Survey on how fluctuating petrol prices are affecting Malaysian large city dwellers in changing their trip patterns

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Abstract. Rising fuel prices shocks have a significant impact on the way of life of most Malaysians. Due to the rising of oil prices, the costs of travel for private vehicle users are therefore increasing. The study was conducted based on the objective of studying the impact of rising fuel prices on three types of trip patterns of Malaysians who are living in the city areas. The three types of trip patterns are, workplaces trip, leisure trip and personal purposes trip during the weekdays. This study was conducted by distributing questionnaires to respondents of private vehicle users in selected city such as Johor Bahru, Kuala Lumpur, Putrajaya, Melaka, Perak, Selangor and Kelantan. This study, found that the trip patterns of those who were using their own vehicles had changed after the rising of fuel prices. The changes showed that many private vehicle users were taking steps to save money on petrol by adjusting their trips.

1. Introduction
Rising fuel prices in the world market will directly affecting the development and future planning of the national economy. Rising fuel prices also indirectly lead to the increase of daily necessities such as food and public transport fares. This has led the government to take steps of raising the fuel prices in the local market to curb the rising subsidy borne by the government.

Fuel subsidies have been reduced since the government had to bear the burden of high rates of annual subsidies of fuel. The government had provided a subsidy of 83 cents per litre for RON95 and RM1 per litre for RON97 in the year 2013. At the beginning of 2014, the government withdrew subsidies of RON97 which is the premium grade of petrol. However, starting from 1 December 2014, the government of Malaysia had officially ended subsidies for all fuel types. A managed float system is being established to set the prices for these two fuels according to the market rate, weekly.

In some countries, higher fuel prices have caused the costs of travel for private vehicle users to increase. As the effect of this, motorists had to take a more prudent and thrifty way in spending and taking a more rational approach of reducing the burden of the impact of rising fuel prices [1]. Higher oil prices have led people to reduce their overall expenditure [2]. Since the users of private vehicles have no other option, they might change their travel patterns to be in accordance with the amount of income they have. They also may have to change their mode of private transport from car to motorcycle [3].

There are several of previous studies that examined the relationship between oil prices with some variables such as the effect on consumer goods and services, the impact on total sales of motorcycles and cars, the impact on accident rates and the impact on travel patterns.
The increase of oil and gas prices directly lead to an increase in general price index for petroleum and gas which is largely used by households. While the indirect effect comes from the producers who transfer some of the increase in oil prices and operating costs towards the goods and end services. Thus, the existence of the macroeconomic impact of the increase in prices of goods and services lead to the increase of production costs and ultimately increase the cost of production output [4]. Domestic prices which are higher for petroleum products will affect the real income of households through two channels, ie directly from the increase in the prices paid by households for the direct use of petroleum, and indirectly from the rise in prices of other goods and services. Such as, higher prices for food and transportation when the manufacturers decided to transfer a higher cost against fuel input [5].

Studies on the effects on total sales of motorcycles and cars are available from various researchers. According to Nizam Ahmat [3], the number of car sales from 2006 to 2009 has experienced a decline of 25.6 percent compared with the total demand for cars from 2000 to 2005. During the same period, the total sales of motorcycles has increased slightly by 4.5 percent compared with the total sales of motorcycles from 2000 to 2005. Meanwhile, the total sale data also showed that a total of 1.84 million units of motorcycles and 1.58 million units of passenger cars, each of which were sold from 2006 to 2009. The increase in motorcycle demand is driven by the prevailing savings in fuel consumption, low maintenance cost and price factor of the motorcycle which is much lower compared to the price of passenger vehicles. This study was supported by the statistics issued by the Road Transport Department (JPJ). Figure 1 shows the statistics issued by the JPJ on the number of registration of motorcycles and cars between years 2005 - 2015.

Bomberg & M.Kockelman [7], conducted a survey of 500 respondents about the impact of rising oil prices on travel distances of private vehicle users. From this study, it was found that the respondents had the tendency to reduce overall or adjust their trips as a way of reducing the travel costs. Bento et al [8] also conducted a study of drivers’ reaction and carpooling attitude towards oil price changes by using data of traffic flows over eight years for 1,700 locations in Los Angeles. The results showed that the flow of traffic in the fast lane was declining as the oil prices rose and this effect was stronger in the presence of car-sharing lane to replace the private drive. In addition, the study also found that the increase in oil prices has increased the number of commuters who shared vehicles. Results of a study conducted by the Congressional Budget Office (CBO) [9] showed the average amount of traffic on a working day on some highways have slightly decreased due to higher petrol prices. However, there were data on the average weekly and weekend traffic flow showed the increase
in petrol prices had only little effect on the amount of traffic on a few other highways. Meanwhile, the results of the CBO study on the behaviour of the driver with the study in California showed that higher petrol prices were associated with the number of passengers on public transport. Results of the study found that the increase in petrol prices has caused the increased number of passengers in the rail transit system.

2. Research data
Data used in this study was gathered from a survey conducted in Malaysia. During the data collection, 400 questionnaires were distributed in highly populated areas in Johor, Kuala Lumpur, Melaka, Perak, Selangor and Kelantan. However, for analysis purposes, this study had targeted 300 respondents to participate. The selection of targeted sample size was according to a sample margin of 6% of registered vehicle. Nevertheless, only 200 questionnaires were returned to the researcher and this was equivalent to 67% of the targeted respondents. From the questionnaire, respondents were asked about their demographic information, and travel patterns before and after the fuel price increase.

2.1. Research Questionnaire
The questionnaire used in this study was divided into three main sections. In the first section of the questionnaire, respondents were asked about their demographic information, such as gender, age, income level and etc. Second part of the questionnaire was a question related to the importance of motorised vehicle in the daily activities. The third part of the survey, contained a question related to respondents’ travel patterns before and after the increase in petrol price.

2.2. Research Respondents
Majority of the returned questionnaires were filled by female travelers (72%). Information provided in the survey showed that 49.5% of the respondents were from travelers aged 25 years and below. Apart from that, of the study respondents, 57% were those of monthly income lower than RM3000.

In response to the question ‘mode of transport used for daily travel’, 68.5% of respondents reported that they used their own transport, while, 24% used public transport, 6.5% carpooling and 1% walking.

3. Survey Result
3.1. Respondents Trip Pattern Before the Increase in Fuel Price
Table 1 shows respondents travel pattern before the increase in fuel price. From the survey, 73% of respondents reported that they used their own vehicles more than 3 times a week for workplace trips. While, 19% of respondents reported that, they only travelled with their personal vehicle once or twice a week. The remaining 8% of respondents did not use their personal vehicle for workplace trips.

The travel survey also indicated that, only 33% of respondents used their own vehicle for leisure trips more than 3 times a week. Furthermore, 8% of respondents informed that they never used their own transport for leisure trips. Further investigation carried out on the respondent characteristics, found that, the respondents who did not use their own vehicles for workplace and leisure trips were those who actively using public transport as their preferred mode of transport.

In addition, for a personal trip on working days (eg. go to bank, shopping, lunch, etc.), showed that respondents who travel at least once a week using their vehicles were 82.5%. Among these respondents, the majority were those who drive their own vehicles or carpooling for workplace trips.

The investigation on public transport usage showed that, 44.5% of respondents informed that they never use public transport for daily trips. Only 22.5% of respondents were actively using public transport (3 times or more trip a week). Most of them were workers (age 18 – 25 years old) with income level between RM1000 – RM3000 per month.
Table 1: Trip Pattern before the increase of fuel price

| Survey questions                                      | Never   | Once a week | 2 times a week | 3 times a week | 4 times a week | > 4 times a week |
|-------------------------------------------------------|---------|-------------|----------------|----------------|----------------|-----------------|
|                                                       | No./percentage (%) | No./percentage (%) | No./percentage (%) | No./percentage (%) | No./percentage (%) | No./percentage (%) |
| Number of workplaces trip using own transport         | 16 (8)   | 27 (13.5)   | 11 (5.5)       | 10 (5)         | 21 (10.5)      | 115 (57.5)      |
| Number of leisure trip with own transport             | 16 (8)   | 72 (36)     | 46 (23)        | 27 (13.5)      | 14 (7)         | 25 (12.5)       |
| Number of personal trip during week days with own transport | 35 (17.5) | 43 (21.5)   | 36 (18)        | 26 (13)        | 18 (9)         | 42 (21)         |
| Frequency of using public transport for daily trip.   | 89 (44.5) | 48 (24)     | 18 (9)         | 13 (6.5)       | 7 (3.5)        | 25 (12.5)       |

3.2. Comparison of Trip Pattern Before and After the Increase in Fuel Price

Table 2 shows respondents travel pattern when there was an increase in fuel price, while the comparison between travel patterns before and after the rise in fuel price is shown in the Figure 2.

From the survey conducted, there was a reduction in the frequency of personal vehicle usage for all three types of trips. The reduction apparently can be seen from those who actively making trips using own vehicles (3 trips or more a week). The reduction in the rate of trip frequency observed were between 2 – 7%. Further investigation conducted also found that, there was a tendency among respondents who used personal vehicles as the main mode of transport decided to leave their vehicles at home, and shifting to public transport when the fuel price was increased. The number of respondents observed were 9.5%.

The analysis also showed that there was an increase in the number of respondents who made three times and more trips by using public transport. Besides that, the number of respondents who did not use public bus services in their daily trip activity also decreased about 14% (Figure 3).

Table 2: Trip Pattern after the increase of fuel price

| Survey questions                                      | Never   | Once a week | 2 times a week | 3 times a week | 4 times a week | > 4 times a week |
|-------------------------------------------------------|---------|-------------|----------------|----------------|----------------|-----------------|
|                                                       | No./percentage (%) | No./percentage (%) | No./percentage (%) | No./percentage (%) | No./percentage (%) | No./percentage (%) |
| Number of workplaces trip using own transport         | 22 (11)  | 28 (14)     | 7 (3.5)        | 17 (8.5)       | 28 (14)        | 98 (49)         |
| Number of leisure trip with own transport             | 23 (11.5) | 87 (43.5)   | 37 (18.5)      | 23 (11.5)      | 17 (8.5)       | 13 (6.5)        |
| Number of personal trip during week days with own transport | 39 (19.5) | 61 (30.5)   | 25 (12.5)      | 28 (14)        | 18 (9)         | 29 (14.5)       |
| Frequency of using public transport for daily trip.   | 76 (38)  | 48 (24)     | 16 (8)         | 17 (8.5)       | 15 (7.5)       | 28 (14)         |
3.3. Other Practices That Applied by Respondents When There is an Increase in Fuel Price

In addition to the question of daily trip pattern, respondents were also asked about their normal practices if there was an increase in fuel price. Among the questions asked were about sharing cars for daily trips. Figure 4 shows the number of respondents who shared vehicles before and after fuel price
The use of motorcycles is more frequent than cars before the increase. The figure graphically shows a change in the number of respondents who shared vehicles after the rising of oil prices (17.2% increment).

![Carpooling to work place](image)

**Figure 4.** The number of respondents who share vehicles

Another question was related to shifting from personal car to motorcycle usage for daily trips. Figure 5 shows the number of respondents according to the frequency use of motorcycles as compared to cars. Review of respondents indicated substantial changes in the number of respondents who agreed and disagreed with the use of motorcycles more often than cars before and after the increase in oil prices. The survey findings showed that respondents who agreed with motorcycle use increased by 6% after the increase in oil prices.

![The use of motorcycles is more frequent than cars](image)

**Figure 5.** Number of respondents shifting from personal car usage to motorcycle usage

### 4. Conclusion

As for the past few years, Malaysians have experienced the rising of fuel prices and if prices continue to increase, they will eventually hit almost everyone. Various methods were sought as an alternative to reduce the burden of fuel cost increases. An easy way to double the gas mileage was to carpool with someone willing to do half the driving. Riding bicycle as an alternative can also be taken into consideration. For shorter distances, people can go by walking or by cycling. By doing so, it is not only reducing the consumption of fuel but it will also save the environment from air pollution. However, most of the Malaysians are working far from home, adjusting their trip patterns particularly by reducing the frequency used of personal vehicles for daily trip can be a very popular approach to
save travel costs. This study also found that Malaysians have the tendency to shift to a more economic mode of transport such as riding motorcycle and public transports.

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