

## [LOG 16] THE IMPACT OF E-COMMERCE ON TRANSPORTATION DEPENDENCY

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### ABSTRACT

*Growth of world population has directly caused traffic congestion particularly in the cities. With the development of technologies such as the internet applications have changed the way of doing things. The e-commerce allows buying to be done at any place and at any time, in the word, subjected to the availability of internet connections. The e-commerce has impacted the buying behaviour and business operations. E-commerce is boomed as it provides the virtual platform to trade the goods and services by just a click without brick and mortar store. It has the ability to re-direct consumer to shop from physical store to online marketplace around the globe. The individuals' journeys to the stores are replaced by frequent deliveries by the courier companies. Growing of e-commerce is able to reduce the private vehicles on road as the delivery services provide by e-retailer. This paper provides more insights into the relationships between e-commerce and transportation dependency. This study examines the role of buying behaviour in e-commerce in affecting the transportation dependency in Malaysia. Nonprobability convenient sampling method used to collect the data from the students studying at Universiti Utara Malaysia (UUM). The data were collected from 400 undergraduate students in UUM by using semi-structured questionnaire. In the pilot test, the Cronbach's alpha score is 0.927, which is reliable. The findings are expected to widen the knowledge regard the impacts of e-commerce on transportation dependency.*

**Keywords:** *buying behaviour, e-commerce, transportation dependency, private vehicles, congestion*

### INTRODUCTION

The growing innovation in technology has grown up new type of commerce, which is e-commerce (Diacon & Donici, 2013) that has become the essential part in global market. In 2015, a global retail e-commerce sale is reaching approximately \$1.671 trillion and is expected to increase to \$3.578 trillion in 2019 (Annicelli, 2015). E-commerce is boomed as it provides an easiest way to trade the goods and services in the virtual marketplace (Tiwari & Singh, 2011). E-commerce has the ability to re-direct consumer from physical store to online, which will reduce dependency on transportation, meaning that less vehicle will be used on road and thus reducing the traffic congestions (Shao, Yang, Xing & Yang, 2016) as consumers are able to get their goods by e-retailer delivery service instead of driving out for the purpose to buy a thing. The growing of e-commerce has indirectly reduces the travel trip of consumers

(Pettersson, Hiselius & Koglin, 2016), in which it eliminates unnecessary vehicles on road. Undeniable, e-commerce involves movement of goods but it will reduce the movement of consumers associated with reduce dependency on transportation (Shao et al., 2016). Nowadays, there is a growing concern on the topic of environment sustainability (Rodrigue, Comtois & Slack, 2013). E-commerce is a green business as it conducts business in virtual marketplace and reduces the consumer travel trip to shopping. The impact of transportation to the environment is usually negatively viewed and it is unavoidable; therefore, the use of e-commerce will help to reduce the negative impact of transportation by reducing the dependency of consumers on private vehicle for purchasing purpose. Thus, the research question for this paper is what is the relationship between buying behaviour and transportation dependency whereas the research objective is to determine the relationship between buying behaviour and transportation dependency.

## **PROBLEM STATEMENT**

Today, the global is facing a big challenge, as the growing number of world population. According to United Nations (2015), the world's population was 7.3 billion in 2015 and it will be reached 9.7 billion by 2050, which is expected to increase continuously from year to year. Therefore, the megacities are expected to increase along with increasing in populations and this brings about the serious traffic congestion, pollution and noise (World Energy Council, 2011). Growth of population is associated with high demand for transportation (Stevenson, Thompson, de Sá, Ewing, Mohan, McClure, Woodcock, 2016). Thus, congestion and pollution will be a serious issue especially in urban areas (World Energy Council, 2011). The increasing of population that drives to the growth of using private automobiles for consumption purpose which can lead to increase the greenhouse gases emissions as well as global climate change (Satterthwaite, 2009).

Global climate change is a threat to all living things and non-living things. According to American Geophysical Union (2013), humanity is the major cause of global climate change over the past 50 years and it is clear that the human activity impact on climate change (Intergovernmental Panel on Climate Change, 2014). Deforestation, burning fossil fuels and urbanization are the human activities causing the climate change by releasing greenhouse gases, which is increase global temperature due to the increase of heat-trapping gases (NASA, 2016). According to the Environmental Protection Agency (2014), 26% of Carbon Dioxides (CO<sup>2</sup>) emission is from transportation sector, which is one of the sources of greenhouse gas emissions. Hence, reducing in travel trips is likely to reduce the carbon emissions from transport (Brand, Goodman, Rutter, Song & Ogilvie, 2013).

In this few decades, we experienced the transformation of technological, environmental and economic (Finnbogason, 2013). Internet is one of the success innovations in this 21<sup>st</sup> century, it is getting advance continuously and has become a necessity in our life. Purchasing online became a common practice all over the world. E-commerce user is increasing dramatically as there are approximately 1.4 billion online shoppers around the world in 2015 (Statista, 2016). It is impactful systems that can help in minimize dependency on transportation because the need to travel to physical shop from home can be reduced (Rosqvist & Heselius, 2016). According to existing data or resource,

there is quite little number of studies for this specific topic. Thus, a prospective study to explore the impact of e-commerce on dependency of transportation is necessary.

## LITERATURE REVIEW

### **E-commerce**

According to Nanehkaran (2013), electronic commerce, generally known as e-commerce is the communication systems, data management systems and security interact with each other and thus available in paperless exchange of commercial information of sale products or services. The e-commerce had been accepted and used wisely by the society in the recent year (Gilaninia, Danesh, Amiri, Mousavian, & Eskandarpour, 2011). E-commerce, which called as e-business is the activity that enhance value creation and market opportunities exploitation via exchange the relationship between two parties (Damanpour & Damanpour, 2001). According to Kalakota and Whinston (1997), e-commerce can be defined from four perspectives, which are communications perspective, business process perspective, service perspective and online perspective. There are four major types of e-commerce, which are Business-to-Business (B2B), Business-to-Consumer (B2C), Consumer-to-Business (C2B) and Consumer-to-Consumer (C2C) (Bhalekar, Ingle & Pathak, 2014). E-commerce allows people to purchase goods and services at home without going out. Hence, the travel trip for shopping at physical shop will decrease that will leads to less road congestion and improve air quality (Shahriari, Shahriari & Gheiji, 2015). Actually, e-commerce is a method of doing business activities without commuting and tenable the employees to work at home or virtual office. This results in decreasing the number of commuters who travel on the road (Tiwari & Singh, 2011).

### **Less dependency on transport**

The term transport or transportation means the movement of people and goods from one place to another (Fair & Williams, 1981). Transportation is a fundamental element in if not every then most of the economic activities. The main reason for people to travel is “access”, which is the capability to acquire desired goods or services. There are many ways where people could acquire access, including the variety of travel modes that is available in our world today (Goodwin, 2001). The role of transport is to facilitate the movement of people or goods. For goods, it may be from points of origin such as manufacturer, storage or pre-positioning to the points of consumption, between the hubs as well as distribution points, hubs to end use or distribution points to end use, or return from end user back to hub as well as pre-positioning points or manufacturers (Fair & Williams, 1981). The point of destination either will be within the country or in a different country, which require international movement. Usually, the meaning of dependency is always negatively and must be avoided. It is related with the provision of relief as well as opposite with the development approaches; seen as undermining initiative of people; perceive as a specific problem or issue relief help are given for a long time (Harvey & Lind, 2005). Dependence is decadent where its characteristics are laziness and deterioration, penury as well as crime (Bartle, 2004). It is how a life transmitted to the young, creating dependency cycles. Dependency justifies, even compels and dismissive perception (Fineman, 2001). Lautze and Hammock (1996) stated that the most neutral meaning of the word ‘dependency’ might be explained as great relying on resources exceeding the control of a person. For instance, in writing

about the debate of welfare in US, Fineman (2001) argued that there are a sequences of negative associations attached to dependency.

However, with the advancement of technology and the internet, researchers are now discovering positive impact of activities such as e-commerce and e-banking may have on the environment. Nowadays, the process of banking activities can now be made online therefore it eliminates the need for people to drive down to the bank as frequent as they used to. This would ultimately reduce the usage and driving of cars (Wirtz, 2001). The direct positive effects of e-commerce shopping are mainly the effects on traffic, but the indirect effects such as change of shopping behaviour and consumer mobility may be of greater significance with regard to general environmental impacts (Quack & Gensch, 2001). According to the Dutch governmental organization for energy saving, NOVEM, they presume that there will be a reduction of car traffic or the use of public transport due to the factor that consumers are going to use e-commerce (Braimaister, 2001).

Besides of the consumer standpoint, workers are also displaying less usage of transportation as these e-commerce establishment mostly consists of workers that are either working from home or commute to a more convenient location to work, this is because that with e-commerce, no energy is needed to be expended for customer comfort as it would be in a traditional shop (Cunningham & Fröschl, 1999). Although energy is still needed to fulfil the goods delivery, nevertheless, efficiency wise, this method is still much more efficient than the traditional ways where customers have to physically drive their personal vehicles to and from the shopping mall or physical shop (Cohen, 2001).

### **Buying behaviour**

Buying behaviour is the actions of people who answer what, why, how, when, and where when buying products or services, the ultimate decision is the result of buyer behaviour (Khaniwale, 2015). According to Sharma (2014), consumer buying behaviour can be defined as the decision processes and actions of people when purchasing and using any products or services. However, online buying behaviour is the process of purchasing goods and services through internet. The process contains some similar steps with conventional buying behaviour (Liang & Lai, 2000). Nowadays, the e-commerce is easy reach to end users via social media (Ioană & Stoica, 2014). The consumer can buy favourite goods via online by using internet.

According to Visser, Nemoto and Browne (2014), the worldwide online retail market was growth about 14.8% in 5 years, which is from year 2007 to 2012. The majority of online users are from United Kingdom, which consists of 71%, followed by Denmark, which has 70% of online users, Netherlands and Luxembourg have 69% and 65% of online users respectively. In Malaysia, the online users were growing up from year to year. In the recent years, the online shopping is obtaining the attention among the consumers in Malaysia, said by Masaya Ueno, the president and chief executive officer of Rakuten Online Shopping Malaysia (Zieman, 2014). According to Law (2015), 11 streets, the brand from South Korea is one of the online stores that become famous and competitive in E-commerce market in Malaysia. In Malaysia, based on the statistics in 2010, there is total around 11 million or 40% of generation Y out of the entire population of Malaysia (Department of Statistics Malaysia, 2015). The benefits of

online purchasing increase the number of online users among consumers especially the generation Y (Lim, Osman, Salahuddin, Romle & Abdullah, 2016).

There are two types of factors that influence the customer buying behaviour: external factors that consists of cultural and social factors; internal factors that consists of personal and psychological factors (Khaniwale, 2015). On the other hand, people choose shopping online due to convenience, availability of information, products and services, and cost effectiveness and time efficiency (Katawetawaraks & Cheng, 2011). According to Abbasi and Torkamani (2010), every person has their own buying behaviour as their needs and desires to purchase the things are different among each other. The consumer buying behaviour can be affected by the buying decision process that consists of several stages which arrange accordingly and start from problem identification, data collection, evaluation options, purchase, and after buying behaviour (Gilani Nia, 2010).

The large range of online shopping activities leads to the non-car modes or called as less car dependency (Hiselius, Rosqvist & Clark, 2012). The people who use conventional ways to shopping make multiple trips to physical shop in order to get information about products and then buy the desired products, on the other hand, the people who online shopping can get their desired products and services without go out and thus less commuting or travel trip decrease (Khalid, 2016). According to Jusoh and Ling (2012), the online buyer can purchase the desired products or services with just a click without leaving home or take any transportation to get the products. Therefore, it reduces the dependency of transportation to go out, leads the reduction of carbon dioxide and contributes to green environment.

## RESEARCH METHODOLOGY



**Figure 1**  
Research framework of transport dependency

### Research hypothesis

The hypothesis was developed as below:

H<sub>1</sub>: There is a significant relationship between buying behaviour and transportation dependency.

### Research design

This research is design as a descriptive study, which is to collect data that describe the characteristics of persons, events, or situations (Sekaran & Bougie, 2013). In this study, the quantitative approach is used in order to further investigate the impact of e-commerce on transportation dependency. Also, a non-contrived setting is used in this research, in which events carry on normally in natural environment. The unit of analysis in this research is individual as the data is collected from each individual student in Universiti Utara Malaysia (UUM). Cross-sectional study is undertaken in a short period of time.

### **Population and sample**

The population of this study is the students from three colleges in UUM namely College of Business (COB), College of Art and Sciences (CAS) as well as College of Law, Government and International Studies (COLGIS). They are also range from semester one to semester seven. In the study, the population data was obtained from Mr. Khairul Hakim, the officer of Academic Affairs Department of UUM. The data showed that there are 16,149 full time undergraduate students on 20th September 2015 including 4,398 of male students and 11,751 of female students. Meanwhile, a sample is a process of choosing a group of subjects in the study where an individual's selected represent in the larger group. As we had constraint on time and cost, convenient sampling method was used to obtain the sufficient number of respondents. Therefore, 400 sample sizes were taken to increase the significance of the study.

### **Data collection**

In the study, primary source was used. Primary data is defined as data collected for a specific problem at hand through the use best procedure to fit the research problem. The information gathered in the research is about the e-commerce users' buying behavior towards transportation dependency. Data is originally collects from the sample population through electronic questionnaire as well as personally administered questionnaires distributed by researchers to respondent of COB, CAS and COLGIS students in UUM. Thus, the questionnaire will print out and distribute by researchers to respondent in COB, CAS and COLGIS building in UUM. In this study, questionnaires were used to obtain data relevant to the study's objectives and research questions. The primary data is collected through questionnaire. The measurement scale of the questionnaires for dependent variable and independent variable is ordinal scale. Respondents are asked to indicate the extent to which they agree or disagree with each statement by ticking one number per row on the 5-points Likert scale response framework in which (1) = Strongly Disagree, (2) = Disagree, (3) = Neutral, (4) = Agree, (5) = Strongly Agree.

### **Data analysis**

The pilot test was tested on the questionnaire to identify if there is any problem occurs in the questionnaire. Frequency analysis is used to determine the number of occurrences whereas Pearson correlation is to measure the strength and direction of the relationship between both independent and dependent variable involved in this study. The coefficient of correlation shows the extent to which changes in the value of one variable are correlated to changes in the value of the other (Udovičić, et al., 2007). Also, simple linear regression analysis is used to determine the relationship between dependent variable and independent variable in this study. Reliability test is assessed to test the goodness of the data. Cronbach's alpha less than 0.60 are considered to be poor, in the range of 0.70 is accepted and those over 0.8 are good (Sekaran & Bougie, 2013).

## **RESULTS**

The result of this study was analysed by using IBM Package for Social Sciences (SPSS) Version 23 software.



**Table 1**  
Frequency table

		Frequency	Percent (%)
Gender	Male	87	22.14
	Female	306	77.86
	Total	393	100.00
College	COB	290	73.79
	CAS	42	10.69
	COLGIS	61	15.52
	Total	393	100.00
Do you know what e-commerce is?	Yes	379	96.44
	No	14	3.56
	Total	393	100.00
Have you use e-commerce before?	Yes	356	90.59
	No	37	9.41
	Total	393	100.00
How often do you use e-commerce?	Never	25	6.36
	Rarely	96	24.43
	Seldom	114	29.01
	Often	114	29.01
	Very often	44	11.2
	Total	393	100.00

Based on Table 1, show the frequency analysis of this study. This table summarised the respondent's profile. There are total 393 respondents instead of 400 due to there is 7 outlier that are excluded in this study. There are total 393 respondents which consist of 87 male respondents and 306 female respondents, where 22.14% are male respondents and 77.86% are female. Besides that, majority of the respondents are from COB which consists of 290 respondents (73.79%). It is followed by respondents from CAS which consists of 42 respondents (10.69%) and the rest are from CAS which consists of 61 respondents (15.52%). There are 96.44% of respondents know and understand about e-commerce and 91.59% of respondents have used it. Lastly, 29.01% of respondents are "often" and "seldom" use for e-commerce which consists of 114 respondents respectively and only 25 respondents are never use e-commerce.

**Table 2**  
Cronbach's alpha score for variables

Variable	N of Item	Cronbach's Alpha
Transportation Dependency	3	0.700
Buying Behaviour	4	0.749

In the research, the alpha score for buying behaviour is 0.700 and transportation dependency is 0.749 which shown in table 2. According to Sekaran and Bougie (2013), the correlation coefficient less than 0.6 are considered to be poor, in the range of 0.7 is accepted and those over 0.8 are good. Thus, these variables can be accepted and considered as reliable and consistent.

**Table 3**  
Correlation between independent and dependent variable

		TD	BB
TD	Pearson Correlation	1	.504**
	Sig. (2-tailed)		.000
	N	393	393
BB	Pearson Correlation	.504**	1
	Sig. (2-tailed)	.000	
	N	393	393

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Based on the Table 3, the p-value is 0.000, which is smaller than  $\alpha$  value of 0.01, thus can be concluded that there is relationship between buying behaviour (BB) and transportation dependency (TD). A positive relationship between buying behaviour and transport dependency in which correlation co-efficient value,  $r = 0.504$ .

**Table 4**  
Simple Linear Regression analysis

Variable	Beta	T	Sig.
Buying Behaviour	0.504	11.5290	0.000

$R^2 = .254$ , Adjusted  $R^2 = .252$ ,  $F(1,391) = 132.925$ ,  $p=0.000$

The simple linear regression shows that there is significant relationship between buying behaviour and transportation dependency where  $F = 132.925$  (table 4) and p-value is 0.00 ( $p < 0.05$ ). R square ( $R^2$ ) value is 0.254 (Table 4), which means buying behaviour explain 25.4% of the transportation dependency. Based on table 4, the standardized coefficient value of 0.504 show that for 1 unit changes in buying behaviour, the transportation dependency will changed by 0.504 unit.

Table 4 indicates the relationship between the independent variables and dependent variable.

H1: There is a significant relationship between buying behaviour and transportation dependency.

The p-value for buying behaviour is 0.000, which is less than  $\alpha$  value of 0.05. Therefore it can be concluded that there is a significant relationship between buying behaviour and transportation dependency. Thus,  $H_1$  is accepted.

## DISCUSSION

This study examines the impact of e-commerce in transportation dependency among online consumers in Universiti Utara Malaysia (UUM). In this research, buying behaviour is the predictor which will affect the transportation dependency when make online purchasing. This survey reveals that buying behaviour has significant and positive relationship on transportation dependency. This is due to those have positive buying behaviour to have greater rely on e-commerce which will contribute to less dependent on transportation for shopping purpose. This means that the change of



buying behaviour purchasing from traditional store to online store will reduce the travel trip which will effectively minimize the usage or dependent on transportation for shopping purpose. Indeed, changed of buying behaviour definitely reduce traffic congestion as well as minimize the environment impact directly and indirectly. This finding is consistent with the previous study which reveals that regular online consumers travel less by car compared with who not regularly purchase online (Hiselius, Rosqvist & Clark, 2012). The changing buying behaviour not only reduces the vehicle on road but relieve the traffic congestion as well as environmental issue. This is because e-commerce has the ability to re-direct the consumers to purchase online which eliminate the unnecessary trip to physical store (Shao, Yang, Xing & Yang, 2016).

Our study aims to show analytical framework to study the relationship of buying behaviour and transportation dependency however there is weak relationship between the variables. Reduction in travel trip for shopping purpose may generate trip for another purposes such as ones drive for visiting friend after shopping trip or having a dinner after travel to physical store. In addition, purchasing online is still consider as new for Malaysian especially the rural and suburban areas, inhabitants in these areas are strong concern on traditional buying method instead of buying online as the variety of goods are limited and the facility is not complete. In Malaysia, development of e-commerce is concern on urban area such as Kuala Lumpur and Penang but omit the rural and suburban which are Kedah, Perlis, Terengganu as well as the regions which underdeveloped. Furthermore, shopping in store is the Malaysian's habit, as many inhabitants not familiar with online shopping and some of them have not adapted the new shopping method. Hence, the conclusion is whether the potential reduction of vehicle on road will be realized is a question for government policy and societal intention rather than consumer buying behaviour.

This study reveals some interesting and simultaneously discouraging result regarding the transportation dependency based on consumer buying behaviour. However, more research is needed in order to examine further discussion on whether the result is hold for different age groups, different education level, different income level as well as different region in Malaysia. At the same time, it is needed to understanding the effect of different logistics solution in order to reveal the whole impact of e-commerce on transportation dependency instead of concern in consumer preference.

## **LIMITATION**

The limitation of this research is time and budgetary constraints. This is because with limitation of time and budget, the researchers need to explore a subject area and obtain the result within a specific period of time, which is only within three months that will affect the amount of information that can be published to the audiences. The researcher was unable to provide a more accurate result due to that reason. Also, in this study, only UUM students are involve as a respondent. Therefore, this study will not representing all the students in Malaysia. Besides that, every respondent has different levels of knowledge towards e-commerce that will affect the ability in contributing this study.

## CONCLUSION

In short, e-commerce is able to reduce the transportation dependency in short run especially in urban area as there is high transportation usage. E-commerce changes the consumer buying pattern which able to reduce the travel trip to physical store. This may not totally eliminate the vehicles on road but it slightly reduces the number of transportation especially the private vehicle. In addition, decreasing the number of vehicles definitely reduce carbon emission. As a result, it can contribute to green and sustainable environment.

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