How to Make Safer Commuting of Garment and Footwear Workers in Phnom Penh based on Stakeholders' Opinions

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Abstract: Commuting by vehicles of garment and footwear workers in Cambodia has been recognized as a daily dangerous trip, resulting in serious accidents of their crowded vehicles including vans, buses, long-tailed remorks, and flatbed trucks. Current commuting vehicles are yet met the required regulations and could not meet without the government subsidy and/or employer support. This study aims to understand all stakeholders' opinions and recommendations in an attempt to find policies to improve commuting condition of these workers. By using questionnaire survey data, factors that statistically impact the passengers' safety concern, commuting satisfaction and willingness to pay for improving the current commuting condition, the drivers' perception on traffic law enforcement, and drivers' commuting fare are determined. The questionnaire survey was completed in December 2016 with 340 respondents. The result from this study would provide government and employer useful information to improve the commuting condition of garment and footwear workers.

Keywords: Traffic Safety; Traffic Law Enforcement; Informal Public Transport; Stakeholder Analysis; Textile Industry

1 INTRODUCTION

Commuting by vehicles of garment and footwear workers in Cambodia has been recognized as a daily dangerous trip, resulting in serious accidents of their crowded commuting means including vans, buses, long-tailed remorks, and flatbed trucks. Dozen are killed and hundreds are wounded during morning and evening commuting to and from their workplace annually. The major causes of these accidents are excessive speeding, overloaded, drink-driving, failure to obey the traffic law, road and vehicle problem, and sleepiness (NSSF, 2014). About 200,000 of workers in this sector have used to this daily risky commuting mode because of its low cost. The government has also considered to strictly enforce traffic laws to reduce traffic accidents; however, these regulations are still not applicable unless there are some subsidy from the government and the support from the employers.

Garment and footwear industry plays an important role in Cambodia's economy, with total export value exceed 6 billion USD, accounting for 80 percent of national export volume in 2015. Most investors are foreigners from China, Taiwan, Korea and Hong Kong and the export countries are mainly European unions and United States (GMAC, 2015). At the end of 2015, there were 699 garment and footwear factories which employ more than 620,000 Cambodian workers, 86 percent of whom are women. These workers work in the range of 8-10 hours per

day and each earns around USD160-220 monthly. It is estimated that approximately 60 percent of these factories are located within 30 kilometer radius from Phnom Penh, i.e., they are in Phnom Penh, Kompong Speu, and Kandal provinces (EuroChamCambodia, 2014; ILO, 2016). The workers commute to and from workplace by walking, motorcycles, and public vehicles in the distance up 60 kilometer. Based on rough approximation, if their factories are located in the urban area, workers commute to workplace by walking (70%), motorcycle (20%), and public vehicle (10%). On contrary, if their factories are located in the suburb, the percentage of each commuting mode are about 10 percent, 20 percent, and 70 percent respectively.

Figure 1: Commuting vehicles of garment and footwear workers in Cambodia:
(a) van; (b) long-tailed remork; (c) flatbed truck; and (d) bus

Poor service and high expense of public buses in Phnom Penh has led to high automobile dependency, which includes private car and motorcycle that brings critical traffic issues to society such as traffic accidents, congestion, pollution, high transportation cost, excessive road and parking demand, and lost urban economic productivity (Cervero, 2000; Litman, 1995; Oeur; Phun, Pheng, & Yai, 2015). On the other hand, low-income workers, those earn less than USD200 per month (Nguonsong & Kasem, 2016) and unable to afford private transport, have faced the most negatively affected, and have had to use informal transport because of its reasonable cost called laissez-fare, friendly and door-to-door commuting mode. In 2000, Cervero defined the informal transportation mode as all common mobility that privately operate, and fail to meet the regulation of public transport sector, referring to paratransit, or low-cost transport (Cervero, 2000). In this case, the commuting vehicle of workers in garment and footwear sector can be separated into four modes including vans, buses, long-tailed remorks, and flatbed trucks (see Figure 1). Based on National Social Security Fund, there are about 4,000 worker-transporting truck drivers who ferry these workers to and from various factories. So, there should be around 150,000-250,000 garment and footwear workers who daily commute by these crowded and unsafe modes. Serious traffic accidents of these vehicle are common and

cause hundreds of factory workers being killed and wounded and being listed as the second-most dangerous form of transportation leading by motorcycle. So, there are both national and international news agencies broadcasting this problem such as Aljazeera: Cambodia's killer commute (Julia & Khuon, 2014), Vice News: transport like pigs (Parkinson, 2015), and Phnom Penh Post: when a risky road is the only option (Kong & Balliga, 2016).

To deal with traffic accident of worker-transporting vehicle, Cambodia's Interior Ministry as the head of National Road Safety Committee had called all truck drivers to use minibuses or buses, to create maximum capacity limit, to organize suitable seat on truck, and to enforce traffic law including driving license, speed limits, traffic sign, drunk-driving, vehicle's technical check, and vehicle technical supervision. This rule is already in the new traffic law, issuing in early 2016, but has been largely ignored. Because of the continuing number of garment factory trucks crashes, Cambodia's Ministry of Transportation thus aims to make a separate, explicit rule against this particular practice covering both regulations and penalties (Huntear, 2016; Sotheary, 2016). On the other hand, the government has created a national organization, National Social Security Fund (NSSF), who has responsibility for providing basic social security, work and commuting related accidents, to the workers in the private sector, while the employers have to pay the contribution to this organization. NSSF has cooperated with other ministries, labor unions, employer association, and some international organization to create a team, Road Traffic Safety Team (RTST), who has a duty to collect related data and analysis the causes of traffic accident. RTST have done many actions to reduce traffic accident such as training worker-transporting drivers about traffic law, advising vehicle inspection and first aid, facilitating drivers to get their appropriate driving license, creating database to control these drivers, and assisting workers suffering from traffic accidents (RTST, 2015). Even there were both warning and supports from the government, serious traffic accidents of these commuting vehicles are still frequently occurred, and the regulations are yet enforceable.

The problems about safety policy implementation and enforcement measures normally lie on the deep understanding of stakeholders. Although the measures are theoretically good, it might not necessarily seem practical and beneficial to drivers and commuters. Therefore, the understanding of each stakeholder's opinions are crucial. This research has four main objectives. First, we want to understand the opinions of all stakeholders about this commuting means of garment and footwear workers. Second is to investigate the factors that has the impact on the workers' safety concern, commuting satisfaction, and their willingness to pay. Third is to explore the relationship of worker-transporting drivers' perception about stricter traffic law enforcement, and their commuting fare. And finally we will recommend some policies in order to improve the commuting safety of these workers based on the regression, and the suggestion from all stakeholders.

2 LITERATURE REVIEW

The garment and footwear industry in Cambodia has thrived for two decades because of normalized-trade relationship with the United States and the European Union since 1996. Since the beginning, most factories are located in Phnom Penh leading to high labor force demand in CBD. So the most workers leave their hometown to work in the urban area by renting room near factories. So commuting to workplace is not a big problem since the distance is not far. In this case we found that most researches focus mostly on basic living requirement including food, health, housing, utilities, transportation, personal safety, workplace harassment, and workplace dispute (Chansomphors, 2008; Jennifer, 2006; Kanitha, 2015; Piotr, 2016). Through the

literature review, there are some academics researches about commuting of garment and footwear workers such as walking (Chowdhury, Rifaat, Shahriar, Al Noman, & Habib; Hoque, Debnath, & Mahmud, 2006; Shumi, Zuidgeest, Martinez, Efroymson, & van Maarseveen, 2015), motorcycle (Brijs et al., 2014; Roehler et al., 2013), and public bus (Badami & Haider, 2007). Nevertheless, in last decade, garment and footwear factories have moved to suburban area of Phnom Penh or provincial area, to special economic zones or industrial parks due to many reasons. First, the authority wants to improve transportation condition in Phnom Penh. Secondly, land rental and acquisition in the CBD is very expensive. Also, there are lots of non-skilled labors in suburban areas and the facilities at the SEZ. Anyway, this industrialized deconcentration without supportive public transport has created commuting barrier to low income workers. The current commuting vehicles of these workers, as shown in Figure 1, are yet meet the regulations required since the commuting cost is 15-50% of the paratransit fare. After reviewing past researches, no specific study about the characteristics of this commuting mode such as the perception of workers about the safety concern, commuting satisfaction, willingness to pay, and the perception of these vehicle drivers' toward stricter traffic law enforcement has been conducted.

To improve the actual performance of transportation mean, it is very important to understand the passengers' perception toward the service including safety, security, reliability, comfort, and service satisfaction (Munira *et al*, 2013; Phun *et al*, 2015). In addition, the passengers' willingness to pay is a very important direction for operators to improve their services effectively (Li, Hensher, & Rose, 2010). Commuter satisfaction comes from a vast literature from marketing research discipline and models in several methods grouping into two groups, macro model and micro model (Huiqun & Xin, 2009). However, the most widely accepted conceptualization is the expectancy of disconfirmation theory. On the other hand, willingness are used to measure the behavior of a person in respond to possible increase in his transportation expense, in exchange for a better commuting services such as time saving, time reliability, safety improvement, comfort improvement (Leon, Lontoc, Padao, & Villanueva, 2014; Li *et al*, 2010). Through past studies, we might conclude that the commuter perception and willingness to pay affect by their attitudes, personality, and predisposition.

From the literature, we found the important of traffic law enforcement in reducing the number of traffic violation and number of traffic accident (Zaal, 1994). Traffic law enforcement defined as any activity aimed to control the road users' behavior by preventive, persuasive, and punitive measures in order to effect the safe and efficient movement of traffic. However, the traffic law enforcement can be extremely costly activity and many policing authorities have developed methods to increase the efficiency and effectiveness of the enforcement operation and sometime this traffic law might not applicable to some kind of travelers. So attitudes of road users toward the traffic law enforcement is very important for successfully enforcing these regulations such as speeding, helmet, seat belt, drink-driving, fatigue driving, etc. (Kweon & Kockelman, 2010; Roehler *et al*, 2013; Rudjanakanoknad *et al,* 2012). This attitude correlates to age, education level, household, marital status, income, vehicle type, driving frequency, alcohol use, etc.

3 METHODOLOGY

3.1 Data Collection Methodology

To reach the objective of this research, we designed face-to-face questionnaire survey and the

in-depth interview with stakeholders related to this problem including workers, worker-transporting drives, general drivers, representatives from labor union, and representative from employers. The questionnaire for workers and worker-transporting drivers compose of 30 questions divided into 3 parts: 1) socioeconomic; 2) commuting/driving characteristics; and 3) opinions about safety and policy suggestions. Note that the third part are used only for general drivers. For in-depth interview with representatives from labor unions and employers, we ask them about their concerns, their future plan, and their suggestion to improve the commuting condition of garment and footwear workers. In this study, we employ 3-points to rate their perception about commuting of garment and footwear workers. Subsequently, the model of workers' perception toward safety, commuting satisfaction, and their willingness to pay (WTP) to improve the current condition are developed. For worker-transporting drivers, factors that statistically affect the commuting fare, and their perception toward traffic law enforcement such as law limiting number of passengers, driving license, and technical vehicle check are extracted. Since there are two types of variables, continuous variable and ordered variable, so linear regression and ordered regression analysis are used to generate the correlation between the objective variables and the factors including socioeconomics and commuting/driving characteristics. These models will be generated under the aid of STATA software package.

Figure 2 (a) Interview sites for workers; (b) Rest areas for worker-transport drivers during day time; (c) Activity during interview with workers

A total of 340 data (155 workers, 100 worker-transporting drivers, 80 general drivers, and 5 representatives from unions and employers) were collected in December 2016. For workers, the data collection were done on off-days at their home in Figure 2(a), but the worker-transporting drivers were interviewed at the factories and the rest areas nearby as shown in Fig. 2(b). For general drivers, the survey was done along highways where worker-transporting vehicle pass by. Also, we interviewed the representatives from labor unions and the factories at their offices. However, the interviews were mostly done in the suburban area since it has high percentage of workers commuting by these vehicles as shown in Figure 2(a).

3.2 Regression Analysis

Regression analysis is a predictive modelling technique used to navigate the relationship between dependent and independent variables. In this case, linear regression model, Eq. 1, is used to construct the model of workers' willingness to pay (WTP) for improving the commuting condition and the drivers' commuting fare. And, ordered regression model, Eq. 2, is used to model the workers' perception toward safety concern, and commuting satisfaction, and the drivers' perception toward traffic law enforcement. 95 % confident level is used to state the significant of independent variables including socioeconomics, commuting characteristics, and driving characteristics.

Linear Regression Model: $\quad Y_i = \beta_0 + \beta_i X_i + \varepsilon_i$ (Eq. 1)

Ordered Regression Model: $\quad Y_i^* = \beta_i X_i + \varepsilon_i$ (Eq. 2)

Where,

Y_i : willingness to pay (WTP) and commuting fee (USD per month) of an individual i

Y_i^* : workers' percetion toward safety concern and commuting satisfaction, and drivers' perception toward traffic law enforcement of an individual i, code as 0, 1, 2 because Y_i^* is unobservable, lower and upper thresholds (μ_{j-1}, μ_j) are used to control which $j \in \{0,1,2\}$ that Y_i^* fall into.

X_i : explanatory variables, socioeconomics, commuting characteristics, and driving characteristics of individual i

β : coefficient of explanatory variables to be estimated

ε_i : error terms

4 DESCRIPTIVE STATISTICS

4.1 Workers' and workers-transporting drivers' Characteristics

From Table 1, on average workers are about 29 years old, and earn USD200 monthly. They spend about USD10 per month on commuting on the distance about 24 km from home. Moreover, they spend about one hour on vehicle, while about half of them have to stand during commuting. Almost all of them have never experienced any traffic accident but nearly one third have experienced to vehicle problems in the last 12 months. The road condition was said to be good in only main road. Based on workers, they think that their vehicle is not either new or old, while the new one means that it was recently bought. In reality, these new vehicles are really the second hand ones imported and were made in 1992-2002. The reports about number of passengers on vehicle are quite the same between workers and drivers, the average number of passengers on van, bus, small flatbed truck, medium flatbed truck, and long-tailed remork are 24, 53, 38, 55, and 24 respectively. However, these workers still think the number of passengers on vehicle are acceptable. Most workers think that their drivers' driving speed is not fast, and they drive quite well. Generally, they think that their commuting is a problem and worried about their safety but they are satisfied with current mode. Moreover, they are willing to pay USD0.74 more if current commuting condition was improved.

Table 1 Worker and worker-transporting drivers' characteristics

Workers (N = 155)			Worker-transporting Drivers (N = 100)		
Categories	**Attributes**	**Percent**	**Categories**	**Attributes**	**Percent**
Age (year)	<=20	14.8	Age (year)	< 25	7.0
	21 - 30	44.5		25 - 35	48.0
	30 - 40	32.3		36 - 45	31.0
	> 40	8.4		> 45	14.0
Income (USD/month)	<= 170	7.7	Income (USD/month)	< 200	10.0
	171 - 210	67.7		200 - 500	49.0
	211 - 250	17.4		501 - 800	33.0
	251 - 300	7.1		> 800	8.0
Cost (USD/month)	mean = 10.3		Cost (USD/month)	mean = 8.9	
Distance (km)	mean = 24.3		Distance (km)	mean = 32.3	
Time (minute)	mean = 58.2		Time (minute)	mean = 80.4	
Seat	Yes = 1	51.6	Driving experience (year)	mean = 9.2	
Traffic accident	Yes = 1	1.3	Hired drivers	Yes = 1	8.0
Vehicle's problem	Yes = 1	29.7	Paid by factory	Yes = 1	22.0
Road Condition	Almost good = 0	36.1	Seat	Yes = 1	45.0
	Average = 1	46.5	Driving license	No	12.0
	Almost bad = 2	17.4		Type A	2.0
Vehicle condition	New = 0	25.2		Type B	66.0
	Average = 1	65.2		Type C	13.0
	Old = 2	9.7		Type D	7.0
Vehicle type	Van	13.5	Vehicle type	Van	10.0
	Bus	25.2		Bus	9.0
	Small Truck	34.8		Small Truck	45.0
	Medium Truck	21.9		Medium Truck	28.0
	Long-tailed remork	4.5		Long-tailed remork	8.0
Average number of passengers in vehicle	Van = 24; Bus = 55; Small Truck = 39; Medium Truck = 56; Long-tailed remork = 24		Average number of passengers in vehicle	Van = 24.5; Bus = 50.3; Small Truck = 37.7; Medium Truck = 53.8; Long-tailed remork =23.3	
Crowded	Uncrowded = 0	21.3	Frequency of drink-driving	Never = 0	45.0
	Moderate = 1	63.2		Few/ year = 1	8.0
	Crowded = 2	15.5		Few/ month= 2	42.0
Driving speed	Acceptable = 0	88.4		Few/week = 3	5.0
	Fast = 1	10.3	Frequency of police stop	Never = 0	80.0
	Very fast = 2	1.3		Few/ year = 1	9.0
Driving performance	Acceptable = 0	92.3		Few/ month= 2	11.0
	Bad = 1	3.9		Few/week = 3	0.0
	Very bad = 2	3.9	Technical specification	Yes = 1	80.0
Is it a problem?	No = 0	21.3	Traffic accident	Yes = 1	8.0
	Problem = 1	45.8	Is it a problem?	No = 0	19.0
	Serious problem = 2	32.9		Problem = 1	49.0
Safety concern	Not worried = 0	19.4		Serious problem = 2	32.0
	Worried = 1	49.7	Current commuting fee (USD/month)	< 200	9.0
	Very worried = 2	31.0		200 - 500	39.0
Commuting satisfaction	Unsatisfactory = 0	17.4		501 - 800	39.0
	Neutral = 1	25.2		> 800	13.0
	Satisfactory = 2	57.4	Willingness to Provide (USD/month)	< 200	6.0
WTP (USD/month)	mean = 0.74			200 - 500	27.0
Average acceptable passengers (Worker + Driver)	Van = 26; Small truck = 32; Bus = 53; Medium truck = 50; Long-tailed remork = 23			501 - 800	45.0
				> 800	22.0

For worker-transporting drivers, they are about 36 years old and has 9 years of driving experience. They earn about USD450 per month by charging the fee from workers around USD9 per month per person. They spend about 80 mins for one-way commuting on the distance of 32 km. 20% of these driver get the payment from factory while the rest work for themselves. Most drivers has driving license, but only about 60 percent of them have the appropriate driving license required by law. Around half of them agree of drinking alcohol before driving but just little and mostly during lunch. However, during transporting workers, they are never stopped by polices. To improve the commuting condition like making seat, limiting number of passengers, etc., these drivers want to get the subsidy from the factory on average about USD630 per month. The average acceptable number of passengers on vehicle proposing by both workers and drivers are slightly different from the current number, but smaller standard error. This problem happens because of fare challenge, it means some drivers charge at a lower fare in order to attract passengers from other vehicles.

4.2 Opinions of Stakeholders

Table 2 compares opinions of three stakeholder groups. Workers and worker-transporting drivers think that current commuting of garment and footwear workers is a problem because of its long distance, bad highway condition, and insufficient seat, but workers think that their drivers drive very well. Contrary, the general drivers think that it is a serious problem because of crowd, speeding and reckless driving. Workers and their drivers agree that the authority and the employers have also help improving the commuting condition such as providing commuting bonus (USD7-10 per month) or providing commuting vehicle, unloosening some regulations, and training the drivers about traffic law, safety during commuting law and first-aid, and repairing the road. All stakeholder think that the current commuting condition is somewhat better than the past in some cases such as on roof commuting, reduction of illegal additional attachment, and awareness of traffic accident by drivers. They also think that public bus is a safe mode, but expensive and they must walk at a long distance to its station and they can run on only main roads. Bus and van is good for protect passengers from severe weathers, but some people think that it is stuffy and they get sick to air conditioner. The disadvantages of van are unsafe, inefficient, and carry small number of passengers, but it has short pick up time. The disadvantages of bus are high expense on operating, maintenance, difficult navigating on narrow and deep pothole roads. So, road improvement is very crucial including road expansion, adding median and layby. For traffic law enforcement, workers and general drivers want to enforce traffic law, but worker-transporting drivers partly agree with some traffic laws such as driving license, drink-driving, and technical vehicle check, but the law to limit number of passengers on vehicle is not. Some worker-transporting drivers agree with law of driving license and technical vehicle check but they don't know how necessary it is, they think it is just avoid the stop or punishment by traffic police.

Based on the depth interview with employers and worker union, we found that new factories likely provide commuting vehicle or high commuting bonus in order to attract workers. After getting enough workers, they start to reduce their expense on commuting of workers to minimum bonus required by law. Sometimes, they stop long-distance workers and choose new short-distance workers because they are more flexible with overtime work. However, long-distance workers are rarely late comparing to other modes and mostly arrive late in rainy season. Most factories have a strict regulation of late arrival, and sometime workers are not allowed to get into the factory if they arrive late. For labor unions, they are also worried about commuting of workers and they suggest to increase the commuting bonus up to USD15.

Table 2 Opinions of Stakeholders about Commuting of Garment and Footwear Workers

Opinions	Workers	Worker-transport drivers	General drivers
Current commuting is problem.	0.97	0.98	1.76
It is overloaded.	N/A	N/A	1.50
They drive fast.	0.13	N/A	0.93
Their driving performance is bad.	0.12	N/A	0.97
They park their vehicle badly.	N/A	N/A	1.11
Employers help solving this problem.	1.46	1.27	N/A
Authorities help solving this problem.	1.44	1.50	N/A
It is better than past few years.	1.69	1.55	1.36
Public bus is helpful.	0.78	0.89	1.22
Using van-bus is good.	1.08	1.13	1.73
Road improvement is helpful.	2.00	2.00	1.98
Layby is helpful.	2.00	1.97	2.00
Law of limiting number of passengers on vehicle is necessary.	1.70	0.94	1.88
Stricter driving-license is necessary.	1.97	1.72	1.95
Stricter technical-check is necessary.	1.97	1.64	1.99
Stricter drink-driving is necessary.	2.00	1.95	2.00
Note: 0=No or Same; 1=Somewhat or little; 2=Very serious or Lots; N/A=Not asked or applicable			

5 FACTORS AFFECTING STAKEHOLDERS' OPINIONS

From the fitted model of workers in Table 3, the worker's concern about commuting safety increases significantly to faster driving speed and higher crowded level. In contrast, this concern is reduced if they spend higher commuting time with assistance from authority including training about traffic law and safety. Van and bus passengers have higher commuting satisfaction comparing to others vehicle modes, long-tailed remork and flatbed truck. But, bad driving performance and more crowded level decrease the commuter satisfaction. On the other hand, the workers want to pay more for seat and reducing number of passengers on vehicle.

From the data, the commuting fare depends on two factors, distance and seat. Those who can sit during commuting had paid about USD1.62 per month higher than those standing, while 1 km. increase in distance increase the cost only USD0.14 per month. Total commuting fare of drivers rely on vehicle mode, distance, and payment from factory. Bus drivers can earn about USD225 and medium flatbed truck can earn around USD180 higher than small flatbed truck drivers per month. But, drivers of this small truck can earn about USD104 higher than van drivers and USD140 higher than long-tailed remork drivers. The drivers getting fare from factory have earn about USD135 more than those collecting the fare from workers. On the other hand, the drivers that get the payment from the factory are strongly agree with law of limiting number of passengers on vehicle. In addition, van drivers has higher agreement level to this law comparing to other vehicle modes. In this case we can see that distance don't have strong effect on fare or total commuting fare, so long distance drivers give low agreement level to this law because they don't think it is possible to increase the fare. Most drivers have driving license but only 63 percent of them fit to their vehicle size, in this case we found that the drivers who have appropriate driving license strongly agree to stricter driving license. Lastly, all drivers strongly agree on stricter vehicle's technical check and stricter drink-driving enforcement.

Table 3. Coefficient of socioeconomics and commuting characteristics and workers' perception on safety, satisfaction and willingness to pay

Variables	Workers' regression models					
	Safety Concern		Satisfaction		WTP	
	Correlation	Fitted Model	Correlation	Fitted Model	Correlation	Fitted Model
Age	-0.0201 (0.116)	-	-0.0402 (0.093)	-	0.0022 (0.816)	-
Income	0.0983 (0.221)	-	0.1166 (0.481)	-	0.0789 (0.177)	-
Cost	0.0260 (0.451)	-	-0.0346 (0.595)	-	0.0010 (0.968)	-
Distance	-0.0139 (0.439)	-	0.0125 (0.718)	-	0.0152 (0.246)	-
Time	-0.0021 (0.728)	-0.0156 (0.014)	0.0062 (0.626)	-	-0.0018 (0.683)	-
Van	-0.2471 (0.679)	-	1.7824 (0.108)	1.4269 (0.017)	-0.4389 (0.308)	-
Bus	-0.8415 (0.127)	-	2.0437 (0.037)	1.4482 (0.001)	0.0659 (0.868)	-
Long-tailed remork	-0.1084 (0.880)	-	1.5983 (0.213)	-	0.0617 (0.906)	-
Medium Truck	-0.1897 (0.604)	-	0.2921 (0.656)		-0.1991 (0.446)	
Seat	0.2240 (0.667)	-	-0.3604 (0.692)	-	-0.7962 (0.033)	-0.9605 (0.000)
Road condition	0.1980 (0.225)	-	0.0393 (0.896)	-	-0.2482 (0.035)	-
Vehicle's condition	-0.5571 (0.007)	-	0.1320 (0.730)	-	-0.1294 (0.390)	-
Vehicle's problem	-0.0114 (0.959)	-	-0.7899 (0.050)	-	0.2194 (0.177)	-
Traffic Accidents	0.1893 (0.845)	-	-16.6004 (0.984)	-	-0.3013 (0.663)	-
Crowded	0.5368 (0.004)	0.7845 (0.007)	-0.8724 (0.015)	-0.7164 (0.016)	0.4362 (0.001)	0.4476 (0.000)
Driving Speed	0.9788 (0.024)	1.8700 (0.003)	-0.5894 (0.376)	-	-0.0467 (0.871)	-
Driving Performance	0.2797 (0.543)	-	-1.1795 (0.077)	-1.5342 (0.003)	0.5002 (0.051)	-
Employer's help	0.2943 (0.144)	-	0.5446 (0.146)	-	-0.1294 (0.371)	-
Authority's Help	-0.3679 (0.031)	-0.5047 (0.041)	-0.4519 (0.150)	-	-0.0513 (0.677)	-
Constant	-	-	-	-	0.7527 (0.185)	0.8100 (0.000)
$\mu1$	-1.4848	-2.3424	-2.9744	-2.1391	-	-
$\mu2$	0.1299	0.1603	-1.1852	-0.5867	-	-
p > F (Df, N)	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
R-Square	0.1457	0.0925	0.2024	0.1332	0.3861	0.2974
Note: Numbers in parentheses are the corresponding p-values						

Table 4. Coefficient of socioeconomics and driving characteristics and drivers' commuting fare and perception toward traffic law enforcement

| Variables | Worker-transporting drivers' regression model | | | | | |
| | Fare | | Commuting Fare | | Limit passengers | |
	Correlation	Fitted	Correlation	Fitted	Correlation	Fitted
Age	-0.0257 (0.340)	-	-1.7048 (0.183)	-	0.0110 (0.726)	-
Income	0.5362 (0.010)	-	44.0263 (0.000)	-	0.0033 (0.991)	-
Commuting fare	-	-	-	-	0.0012 (0.681)	-
Distance	0.0891 (0.001)	0.1417 (0.000)	2.3896 (0.039)	5.6412 (0.000)	-0.0215 (0.493)	-0.0181 (0.021)
Time	0.0059 (0.606)	-	0.2310 (0.669)	-	-0.0055 (0.693)	-
Van	1.1570 (0.168)	-	1.0467 (0.979)	-103.9856 (0.030)	1.6065 (0.104)	1.2447 (0.004)
Bus	0.9610 (0.347)	-	44.3024 (0.368)	224.4662 (0.000)	-0.0126 (0.992)	-
Long-tailed remork	-3.3640 (0.008)	-	-91.5286 (0.121)	-137.7973 (0.021)	-0.3452 (0.808)	-
Medium truck	-0.1080 (0.890)	-	-17.6703 (0.620)	180.2912 (0.000)	-0.0340 (0.971)	-
Seat	1.1128 (0.156)	1.6168 (0.003)	-12.5693 (0.712)	-	-0.0270 (0.974)	-
Average passengers	-0.0480 (0.065)	-	5.7720 (0.000)	-	-0.0563 (0.118)	-
Driving experience	0.0167 (0.703)	-	2.3171 (0.261)	-	-0.0088 (0.867)	-
App. driving license	-0.4478 (0.423)	-	-37.8234 (0.143)	-	-0.2013 (0.764)	-
Technical check	-0.4782 (0.495)	-	-5.8594 (854)	-	0.2017 (0.817)	-
Factory paid	-2.8745 (0.131)	-	101.0309 (0.001)	135.2292 (0.000)	3.2961 (0.000)	1.7759 (0.000)
Hired	1.7708 (0.222)	-	288.5757 (0.000)	-	-0.7334 (0.698)	-
Drink-driving	-0.1037 (0.677)	-	-11.8509 (0.284)	-	-0.6549 (0.032)	-
Police stop	-0.0759 (0.819)	-	1.2335 (0.938)	-	0.4116 (0.316)	-
Traffic accident	0.2680 (0.728)	-	6.4356 (0.859)	-	1.3703 (0.111)	-
Employer's help	0.0037 (0.991)	-	2.3977 (0.878)	-	0.6280 (0.136)	-
Authority's Help	0.5602 (0.116)	-	8.0910 (0.590)	-	0.4047 (0.297)	-
Problems	-3.3854 (0.215)	-	-28.9680 (0.045)	-	-0.9159 (0.020)	-
Constant	8.9061 (0.000)	5.8447 (0.000)	100.1214 (0.228)	251.3386 (0.000)	-	-
$\mu 1, \mu 2$	-	-	-	-	-2.060,-0.954	-0.264, 0.275
$p > F(Df, N)$	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000
R-Square	0.7587	0.6623	0.8791	0.6983	0.2757	0.1823
Note: Numbers in parentheses are the corresponding p-values						

6 POLICY RECOMMENDATIONS

As shown in the introduction part, the government has proposed some laws to reduce traffic accident of garment and footwear worker in Cambodia. However, some enforcements are agreed by the drivers, but some seems to be impractical unless there are subsidy from government and the support from factories. During the survey, we also asked the workers and their drivers for any suggestions in order to improve the current commuting condition. The discussion and suggestion are summarize as following.

Traffic law enforcement including, law of limiting number of passengers on vehicle (or seat), driving license, vehicle's technical check, and drink driving would be possible if the employers increase a bit more commuting benefit, and the government should subsidize in reducing the fee of driving license, and technical vehicle check. As shown in Table 1, the current average number of passengers on vehicle and the acceptable number of passengers on vehicle suggested workers and drivers are very similar but the current average number of passengers has higher standard error. It is because of completion in commuting fare, so some vehicles have too many passengers which lead to high risk of traffic accident. To solve this problem, law of limiting number of passengers is very important.

Even drink-driving enforcement get the highest agreement level from all stakeholders, and the worker-transporting drivers themselves know the bad effect of alcohol on driving behavior but some still frequently drink alcohol. It is because some drivers do not have anything to do during day time, so they usually meet up with other drivers by drinking. In this case, some drivers suggest to check up alcoholic content in the evening. Furthermore, some workers show their serious concern about commuting safety after they realized that their drivers are drunk by fast driving and bad driving performance. However, these workers do not dare to criticize the drivers that would lead to worsen driving behavior. To solve this problem, the employers should provide these drivers some factory job to increase their income and reduce alcoholic abuse during day time.

Speeding is also a crucial causes of traffic accidents. Based on 20 serious traffic accidents in 2016, about 60 percent of traffic accidents were caused by speeding and about 80 percent happened in the morning. Even the workers think that their drivers' driving speed is acceptable, but general drivers think that it is quite fast. About half of worker-transporting drivers agree that driving in the morning is usually faster than in the evening because of strict regulation of late arrival at the factory that forces them to take risk of speeding or takeover. Some drivers suggest employers to loosen their late arrival rule by accepting some reasons such as vehicle's problem, and unexpected conditions.

Changing vehicles to use bus or van seems to be very difficult even the workers also do not like using this vehicle mode either. Besides transporting workers, truck can be used to transport other goods and it is cheap and low expense. Some drivers said that this regulation are not applicable unless the road condition are improved and the government must buy back their current vehicles.

In the drivers' opinions, they are very concern on the accident caused by bad driving behavior of motorcycle riders. Most of them suggest to government to train all motorcyclists about traffic law. In the view point of workers, they think that road improvement and training drivers are two most important things. They suggest to train drivers periodically about traffic law and traffic safety. Some workers also demand to repair and expand the road but recommend not to do it in a rainy season.

7 CONCLUSION

In summary, we found that most workers are worried about commuting safety causing from fast driving and high number of passengers on vehicle. But this concern is lower if their drivers are frequently trained about traffic law and traffic safety from the authority. However, about 60 percent of this drivers satisfy with this commuting mode because of its low cost, especially when comparing with those commute by van and bus. These workers also want to pay more to sit during commuting and to reduce the number of passengers of vehicle, which strongly affect their safety concern and comfort. For worker-transporting drivers, they strongly agree with some traffic law enforcement including driving license, vehicle's technical check and drink-driving. But some enforcement such as limiting number of passenger on vehicle and changing vehicle are not applicable unless there are some supports from employers and subsidy from government. So, to reduce the traffic accidents of these commuting mode, the government and the employers should work together and consider factors and suggestions from both workers and drivers.

This research has some limitations including errors in categorizing vehicles, dispersion of workers, data the error of answering the questions, and the limited proposing idea. For example, there are several kind of vans (12 seats and 15 seats), small flatbed trucks (1T, 1.25T, 1.4T, and 1.5T), and Bus (25 and 35 seats). Also, some workers and their drivers are relatives, so they give high score to their drivers' performance.

This research could extend to some further researches such as prioritizing the traffic safety policies or regulations, cost benefits analysis of each vehicle modes, the impact on low income workers from lacking public transit toward industrialized deconcentration, etc. Moreover, it could expand the scope to other similar commuting modes such as construction workers, and students.

REFERENCES

Badami, M. G., & Haider, M. (2007). An analysis of public bus transit performance in Indian cities. *Transportation Research Part A: Policy and Practice, 41*(10), 961-981.

Brijs, K., Brijs, T., Sann, S., Trinh, T. A., Wets, G., & Ruiter, R. A. C. (2014). Psychological determinants of motorcycle helmet use among young adults in Cambodia. *Transportation Research Part F: Traffic Psychology and Behaviour, 26, Part A*, 273-290.

Cervero, R. (2000). *Informal transport in the developing world*: UN-HABITAT.

Chansomphors, C. (2008). *The Standard of Living of Garment Workers in Cambodia: Its Determinants and Workers' Perception.* . Cambodian Institute for COoperation and Peace [Online].http://www.cicp.org.kh/userfiles/file/Working%20Paper/CICP%20Working%20Paper%2026%20Garment%20Worker%20by%20Chansomphos.pdf [17 Jan 2017]

Chowdhury, T. U., Rifaat, S. M., Shahriar, A., Al Noman, M. R., & Habib, M. A. (2015) Case

Study on Vulnerable Pedestrian: Garment Workers' Road Safety Education Source. *Proceedings of International Conference on Architecture, Structure and Civil Engineering (ICASCE'15)*, Antalya, Turkey.

EuroChamCambodia. (2014). *Market Study: The Textile Industry in Cambodia*, Market Study, Intalian Embassy, Bangkok, Thailand.

GMAC. (2015). *Cambodia Garment and Footwear Industries*, Annual Report 2015, Garment Manufacturers Association in Cambodia, Phnom Penh, Cambodia.

Hoque, M. S., Debnath, A. K., & Mahmud, S. (2006). *Impact of garment industries on road safety in metropolitan Dhaka.* Proceedings of International Conference on Traffic Safety in Developing Countries, Dhaka, Bangladesh.

Huiqun, L., & Xin, Z. (2009). A Literature Review and Critique on Customer Satisfaction. University of International Business and Economics "211 Project" (No.73200008) and the National Social Science Fund of China (No. 07BJL047).

Huntear, M. (2016). *It's Safety First for Workers*. Khmer Times. [Online]. http://www.khmertimeskh.com/news/26386/it---s-safety-first-for-workers/ [17 Jan 2016]

ILO. (2016). *How is Cambodia's minimum wage adjusted?* [Online]. http://www.ilo.org/asia/ whatwedo/publications/WCMS_383562/lang--en/index.htm [30 March 2016]

Jennifer, M. (2006). *Women and work in the garment industry*. ILO Better Factories Cambodia and World Bank. [Online]. http://siteresources.worldbank.org/INTJUSFORPOOR/ Resources/ WomenandWorkinthefactory.pdf [17 Jan 2017]

Julia, W., & Khuon, N. (2014). *Cambodia's killer commute*. Aljazeera. [Online]. http://www.aljazeera.com/indepth/features/2014/09/cambodia-killer-commute-201492913593986836.html [20 March 2016]

Kanitha, V. (2015). *Reproductive Health Issues Among Young female Factory Workers: A Case Study of Female Garment Workers in Phnom Penh, Cambodia* Asian Institute of Technology. [Online].

Kong, M., & Balliga, A. (2016). *When a risky road is the only option* The Phnom Penh Post. [Online]. http://www.phnompenhpost.com/post-weekend/when-risky-road-only-option [20 Jan 2016]

Kweon, Y.-J., & Kockelman, K. M. (2010). *Driver attitudes and choices: speed limits, seat belt use, and drinking-and-driving.* Journal of Transportation Research Forum. Vol. 45 No. 3.

Leon, M. R. M. d., Lontoc, A. R., Padao, I., & Villanueva, C. (2014). *Willingness to Pay (WTP) for MRT 7*. Research Project. Philippine.

Li, Z., Hensher, D. A., & Rose, J. M. (2010). Willingness to pay for travel time reliability in passenger transport: a review and some new empirical evidence. *Transportation Research Part E: Logistics and Transportation Review, 46*(3), 384-403.

Litman, T. (2002). *The costs of automobile dependency and the benefits of balanced transportation*, Research Report, Victoria Transportation Policy Institute, Canada.

Munira, S., Samath, S., & San Santoso, D. (2013). Perception of Public Van Users in Bangkok. *Journal of the Eastern Asia Society for Transportation Studies, 10*, 1501-1515.

Nguonsong, E., & Kasem, C. (2016). Travel Behavior of Paratransit and City Bus Passengers in Phnom Penh. *Proceedings of the 21st National Convention on Civil Engineering*, Songkhla, Thailand.

NSSF. (2014). *Report on Annual Achievement in 2013 and Action Plans of Road Traffic Safety Team for Worker Prevention (RTSTWP).* [Online]. http://www.nssf.gov.kh/default/ dissemination/report/ [10 March 2016]

Oeur, R. (2017) *Private Car and Motorcycle Dependency: Users' Characteristics through Analysis of People's Perception and Their Travel Behaviour- A Case Study of Phnom Penh City Cambodia*. Master Thesis, University of Tokyo.

Parkinson, C. (2015). *Transportation Like Pigs: Cambodia's Garment Makers Risk Death Just to get to Work*. Vice News. [Online].   https://news.vice.com/article/transported-like-pigs-cambodias-garment-makers-risk-death-just-to-get-to-work [20 March 2016]

Phun, V. K., Pheng, P., & Yai, T. (2015). Using ordered probit modeling to assess perceived bus performance in Phnom Penh. *Eastern Asia Society for Transportation Studies,* 11(0), 1155-1172.

Piotr, Z. (2016). *Garment Workers' Health and Nutrition Status, and Food Provision in Factories: A Study from Selected Enterprises in Cambodia*. ILO, BFC, AFC, Angkor Research. [Online].   http://betterfactories.org/cambodia/wp-content/uploads/2016/06/Final-Report_Garment-Workers-Health-and-Nutrition_June_2016.pdf [17 Jan 2017]

Roehler, D. R., Sann, S., Kim, P., Bachani, A. M., Campostrini, S., Florian, M., Hyder, A. (2013). Motorcycle helmet attitudes, behaviours and beliefs among Cambodians. *Injury control and safety promotion, 20*(2), 179-183.

RTST. (2015). Report on Annual Achievements in 2015 and Action Plans of Road Traffic Safety Team for Worker Prevention (RTST), Annual Report, National Social Security Fund, Cambodia.

Rudjanakanoknad, J., Prarom, P., & Panwai, S. (2012). Attitudes of Drivers towards Speed Enforcement Measures on Bangkok Expressways. *Procedia - Social and Behavioral Sciences, 48*, 222-233.

Shumi, S., Zuidgeest, M., Martinez, J., Efroymson, D., & van Maarseveen, M. (2015). Understanding the relationship between walkability and quality-of-life of women garment workers in Dhaka, Bangladesh. *Applied Research in Quality of Life, 10*(2), 263-287.

Sotheary, P. (2016). *Traffic Law Change Again*. Khmer Times. [Online]. http://www.khmertimeskh.com/news/33512/traffic-law-to-change-again/ [17 Jan 2016]

Zaal, D. (1994). *Traffic law enforcement: A review of the literature*. Report No. 53, Monash University.