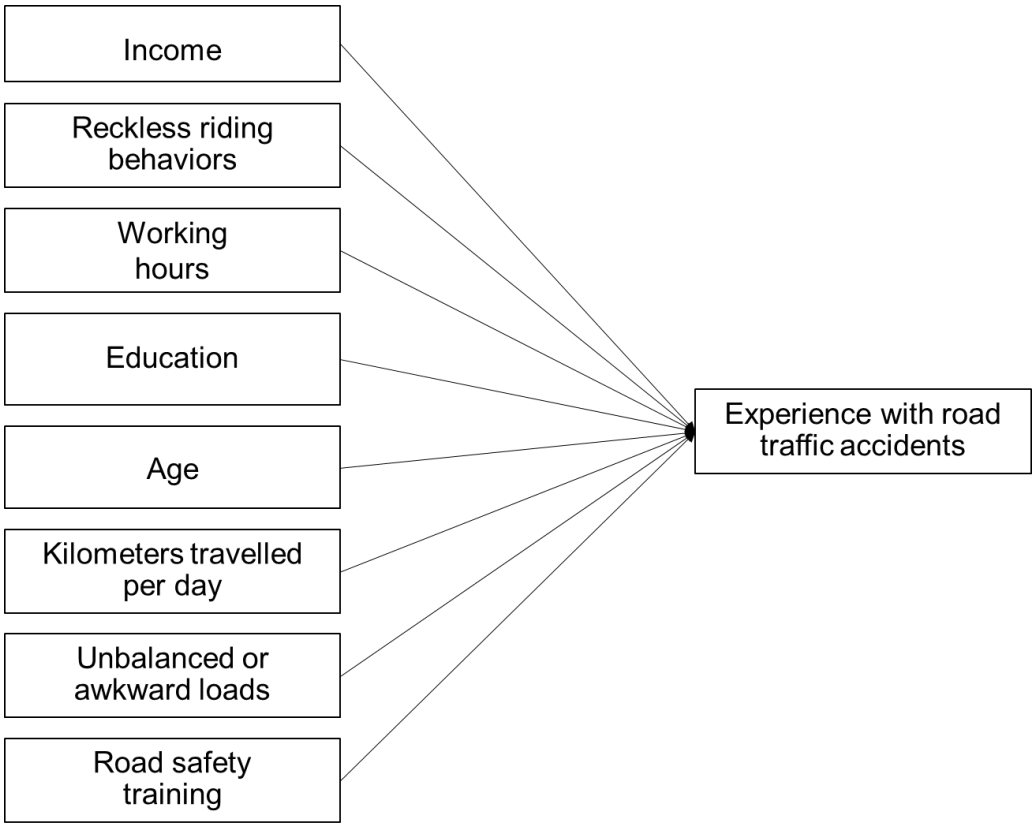

Figure 1 Proposed conceptual framework

Then, the hypotheses were proposed as follows.

H1: Income has an influence on experience with road traffic accidents.

H2: Reckless riding behaviors have an influence on experience with road traffic accidents.

H3: Working hours have an influence on experience with road traffic accidents.

H4: Education has an influence on experience with road traffic accidents.

H5: Age has an influence on experience with road traffic accidents.

H6: Kilometers travelled per day has an influence on experience with road traffic accidents.

H7: Unbalanced or awkward loads have an influence on experience with road traffic accidents.

H8: Road safety training has an influence on experience with road traffic accidents.

1.2 Research Questions

1. What are the situation and prevalence of road traffic accidents among riders (food delivery) in Bangkok?
2. What are the causes of road traffic accidents among riders (food delivery) in Bangkok?
3. What are countermeasures against accidents?
4. What are suggestions and recommendations to policy makers?
5. Are the main findings of the study consistent with previous studies?

1.3 Objectives

1. To examine the situation and prevalence of road traffic accidents among riders (food delivery) in Bangkok.
2. To examine causes of road traffic accidents among riders (food delivery) in Bangkok.
3. To examine countermeasures against accidents.
4. To provide suggestions and recommendations to policy makers.
5. To compare the main findings with other previous works (PRISMA Analysis).

1.4 Research Benefits

1. The findings of this research will catch the attention of the public to place importance on road traffic accidents among riders.
2. The findings of the study can be used as evidence in the policy making process to deal with road traffic accidents among riders.
3. Researchers and scholars can apply the findings in their research in the future.

CHAPTER 2 METHODOLOGY

2.1 Research Design

This research is a mixed method research including quantitative research and qualitative research.

2.2 Quantitative Research

2.2.1 Population

The population of this study is food delivery riders in Bangkok and vicinity.

2.2.2 Sample

The sample of this study were 384 participants who are food delivery riders in Bangkok and vicinity derived from the following formula (Cochran, 1977).

$$n = \frac{Z^2}{4e^2}$$

Where n = sample size

Z = Z value at reliability level or significance level. The reliability level 95% or significance level 0.05; Z = 1.96

e = The desired level of precision (.05)

Hence,

$$n = \frac{(1.96)^2}{4(.05)^2}$$

$$= \frac{3.8416}{0.01}$$

$$= 384.16$$

$$= 384$$

2.2.3 Research Tool

The questionnaire was employed as a research tool. It consists of 9 parts as follows.

1. Demographic information
2. Reckless riding behaviors
3. Working hours
4. Education
5. Age
6. Kilometers travelled per day
7. Road safety training
8. Experience of road traffic accidents

2.2.4 Validity

Each item will be assessed by transportation experts giving the item rating of 1 for clearly measuring, -1 for clearly not measuring, and 0 for unclear measuring. Finally, the index of item – objective congruence (IOC) will be calculated using the formula developed by Rovinelli and Hambleton (as cited in Kotchapong, 2008) for each item of the questionnaire. Prasitrattasin (2007) suggested that the IOC index higher than .50 is determined as valid. Hence, any item with IOC index lower than .50 will be deleted or the statements will be revised in accordance with the recommendations of the experts.

2.2.5 Reliability

The reliability of each measurement, measure of internal consistency, will be examined employing Cronbach's alpha coefficient (Cronbach, 1951). George and Marry (as cited in Gliem & Gliem, 2003) suggested that the Cronbach's alpha coefficient >.90 – Exccellent, >.80 – Good, >.70 – Acceptable, >.60 – Questionable, >.50 - Poor, and <.50 – Unacceptable. According to the analysis, reckless riding behaviors and unbalanced or awkward loads had the Cronbach's Alpha coefficients of 0.939 and 0.848 respectively.

2.2.6 Data Collection

During July-September 2022

2.2.7 Data Analysis

The primary data will be collected using questionnaires as a research tool. Well-trained research assistants are assigned to collect data. Then, descriptive statistics such as frequency, percentage, mean, median, and standard deviation were applied in data analysis. In addition, ordinary multiple regression analysis using statistical software was employed to examine the relationship between independent and dependent variables.

2.3 Qualitative Research

2.3.1 Key Informants

There were 20 key informants who are food delivery riders and had experienced road traffic accidents. Snowball sampling was used to select the key informants. Criteria for selecting key informants are defined as follows:

1. Being a food delivery rider in Bangkok and vicinities.
2. Experienced in road traffic accidents in the past 2 years.
3. Willing to cooperate or participate in this study.

2.3.1 Research Tool

In-depth interview using semi-structured interview.

2.3.2 Data Collection

During July-September 2022.

2.3.3 Data Analysis

Narrative analysis will be employed in this study. This method is used to analyze content from various sources, such as interviews of respondents, observations from the field, or surveys. It focuses on using the stories and experiences shared by people to answer research questions.

CHAPTER 3 RESEARCH PLAN

3.1 Project Schedule

This project is a 1-year project. The timeframe of this research is scheduled as illustrated in Table 1.

Table 1 Timeframe

Activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Review of literature	■											
Inception report submission	■											
Questionnaire Validation		■										
Progress report			■									
Data collection				■	■							
Data analysis						■						
Interim report presentation & submission							■					
Roundtable discussion & workshop								■				
Final report presentation & comments									■			
Final report preparation & submission										■	■	■

3.1 Project Expenditure

The total budget of the project is 414,000 and the expenditure of this project is illustrated in Table 2.

Table 2 Project expenditure

No.	Description	Cost/Unit	Unit	Amount (Baht)
1	Project leader	3,000	12	36,000
2	Research assistants	6,000	12	72,000
3	Expenses for project meeting (3 project members x 12)	1,000	36	36,000
4	Survey Data collection	400	100	40,000
5	In-depth interview	2,000	20	40,000
6	Transportation & Petrol	3,000	30	90,000
7	Office and computer supply	5,000	1	5,000
8	Document & Copy	5,000	1	5,000
9	Secretariat's participation portion	10,000	1	10,000
10	Advisor	10,000	2	20,000
11	Data coding & analysis	40,000	1	40,000
12	Publishing proportion of the report book	20,000	1	20,000
Total				414,000

3.3 Project oversight

The project oversight component of this research has been designed to track and provide guidance, comments, and recommendations at key stages of the project from different perspectives.

1. Project advisors – four advisors are assigned to provide independent assessment and review of major outputs. Then, they are responsible for giving comments and recommendations on technical excellence and relevance.

2. Consultative forum – to ensure the relevance and completeness of the findings, this forum or roundtable discussion will be held in order to gain comments and recommendations from various perspectives.

CHAPTER 4 RESULTS

4.1 Quantitative Research Results

4.1.1 Participants

The questionnaire was distributed to the prospective participants. The authors obtained 428 completed questionnaires from the food delivery riders. Table 3 shows the demographic characteristics of the respondents.

Table 3 Demographic characteristics of the respondents

Demographic information	Frequency	Percentage
Gender		
Male	301	70.33
Female	126	29.44
LGBTQIA+	1	0.23
Marital status		
Single	83	19.39
Married	256	59.81
Divorced	46	10.75
Separated	43	10.05

According to Table 3, most of the participants were male accounting for 302 riders (70.33%). There were 126 female riders participating in this research project accounting for 29.44% while there was only 1 rider, who identified himself/herself as LGBTQIA+. About 59.81% of the participants were married. There were 83 riders, who are single accounting for 19.39%. In addition, divorced and separated people were 10.75% and 10.05% in that order.

4.1.2 Characteristics of variables in the study

Table 4 shows the average age of respondents, with the average age being 41, with the youngest respondent being 18 years old and the oldest being 55 years old. When considering the time spent studying, it was found that, on average, the respondents spent around 16 years in school and university. The minimum time is 11 years, and the longest duration is 28 years. The average income per month of respondents was approximately 17,700 Baht. A person with the lowest income has about 8,000 Baht per month, while the person with the highest income is 35,000 Baht per month. When asked about safe riding training, it was found that some people have never been trained at all. But on average, in the last 3 years, the respondents received approximately 8 hours of safe riding training. Considering the working hours in each day, they work from 5 hours to 16 hours a day, but

on average fall to around 10 hours a day. The number of kilometers traveled ranged from 8 kilometers to 260 kilometers per day. But on average, respondents traveled about 118 Kilometers per day. In addition, inquiries were made about the experience of road accidents. In the past 3 years, some have never had an accident. The highest number of accidents in 3 years is 5 times, so on average, respondents experienced road accidents within 3 years was about 1 time each.

Table 4 Mean and standard deviation of variables

Variable (s)	Minimum	Maximum	Mean	Standard deviation
Age	18.00	55.00	41.48	4.68
Education	11.00	28.00	15.52	3.73
Income	8,000.00	35,000.00	17,708.24	2,172.81
Safety riding training	.00	25.00	7.60	2.97
Workload	5.00	16.00	10.05	1.77
KM traveled	8.00	260.00	117.95	31.08
Experience with road traffic accidents	0.00	5.00	0.79	1.03

4.1.3 Reckless riding behaviors

Reckless riding behaviors variable was measured by 7 items. The mean and standard deviation of each item are illustrated in Table 5.

Table 5 Mean and standard deviation of reckless riding behaviors

Item	Mean	S.D.	Description
1. The hustle and bustle of deliveries makes me ride my motorcycle at high speed.	1.43	.90	Low reckless riding
2. Working against time makes me violate traffic lights.	1.68	.90	Low reckless riding
3. While riding a motorcycle, I must also look at the map from my mobile phone.	1.74	.92	Low reckless riding
4. I don't wear a safety helmet because it makes work difficult.	1.73	.82	Low reckless riding

Table 5 Con't

Item	Mean	S.D.	Description
5. I zigzags between other vehicles on my motorcycle to make deliveries on time.	1.69	.86	Low reckless riding
6. I ride closely behind the back of the car in front of me to reach my destination faster.	1.64	.87	Low reckless riding
7. Sometimes I ride a motorcycle on the sidewalk to speed up my work.	1.64	.86	Low reckless riding
Total	1.65	.75	Low reckless riding

Table 5 suggests that, overall, riders have a low average reckless riding behavior (Mean = 1.65, S.D. = 0.75). An item with the highest average is Item 3 " While riding a motorcycle, I must also look at the map from my mobile phone" (Mean = 1.74, S.D. = 0.92). This is followed by Item 4 "I don't wear a safety helmet because it makes work difficult" (Mean = 1.73, S.D. = 0.82), Item 5 "I zigzags between other vehicles on my motorcycle to make deliveries on time" (Mean = 1.69, S.D. = 0.86), Item 2 "Working against time makes me violate traffic lights" (Mean = 1.68, S.D. = 0.90), Item 7 "Sometimes I ride a motorcycle on the sidewalk to speed up my work" (Mean = 1.64, S.D. = 0.86), Item 6 "I ride closely behind the back of the car in front of me to reach my destination faster" (Mean = 1.64, S.D. = 0.87), and Item 1 "The hustle and bustle of deliveries makes me ride my motorcycle at high speed" (Mean = 1.43, S.D. = 0.90) respectively.

4.1.4 Unbalanced or awkward loads

Unbalanced or awkward loads were measured by 5 items. The mean and standard deviation of each item are illustrated in Table 6.

This Table suggests that, overall, there were slightly unbalanced or awkward loads among food delivery riders (Mean = 2.14, S.D. = 0.67). An item with the highest average is Item 2 "I have to carry heavy things" (Mean = 2.20, S.D. = 0.76). This is followed by Item 4 "I have to carry large or long items " (Mean = 2.15, S.D. = 0.86), Item 3 "I must carry more weight

than the motorcycle can support" (Mean = 2.14, S.D. = 0.89), Item 1 "I have to carry a lot of stuff" (Mean = 2.11, S.D. = 0.86), and Item 5 "I must carry items that are prone to breakage or damage easily" (Mean = 2.08, S.D. = 0.86) respectively.

Table 6 Mean and standard deviation of awkward loading

Item	Mean	S.D.	Description
1. I have to carry a lot of stuff.	2.11	.86	Slightly awkward loading
2. I have to carry heavy things.	2.20	.76	Slightly awkward loading
3. I must carry more weight than the motorcycle can support.	2.14	.89	Slightly awkward loading
4. I have to carry large or long items.	2.15	.86	Slightly awkward loading
5. I must carry items that are prone to breakage or damage easily.	2.08	.86	Slightly awkward loading
Total	2.14	.67	Slightly awkward loading

4.1.5 Multiple Regression Analysis' s Assumption Testing

4.1.5.1 Linearity

An examination of residual scatterplots is employed to test the assumption of linearity as suggested by Coakes & Steed (2003). If there is no clear relationship between the residuals and the predicted values, the assumption of linearity should be met. By plotting the standardized predicted values (ZPRED) against the standardized residuals (ZRESID), the result of testing linearity through scatter plot diagrams is shown in Figure 2, which shows no evidence of a nonlinear pattern to the residuals.

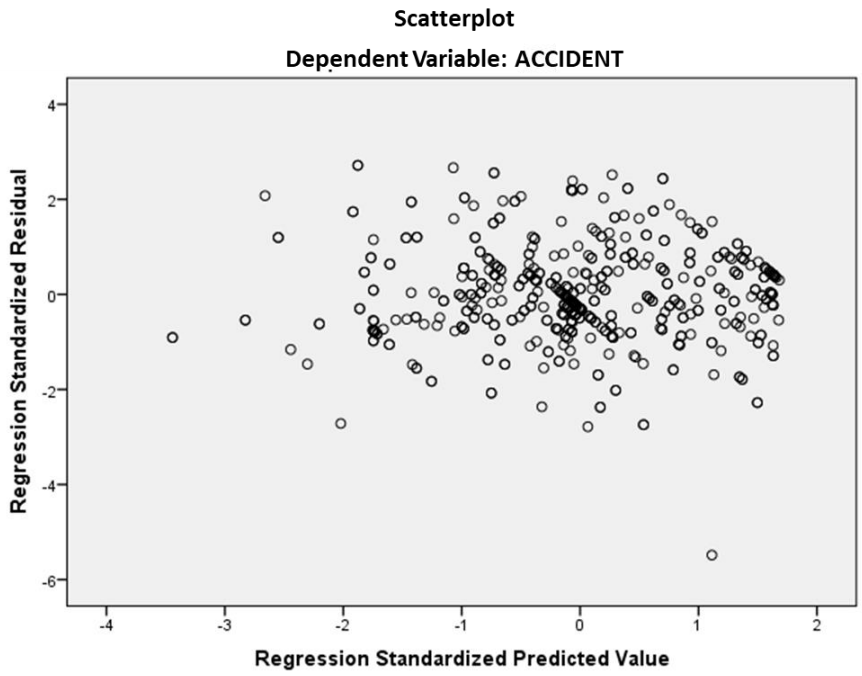

Figure 2. The Scatter Plot for Linearity and Homoscedasticity

4.1.5.2 Normality

Normality was tested using normal p-p plot and the histogram of the distribution of the residuals. The cumulative probability plots of residuals (P-P plot) were used to judge whether the distribution of variables is consistent with a specified distribution. If the Standardized residuals are normally distributed, the scatters should fall on or tightly close to the normal distribution line. Figure.2 shows that the scatters of the residuals basically fall straightly on the normal distribution line, indicating a normal distribution of residuals.

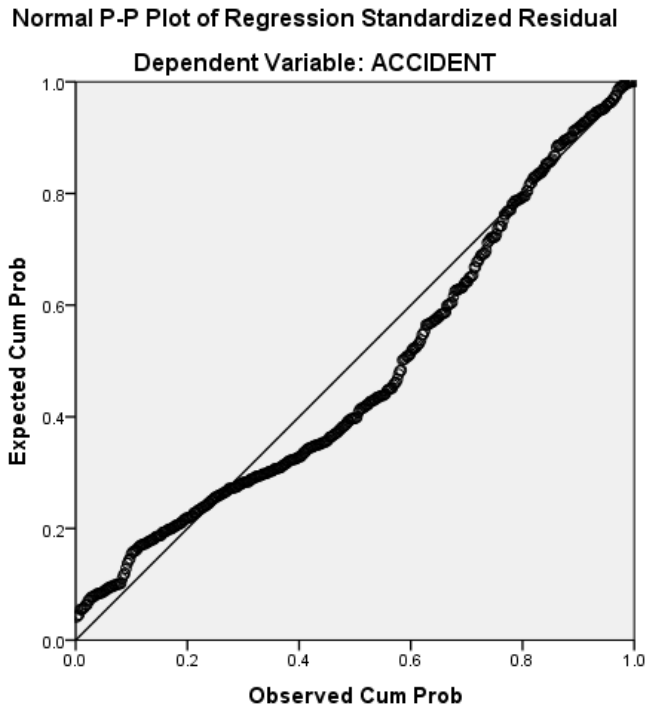

Figure 3. The P-P Plot of the Normality Test

4.1.5.3 Homoscedasticity

The residual scatterplots could also be used to test the assumption of homoscedasticity. If there is no clear relationship between the residuals and predicted values, the assumption of homoscedasticity should also be met. In this study, by plotting the standardized residuals against the predicted values as shown in Figure 2, the researcher found there was no clear relationship between the residuals and the predicted values. Therefore, the results suggest that the assumption of homoscedasticity should be met in this study.

4.1.5.4 Multicollinearity

Multicollinearity test is important because if multicollinearity exists between two or more independents variables it can deteriorate the results of multiple regression. In this present study, multicollinearity has been examined between the independent variables using VIF as shown in Table 7.

Table 7 Tolerance Value and the VIF of Variables

Variables	Collinearity statistics	
	Tolerance	VIF
AGE	.676	1.479
EDU	.652	1.533
INCOME	.802	1.247
TRAINING	.902	1.108
WHOUR	.631	1.585
KMT	.765	1.307
RRB	.625	1.600

The results in Table 7 indicate that multicollinearity does not exist among all independent variables because the Tolerance values are more than .10 and VIF values are less than 10. The results suggest that the current study does not have any problem with multicollinearity, and this allows for standard interpretation of the regression coefficients.

4.1.6 Multiple regression analysis

According to the analysis results, a significant regression equation was found to be significant ($F(8, 419) = 10.052$, $p<.001$) (Table 7), with an explained variance of 16.1% ($R^2=.161$) (Table 8). Furthermore, the data analysis revealed that reckless riding behaviors (β = .291, $p<.001$), education (β = .224, $p<.001$), kilometers traveled (β = .201, $p<.001$), and road safety training (β = -.172, $p<.001$) significantly influence experience with road traffic accident of food delivery riders. Alternately, the age (β = -.036, $p=.504$), income (β = .057, $p=.266$), working hours (β = .066, $p=.245$), and unbalanced or awkward loads (β=.030, $p=.734$), do not significantly influence the experience with road traffic accident of food delivery riders (Table 9).

Table 7 ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	73.411	8	9.176	10.052	.000[b]
	Residual	382.495	419	.913		
	Total	455.907	427			

a. Dependent Variable: ACCIDENT

b. Predictors: (Constant), AL, AGE, KMT, TRAINING, INCOME, WHOUR, EDU, RRB

Table 8 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.401[a]	.161	.145	.955

a. Predictors: (Constant), AL, AGE, KMT, TRAINING, INCOME, WHOUR, EDU, RRB

Table 9 Coefficient Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.474	.603		-.787	.432
	AGE	-.008	.012	-.036	-.669	.504
	EDU	.062	.015	.224	4.039	.000
	INCOME	2.706E-5	.000	.057	1.115	.266
	TRAINING	-.060	.018	-.172	-3.336	.001
	WHOUR	.038	.033	.066	1.163	.245
	KMT	.007	.002	.201	3.911	.000
	RRB	.400	.113	.291	3.525	.000
	AL	.047	.137	.030	.340	.734

a. Dependent Variable: ACCIDENT

As can be seen that the R^2 was statistically significant, with F =10.052 and $p < .001$, the common expression of the regression equation is stated as follows:

ACCIDENT = .224EDU - .172 TRAINING + .201KMT + .291RRB

In this equation, it can be observed that:

1. For each unit of change in the EDU, the experience with road traffic accidents will vary in positive relation to .224 units.
2. For each unit of change in the TRAINING, the experience with road traffic accidents will vary in negative relation to .172 units.
3. For each unit of change in the KMT, the experience with road traffic accidents will vary in positive relation to .201 units.
4. For each unit of change in the RRB, the experience with road traffic accidents will vary in positive relation to .291 units.

In conclusion, reckless riding behavior (RRB) was the most important factor affecting the experience of road traffic accidents among food delivery riders. This is followed by education (EDU), kilometers traveled (KMT), and road safety training (TRAINING) in that order. Table 10 illustrates the summary of hypothesis testing.

Table 10 Summary of hypothesis testing

Hypothesis	Result
H1: Income has an influence on experience with road traffic accidents.	Not accepted
H2: Reckless riding behaviors have an influence on experience with road traffic accidents.	Accepted
H3: Working hours have an influence on experience with road traffic accidents.	Not accepted
H4: Education has an influence on experience with road traffic accidents.	Accepted
H5: Age has an influence on experience with road traffic accidents.	Not accepted
H6: Kilometers travelled per day an influence on experience with road traffic accidents.	Accepted
H7: Unbalanced or awkward loads have an influence on experience with road traffic accidents.	Not accepted
H8: Road safety training has an influence on experience with road traffic accidents.	Accepted

4.2 Qualitative Research Results

4.2.1 Current working situation

The authors conducted in-depth interviews with key informants, including 20 food delivery riders, about their situation and working conditions. The results of the in-depth interview point out that working as a rider is not covered by the Labor Relations Act B.E. 2518. Food delivery riders are a new way of working that lacks clarity. Moreover, at present, the government has not established appropriate supervision measures. As a result, the business faces a number of operational issues, particularly those related to the rights and welfare of food delivery workers for platform companies. The main problem that riders are not covered by appropriate laws is unclear on the legal status of food delivery providers through the platform. Inevitably, it will lead to the enforcement of the law with accuracy. This includes the rights of workers and appropriate legal supervision measures from the government. One interviewee said the ambiguity allowed Ryder to be exploited by the company.

> “In the case of an app charging a rider of 200 baht per person to work in the system, claiming that it will be returned when the rider’s account is closed, and riders must not commit a serious offense, which does not know which law to use in exercising power. The employer is not a partner or not, I'm not sure.”

A female rider added that her income has been decreased according to the exploitation of the food delivery companies:

> "I ran LINE MAN for 2 years, Originally, I worked 6 hours a day for 700-800 baht, now I work 6 hours to get 300 baht. The fuel will be 30 baht per liter, some days I run until the tank runs out of fuel. Hundreds of gases a day, and what do I eat."

The following statements are part of a complaint from riders that reflects unfair employment conditions.

> "The number of riders is increasing, there is a scramble for jobs. Who can be fast first? Competition (competition system) causes me to look at my phone all the time to check my work."

> "Algorithm: Normally, people who press finishing the job will get more work than people who stop waiting for a check."

> "Less pay makes riders to work harder."

> "Application is more complicated than ever. This requires several steps."

> "If the order is cancelled, the rider will be punished or banned according to the rules of each company, such as percentage of job reception will be reduced, or work will not be visible. Also, the company does not pay for your work.

> "The company can control everything."

> "The cost of replacing the phone with higher speeds makes me suffer."

> "Each app tries to discourage riders from running for another company."

In the past, there was no compulsion that riders could or may not accept a job. No penalties followed. For example, if a rider does not accept a job, the signal must be suspended for 24 hours, which is not a direct compulsion, but it creates an incentive to

work. How is it badly assessed? The platform itself will be evaluated, affecting wages and employment rates.

Even today, Thailand does not have a clear legal status decision. Initially, workers were still able to exercise their common rights to be protected by law, such as constitutional rights under Article 42. To unite to demand rights from employers, and rights under Section 40 of the Social Security Act B.E. 2533 (1990). Although these preliminary measures may not be able to ensure that workers are fully protected. But these preliminary measures will help workers to get initial protection while the relevant legislation and other assistance operations are in progress to ensure that those who work in food delivery services through the form platform are fully protected and sustainable in the future.

4.2.2 Factors leading to road traffic accidents

Most of the riders have experienced road traffic accidents in the past 3 years. More than 50% reported they had experienced road accidents in the past three years, 6 people had minor injuries while one rider had serious injuries. Thirteen riders reported they never had an accident in the past 3 years. Hence, 35% of the respondents experienced accidents. They were asked to identify antecedents of road accidents among food delivery riders. According to their reports, there were several factors leading to road accidents as follows.

1. Carelessness
2. Using a mobile phone while riding.
3. Non-compliance with traffic rules among riders and other road users.
4. Overloaded, they hung items around the motorcycle, that resisted the wind, and they could not control the vehicle.
5. Road conditions, such as flooding, pits, and poor traffic surfaces.
6. Traffic signs are not clear.
7. Non-standard maps. Unknown riders followed the map and there was an accident.
8. Traffic jam
9. Size, weight, and characteristics of the product. For example, riders are paranoid while carrying items made from glasses.
10. Hard work and insufficient rest.

A rider claimed that he must work hard to earn more money for his family. He worked more than 16 hours a day.

> “I got up around 5 A.M. and finished my work around 10.00 P.M. I do this every day to get more money otherwise my family cannot

> survive. Sometimes, I had an accident but not a serious injury. I found that insufficient rest is the cause of the accident."

Several riders explained that they had accidents since they have to rush to their destinations and also use their mobile phone to see the map while riding.

> "I had an accident last year. It happened while I was looking at the map on my phone while riding. I did not see the car nearby me, so I Hit the side of that car. Fortunately, I wasn't seriously injured."

A female rider reported that she had an accident since she carried many items, and they are overloaded.

> "At that time, customers ordered a lot of products and weighed a lot. During the ride, it is not possible to control the motorcycle well. When turning left onto a secondary road, the motorcycle fell and injured my leg."

Most of them reported that riding discipline is a very important factor. Many road users lack driving discipline, do not respect traffic laws, and are in non-compliance with traffic lights. This results in accidents easily. One of them explained:

> "People don't respect traffic rules these days, they drive at their own pace, they drive carelessly with disregard for the safety of oneself and others. Besides that, they are impatient, causing fights, violence on the road, and more importantly, accidents."

4.2.3 Countermeasures

There has been a gathering of riders to demand rights, welfare, and fairness on a variety of issues against platform companies, but it doesn't seem to have made much progress. Considering the legal relationship of the labor, the rider is still a hired laborer in Thai law. The platform company does not have to have many obligations to take care of workers. One way to increase riders' rights and welfare is to amend the law to include riders as 'employees' workers so that riders can receive protection and welfare under the Labor Protection Act. At present, studying and considering draft issuance of the Act on the promotion and development of quality of life for informal workers are in process. This law will be designed to protect the rights of riders who work independently. In addition, the Ministry of Labour is considering several other measures to provide rider protection, especially accident insurance. Some riders suggested in according to the amendment of the law:

> "Amendments to laws should be amended at the executive stage, as is the nature of ministerial regulations, or others because they are faster, easier to resolve, as opposed to enacting laws on the legislative floor, which may take too long. Nowadays, technology is advancing rapidly, and there may be hiring with more complex processes and more technology before the law is finished, it may not catch up and the legislation must be continuously revised."

Another rider added that some issues should be added to the Labour Relations Act rather than issuing a new law.

> "Personally, I agree that it should not be enacted as a new law, that it can be added or overridden in the Labour Relations Act. This is my opinion. In practice, a broader opinion may be required.

The participants were asked if they have any suggestions for solving road traffic accidents among food delivery riders. They suggested various measures as follows.

1. Promote a campaign for road users to have traffic discipline. They suggested that this means is more efficient compared to increasing the traffic fine. One of them said:

> "Now people are not afraid of the law even if there is an increase in the penalty because Thai people like to find ways to avoid being caught by the police." Or

> "Most riders are not informed about the right laws because the relevant agencies do not publicize. As a result, many people break traffic laws because of their ignorance. In addition, suggestions or advice on safe driving are not transmitted. Individual riders often learn to ride motorcycle from experience or have a family member or friend teach them how to drive but did not teach about traffic rules."

2. Safe driving training for food delivery riders. Providing related short-term training courses continually. These include the basic regulation of driving, riding behaviors in various situations, preparation of vehicles and equipment, motorcycle troubleshooting and maintenance, and dealing with customer-related delivery situations in various aspects, which will help motorcyclists deliver food to deal with immediate situations more efficiently. A rider talked about his history of working as rider:

> "I started riding motorcycles when I was 12 years old, taught by my father. After participating in the Safe Driving Program, I found that most of what I had learned since I was a child was wrong. Being trained means driving carefully, putting safety first, and increasing driving skills. Consequently, I have never had an accident at all. Therefore, there should be government agencies to take care of and support the budget for training riders."

3. Development of road and traffic condition alert system. Some riders complained that the poor road conditions caused them having accidents and have minor injuries. They suggested that there should be an alert system to inform road users whether there is repair, peeling off the road surface, there is a new road surface or pavement. Hence, riders can plan to change the driving route (if possible, in the case of changing the route from the platform specified) or using more caution when driving. A male rider suggested on this issue:

> "Platforms or information should be developed that can notify or provide information on road conditions to help increasing caution in driving or making driving plan."

4. The government should pay attention to the welfare and quality of life of riders. A policy on the assignment or acceptance of work of riders should be established. For example, limit the total number of working hours, which can be in line with driving other types of transport vehicles that set working hours do not exceed 8 hours a day. For a person working part time, there should be a limitation of working hours per day or may consider the transportation distance per day. One of the participants suggested.

> "Riders are currently not supervised by the government causing the company to take advantage. Their welfare and quality of life are neglected. The government should set policies to look at because such occupations are a means of generating income for the poor."

CHAPTER 5 CONCLUSION, DISCUSSION, AND RECOMMENDATIONS

5.1 Conclusion

This present study aims to examine the situation and prevalence of road traffic accidents among riders (food delivery) in Bangkok, causes of road traffic accidents among riders (food delivery) in Bangkok, countermeasures against accidents, suggestions, and recommendations to policy makers, and compare the main findings with other previous works (PRISMA Analysis). This is a mixed method research including quantitative and qualitative research. According to the quantitative study, questionnaires were employed to collect data from 428 respondents. The data was analyzed using multiple regression analysis techniques to explain the relationship between variables. Most of the participants were male. More than 50% of the participants were married. The average age of respondents was 41. On average, they spent around 16 years in school and university. The average income per month of respondents was approximately 17,700 baht. Some participants have never been trained at all. But on average, in the last 3 years, the respondents received approximately 8 hours of safe riding training. They work from 5 hours to 16 hours a day, but on average fall to around 10 hours a day. The number of kilometers traveled ranged from 8 kilometers to 260 kilometers per day. But on average, respondents traveled about 118 Kilometers per day. In addition, in the past 3 years, some have never had an accident but the average of respondents experienced road accidents within 3 years was about 1 time each. The respondents reported low reckless riding behaviors, and slightly unbalanced or awkward loads. The findings revealed reckless riding behavior was the most important factor affecting the experience of road traffic accidents among food delivery riders. This is followed by education, kilometers traveled, and road safety training in that order. On the other hand, income, age, working hours unbalanced or awkward loads, and do not significantly influence the experience with road traffic accident of food delivery riders.

Qualitative research was conducted using in-depth interviews with semi-structured interviews to collect data from 20 key informants. The findings revealed that working as a rider is not protected by labor law due to the vague interpretation of the nature of work performed because rider works for many applications, resulting in various welfare benefits being neglected and taken advantage of by the company. Some of them experienced road traffic accidents and did not receive any aid from any organization. They also reported that they are prone to be vulnerable road users. There were several factors leading to road accidents according to their report, such as carelessness, using a mobile phone while riding, non-compliance with traffic rules among riders and other road users, overloaded,

road conditions, traffic signs are not clear, non-standard maps, traffic jam, size, weight, and characteristics of the product they carry, and hard work and insufficient rest. They suggested the government and public agencies to promote a campaign for road users to have traffic discipline, to provide safe driving training for food delivery riders, to develop road and traffic condition alert system, and to pay attention to the welfare and quality of life of riders.

5.2 Discussion

The findings indicate that there was a relationship between reckless riding behavior, education, kilometers traveled, road safety training and experience with road traffic accidents. On the other hand, income, age, working hours, and unbalanced or awkward loads did not affect the experience with road traffic accidents among riders. Hence, discussion of these findings was made as follows.

Reckless riding behavior had a positive influence on the experience with road traffic accidents. The analysis shows that the more drivers engage in reckless driving behaviors, the more likely they are to be involved in road accidents. These findings are consistent with the research of Zheng et al. (2019), who found a positive relationship between reckless riding behaviors and road traffic accidents among riders. Bernama (2021) added that rushing to reach destination on time could lead to accidents since the riders may perform risky riding behaviors, such as using mobile phone while riding, looking at the map while riding, and non-compliance with traffic rules as reported by the respondents of the in-depth interviews.

Education had a positive influence on the experience with road traffic accidents. Normally, highly educated people tend to have self-control. They are aware and cautious in driving, so they are less likely to have an accident than less educated people. But in this present study, there was a positive association between study and accident. This means that highly educated people have a higher chance of having an accident than less educated people. A key reason may be that less educated people rely on motorcycles on a regular basis resulting in higher driving skills than well-educated people, who have a full-time job and work as a rider as a part-time job but lacks expertise in driving a motorcycle. Therefore, it is easier to have an accident. The findings were not consistent with the study of Sami et al. (2013), who found the negative relationship between education and mortality rate. Hence, more research on this issue should be conducted.

Kilometers traveled had a positive relationship with the experience with road traffic accidents. This means that the more distance a rider drives or spends more time on the road, the higher the risk of an accident. This finding was consistent with the study

conducted by Teerakowitkajorn and Tularak (2020) and Jitpisal et al. (2016). However, Shen et al. (2020) suggested that the length of driving time can be an alternative to driving distance as a measure of driving exposure since the findings of their study revealed that driving distance and the length of driving time provide similar fatal crash risk ratio estimates.

Road safety training had a negative relationship with the experience with road traffic accidents. This means that the more training a rider receives, the lower the risk of an accident. This finding was consistent with previous studies (European Agency for Safety and Health at Work, 2010; Zhou, 2018), who found that risks among riders resulting from lack of training.

Income had no influence on the experience with road traffic accidents. This finding was inconsistent with the study of Shabadin et al. (2020), who found negative relationship between income and road accidents among motorcyclists in Malaysia. However, the study by Soonthorn et al. (2020) indicated that there was no relationship between the income and risky riding behaviors, which is the major variable leading to road accidents.

Age had no influence on the experience with road traffic accidents. This finding was inconsistent with the previous studies (Sami et al., 2013; Ayun et al., 2019; Vijayasankari et al., 2020: McKinlay et al., 2022), which found a negative relationship between age and road traffic accidents. However, the study conducted by Ayun et al. (2019) found that all types of injury decreased with age, but the death or disability' accidents increased with age.

Working hours had no influence on the experience with road traffic accidents. These findings were not consistent with the study of Zheng et al. (2019), who found a positive relationship between workload and crash. In Thailand, riders must work more than 10 hours a day to obtain a basic level of income (Teerakowitkajorn & Tularak, 2020). This kind of work would result in stress and pressure as mentioned by the study of Zhou (2018). Therefore, workload should be a key factor of road safety. However, the present study revealed contrast results. Hence, in-depth study on this variable should be conducted in the future.

Unbalanced or awkward loads had no influence on the experience with road traffic accidents. This finding did not support the findings of a study conducted by the European Agency for Safety and Health at Work (2010), who mentioned that unbalanced or awkward loads are also an important factor leading to road traffic accidents. The relationship

between these two variables were still doubtful in the Thai context and need more studies on this issue.

Besides the factors mentioned above, the key informants of this present study also suggested that there are several risk factors of road accidents among riders. These include road conditions, flooding, pits, poor traffic surfaces, traffic signs are not clear, non-standard map, traffic congestion, size, weight, and characteristics of the product, and inefficient rest. The study conducted by Wantanasombut and Pitukthanin (2021) found that nearly 30% of riders, a sample of 435 people across the country, had been involved in accidents, and up to 12% were fatal. The finding of the present research also found 35% of riders experiencing road accidents in the past 3 years. Comparing the past 3 years, it was found that in 2021, from January to July 26, there were up to 6,163 motorcycle injuries, of which 110 were riders, while in 2020 there were 6,649 injuries including 61 riders, while in 2019, there were 6,432 injuries, including 44 riders (The Opener, 2021).

5.3 Limitations and Future Studies

There are various factors resulting in road traffic accidents among riders. The present study focused on only eight variables, which are age, income, kilometers traveled, reckless riding behaviors, road safety training, unbalanced or awkward loads, and working hours. However, some variables, such as conditions of motorcycles (lifetime), number of stackers, average annual daily traffic, and speed limit on roads, were not included in the study. For further analyses, future studies could use these variables to further examine their effects on road accidents among foo delivery riders in Thailand.

5.4 Recommendations

Workers in food delivery business are referred to as “temporary workers” to indicate the nature of the labor without an employer. They are not affiliated with an organization or agency and are free to choose to work on their own, that is, workers can access and choose jobs. There is a flexible working period, they can set the working period by themselves. They can receive compensation that is competitive in the labor market However, the above phenomenon will create ambiguity in the legal status of workers as to whether they are employees of platform providers under labor contracts as well as the unclear rights and obligations between platform operators and legal workers. These result in exploitation of labor. Riders must work harder, faster, but pay less. To make more income, the rider has reckless riding behaviors, such as violation of traffic lights, riding on the sidewalk, and riding at high speed, etc. Reckless riding behavior is the most influential factor leading to road accidents. Hence, rigid law enforcement against riders who regularly violate the law should be administered in coupled with providing them the consequences of reckless riding behaviors. In addition, the labor law should be amended so the welfare and

employment conditions of riders would be improved. This will affect not only their welfare but also their safety. Training of safety riding should be provided by related governmental organizations, such as preparing the condition of the vehicle, equipment, physically and mentally before working, practicing basic first aid skills, and informing them the ways to ask for help if they have accidents. Furthermore, training courses to reduce stress and pressure should be provided, such as practicing basic skills about anger management, and understanding of emotions to have good mental health at work. Occupational therapy and physiotherapy corresponding to the individual rider's health courses are also important to riders' health and well-being. The distance of travel per day should be limited to riders since the longer distance they travel, the greater the risk of accidents. Alternatively, working hours should be limited so that riders are not overworked until they have no time to rest, which will cause a risk of accidents. The Department of Land Transport plays an important role in organizing service provision, organizing training for riders to know the work regulations, and to know how to ride safely. The important thing is that the media can help publicize the importance of safety riding. The study found that higher educated people are more likely to have accidents, riding skills training for this group should be emphasized because many of them work as part-time riders and have less familiarity and skill in riding than people who use motorcycles regularly. In conclusion, the action to solve such problems must begin to amend the law to protect riders, and the public and private sectors must work together to solve the problem.

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Appendix

Research Project Questionnaire

Road Traffic Accidents caused by the increased number of delivery service riders during the Pandemic: An Empirical Study in Bangkok Metropolitan and Vicinity

Part 1 Demographic characteristics

1. Gender ☐ Male ☐ Female ☐ LGBTQIA+
2. Age……years old.
3. I had spent a year studying from elementary school to the highest grade for…….years.
4. Marital status
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Separated
5. Average income ..... Baht/month
6. In the past 3 years, I have completed safe driving training or road safety-related courses for……hours.
7. Within 1 day, I work as a rider for an average of .....hours.
8. Within 1 day, I deliver products to customers for a total distance of about .....kilometers.
9. In the past 3 years, you have experienced road accidents. .....time(s).

For part 2 and Part 3, The level of feedback is as follows:

5 = Strongly agree
4 = Agree
3 = Not sure
2 = Disagree
1 = Strongly disagree

Part 2 Reckless riding behaviors

Item	Level of agreement				
	5	4	3	2	1
1. The hustle and bustle of deliveries makes me ride my motorcycle at high speed.					
2. Working against time makes me violate traffic lights.					
3. While riding a motorcycle, I must also look at the map from my mobile phone.					
4. I don't wear a safety helmet because it makes work difficult.					

Item	Level of agreement				
	5	4	3	2	1
5. I zigzags between other vehicles on my motorcycle to make deliveries on time.					
6. I ride closely behind the back of the car in front of me to reach my destination faster.					
7. Sometimes I ride a motorcycle on the sidewalk to speed up my work.					

Part 3 Unbalanced or awkward loads

Item	Level of agreement				
	5	4	5	2	5
1. I have to carry a lot of stuff.					
2. I have to carry heavy things.					
3. I must carry more weight than the motorcycle can support.					
4. I have to carry large or long items.					
5. I must carry items that are prone to breakage or damage easily.					

Final Report

Research Grant 2022

ATRANS