IRESPUB
IRESPUB Journal of Natural & Applied Sciences
ISSN: 2770-3649
Volume: 2 | Issue: 1 | MAR - APR 2022 | Available Online: www.irespub.com

Empirical study on factors impact on traffic congestion: the 31 city-provinces in Vietnam case

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ABSTRACT
Traffic congestion is a problem that not only of a particular country but also of the whole world, it is happening extremely complicated and dangerous. It causes bad consequences for the economy as well as the people. The objective of this paper is to measure which factors impact on traffic congestion through empirical case of thirty-one city-provinces in Vietnam by using methodology Cronbach's Alpha, Pearson Correlation and Multinomial logistics regression. The main results are Population of Ben Tre province is likely to slightly impact on traffic congestion that for every unit increase on Population of Ben Tre province, the probability of Population of Ben Tre province slightly impacts on traffic congestion is changed by a factor of 935.946 increasingly. Urban residents of Quang Nam province are likely to heavily impact on traffic congestion which for every unit increase on Urban residents of Quang Nam province, the probability of Urban residents of Quang Nam province heavily impacts on traffic congestion is changed by a factor of 15.796 increasingly. Yen Bai province is likely to slightly impact on traffic congestion which for every unit increase on Urban residents of Yen Bai province, the probability of Urban residents of Yen Bai province slightly impact on traffic congestion is changed by a factor of 165568.300 increasingly.

KEYWORDS
traffic congestion; Vietnam; population; urban residents

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(1) INTRODUCTION

Traffic congestion is a painful reality not only in a certain country but also in every country in the world. Traffic congestion is a global disaster that billions of people around the world have to accept to live with it every day. While each individual has to struggle when they go out, especially in the rush hours, governments and traffic experts themselves are still looking for solutions, but they have not been able to completely solve the traffic congestion problem yet. The truth is the situation in any countries that congested traffic is come from and become congested bottlenecks that makes participants traffic can't go forward, and also can't be able to get back in the rush hour during the long line of many kilometers in the congested traffic, especially to wait for turning to pass the highway toll stations, and it is worse in the holidays. While, in Hanoi capital or Ho Chi Minh City, Vietnam, many people take hours from home to work, which is the main cause make them to be late at working places every morning, in Sao Paolo, Brazil where traffic disaster is much more terrible. According to many of elaborate studies by the Centre for Hazard Analysis at Harvard University, US, the situation of traffic jams in eighty-three of the largest metropolitan areas in the United States that led to 2,200 sudden deaths in 2010, causing an increase of the health budget is 18 billion USD. In the "golden era" of the car industry in the 1960s, millions of families in Europe and the United States simultaneously switched to use cars as cars were cheaper at that time, creating a huge challenge to the available transportation system of the world. Under a world-wide perspective, traffic congestion is really presented everywhere. From European countries with aging populations, good social discipline and good social order to young, dynamic and modern cities in Asia. From old urban areas to completely new cities are meticulously planned.

It can be affirmed certainly that at present there is no possible solution which can be proven to solve completely and permanently the problem of traffic congestion in busy cities, especially big cities. if possible, such a solution that can be able to be come in the future, when we accept to live with traffic congestion and improve it instead of trying to hope to delete it completely.

The congestion phenomena propagating on the road network of large cities have a major impact on the development of traffic patterns. There is no method has been developed that takes traffic information into account for forecasting in situations are complex processes taking place on the road network of the city yet [1]. Traffic congestion has major negative impact on transport sector and creates a massive increase in the transportation cost. Congestion cost if evaluated accurately that can help wider aspects of the policy and planning and thus by providing potential solutions to the traffic congestion problem. The case of the state of Kerala, India which prevail heterogeneous traffic conditions, where the private vehicles such as two wheelers and car constitute an average share of 75% of total traffic and which has the maximum share of traffic compared to public vehicles [2]. Traffic congestion has been a serious menace in under-developed, developing and developed countries of the world. Almost countries are struggling on how to deal with the issue of road traffic congestion. Johannesburg is a highly populated city situated in the Gauteng province of South Africa, where is famous for economic prowess and sophisticated infrastructure. However, the big drawback of living in Johannesburg is the traffic congestion. Traffic congestion is not only in Johannesburg but also hindrance to any developing society. In the past few decades, the South African Government spent millions of Rands on state-of-the-art traffic signal equipment [3].

The object of this paper is to assess thirty-one city-provinces consists of three hundred and then independent variables impact on traffic congestion by using methodology Cronbach's Alpha, Pearson Correlation and Multinomial logistics regression. Paper has eight sections which are introduction is section 1, section 2 is literature review, methodology will be in section 3, section 4 will present introduction of thirty-one City-Provinces in Vietnam, data source will be in section 5, section 6 will illustrate study results, section 7 is discussion and conclusion will be in section 8.

(2) LITERATURE REVIEW

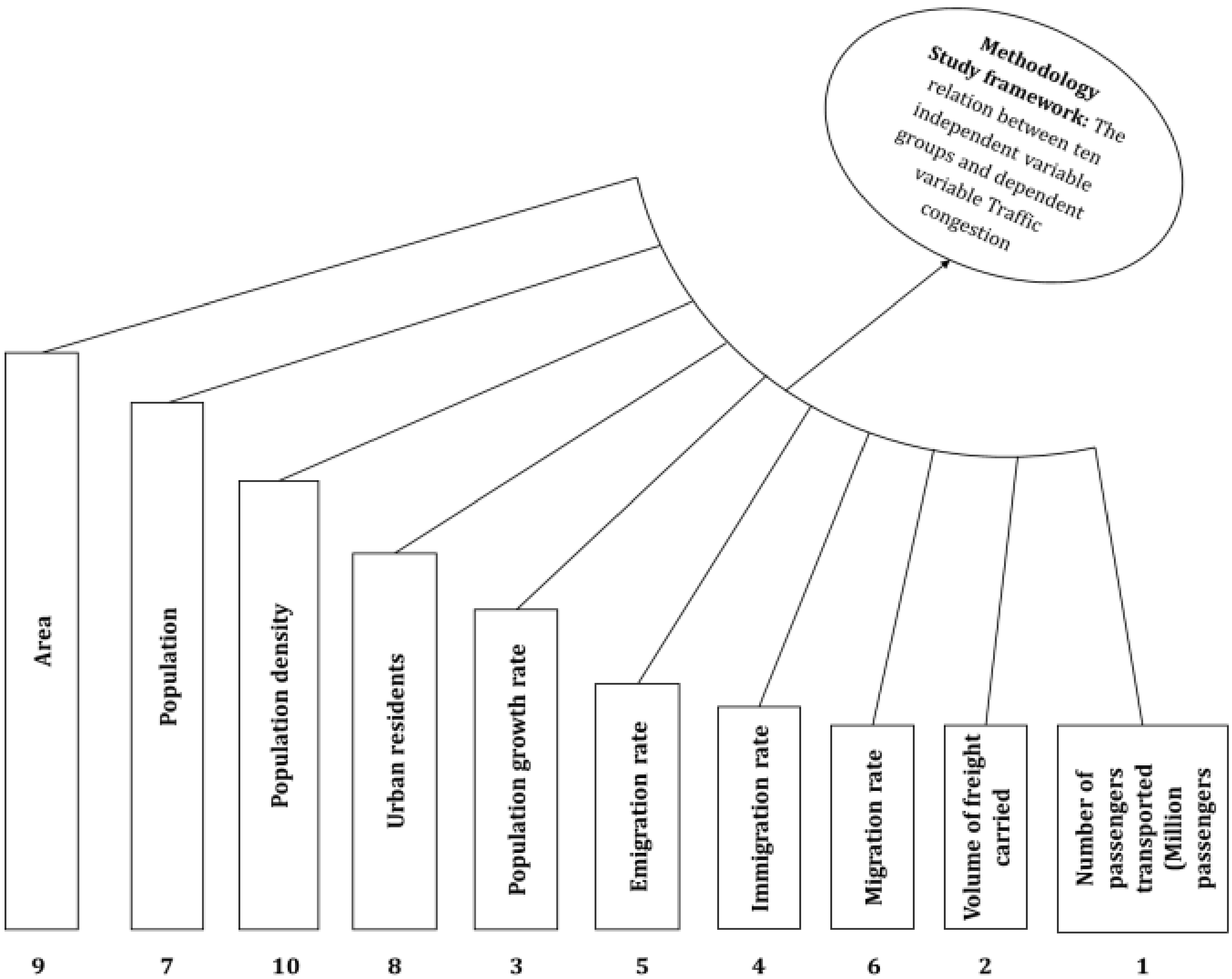
Recent discoveries and new innovative methods in intelligent transportation systems have proven that traffic congestions at an un-signalized road intersection are now becoming a problem of the past, an instance is in Johannesburg roads in the Gauteng province of South Africa [3]. Khulna City, Bangladesh, Central Business Districts areas with breakdown flow have the worst congestion. Inadequate parking facilities, illegal road occupancy by roadside vendors, and street parking decrease 32% to 82% of the road efficiency in different areas. Congestion occurs mostly between 6.00 PM and 9.00 PM. A rapid increase of vehicle population, poor public transportation, behavior of pedestrians, illegal road occupancy, and fragile enforcement of laws that are leading the traffic condition of Khulna towards an unsustainable future [4]. Traffic congestion and abundance - spatial configuration of urban land uses have correlation. while contiguous residential development was correlated with less congestion, high degrees of polycentricity for both high-intensity and low-intensity urban land uses were associated with more congestion. Urban morphology shows more substantial influence on overall congestion than congestion in rush-hours [5]. Some systems is proven that can reduce the traffic congestion and reducing the total charging time at the charging stations; firstly is a novel dynamic traffic congestion pricing and electric vehicle charging management system for the internet of vehicles in an urban smart city environment, secondly is a system that rewards the drivers that choose to take alternative congested-free ways and congested-free charging stations, and thirdly is a token management system that serves as a virtual currency, where the vehicles earn these tokens if they take alternative non-congested ways and charging stations and use the tokens to pay for the charging fees [6]. There are some proposes a complete framework to resolve traffic congestion are for two city scales in order to compare different trip densities, that is a city scale of 25 km2 with a total market of 11,235 shareable trips for the medium-scale network and a city scale of 80 km2 with 205,308 demand for service vehicles for the large-scale network over a 4-hour period with a rolling horizon of 20 minutes. The solutions are measured using a dynamic trip-based account for the congestion effect [7]. Intelligent vehicles give the opportunity to improve the issue of traffic congestion by identification and prediction through the huge data generated are come from individual vehicles that are collected by GPS. The machine learning approach on generated vehicle data through GPS and applying the Gaussian process in machine learning for prediction of traffic speed [8].

To avoid traffic congestion is to distribute traffic in the street network in a system-optimal manner which can be calculated by a centralized traffic management system to be communicated as route advice. Drivers really tend to remember the extreme experiences on related to transport. However, the affective quality of the events which are remembered by drivers could neither explain the affective forecast of upcoming events nor the driver's route choice decision. Thereby, it was found that drivers were generally more willing to face traffic congestion than to consider bypassing it to another turning-streets [9]. A novel Knowledge Graph reasoning framework is introduced to predict the real-time propagation pattern of congestions on traffic network, using real-time traffic state data [10]. Traffic congestion is a major problem in almost cities in Ghana, especially in market centers, a decrease in productivity and reduction in sales are by delayed caused by traffic jams. Study is revealed that bad attitude of drivers, traders, and pedestrians, Road Traffic Crashes, and poor road designs were the main reason causing of traffic congestion. Traffic congestion are decreasing sales and productivity and cause stress. There are recommends that authorities should have program in terms of public education, strict enforcement of road traffic regulations, and provision of adequate parking spaces to help manage traffic congestion [11]. In the Hague, Netherlands, besides the positive effect of the autonomous driving capabilities of shared autonomous vehicles help reduce traffic congestion, it also creates negative effect by stopping on the curb-side to drop off passengers. The dedicated lanes design was unsuccessful at reducing this congestion caused shared autonomous vehicles [12]. Traffic congestion is an important issue that have negative impact on socio-economic problem that swelled in the last few decades. The movement of people, length of trips, quality of life, and the economy of countries are also impacted. Intelligent transportation systems, Hidden Markov Models are suggested to be used as a solution to solve traffic congestion [13]. The proposed models for traffic congestion that may has the potential impact to long term congestion planning which provided by decision makers with the full probabilistic behavior of congestion emerging from their decisions, even when there is only minimal statistical information is available [14]. Algorithms including decision tree, logistic regression and artificial neural network are suggested to predict traffic congestion, these models can be further improved by linking the road condition database with satellite system [15]. In Jakarta, Indonesia, Twitter is one of the social media with text and image information and Support Vector Machine that can be used as a source of information to detect traffic congestion in real-time [16]. In Austria, a approach consisting in the analysis of separate traffic lanes is suggested to be used, this approach is studied and proven that it provides better insights into the congestions patterns and their causes on alpine motorways and might be used to evaluate traffic management measures more accurately and reliably than the standard technique [17]. Traffic congestion is problem not only in urban cities and county but also in coastal urban roads. For instance, in traffic congestion on the coastal Othonos-Amalias Avenue, in Patras city centre, which leads to the port of Patras. Traffic congestion is common during peak periods and is a recurring phenomenon in morning and noon at work trips and afternoon at leisure trips for hours on this road. Intelligent Transportation Systems and Variable Message Sign are studied and suggested to be used for realizing and be diverted to alternative routes, avoiding the congested coastal road [18]. VANET networks is a platform for vehicle-to-vehicle to be used to transmit information which is being suggested to use as solution in terms of congestion in road traffic presents itself as a very persistent problem in urban areas [19].

(3) METHODOLOGY

(3.1) Study framework

The relation between ten independent variable groups and dependent variable Traffic congestion



(3.2) Variables

TABLE 1: Independent variables Matrix of thirty-one City – provinces

No	Independent Variables / Cities / Province name	Number of passengers transported (Million passengers/km)	Volume of freight carried (Million tons/km)	Population growth rate (%)	Immigration rate (‰)	Emigration rate (‰)	Migration rate (‰)	Population (Thousand people)	Urban residents (Thousand people)	Area (Km2)	Population density (thousand people/km2)
1	LONG AN (LAN)	LAN$_1$	LAN$_2$	LAN$_3$	LAN$_4$	LAN$_5$	LAN$_6$	LAN$_7$	LAN$_8$	LAN$_9$	LAN$_{10}$
2	TIEN GIANG (TGG)	TGG$_1$	TGG$_2$	TGG$_3$	TGG$_4$	TGG$_5$	TGG$_6$	TGG$_7$	TGG$_8$	TGG$_9$	TGG$_{10}$
3	DONG THAP (DTP)	DTP$_1$	DTP$_2$	DTP$_3$	DTP$_4$	DTP$_5$	DTP$_6$	DTP$_7$	DTP$_8$	DTP$_9$	DTP$_{10}$
4	BEN TRE (BTE)	BTE$_1$	BTE$_2$	BTE$_3$	BTE$_4$	BTE$_5$	BTE$_6$	BTE$_7$	BTE$_8$	BTE$_9$	BTE$_{10}$
5	CAN THO (CTO)	CTO$_1$	CTO$_2$	CTO$_3$	CTO$_4$	CTO$_5$	CTO$_6$	CTO$_7$	CTO$_8$	CTO$_9$	CTO$_{10}$
6	HO CHI MINH (HCM)	HCM$_1$	HCM$_2$	HCM$_3$	HCM$_4$	HCM$_5$	HCM$_6$	HCM$_7$	HCM$_8$	HCM$_9$	HCM$_{10}$
7	BR VUNG TAU (BRVT)	BRVT$_1$	BRVT$_2$	BRVT$_3$	BRVT$_4$	BRVT$_5$	BRVT$_6$	BRVT$_7$	BRVT$_8$	BRVT$_9$	BRVT$_{10}$
8	DONG NAI (DNI)	DNI$_1$	DNI$_2$	DNI$_3$	DNI$_4$	DNI$_5$	DNI$_6$	DNI$_7$	DNI$_8$	DNI$_9$	DNI$_{10}$
9	BINH DUONG (BDG)	BDG$_1$	BDG$_2$	BDG$_3$	BDG$_4$	BDG$_5$	BDG$_6$	BDG$_7$	BDG$_8$	BDG$_9$	BDG$_{10}$
10	TAY NINH (TNH)	TNH$_1$	TNH$_2$	TNH$_3$	TNH$_4$	TNH$_5$	TNH$_6$	TNH$_7$	TNH$_8$	TNH$_9$	TNH$_{10}$
11	BINH PHUOC (BPC)	BPC$_1$	BPC$_2$	BPC$_3$	BPC$_4$	BPC$_5$	BPC$_6$	BPC$_7$	BPC$_8$	BPC$_9$	BPC$_{10}$
12	BINH DINH (BDH)	BDH$_1$	BDH$_2$	BDH$_3$	BDH$_4$	BDH$_5$	BDH$_6$	BDH$_7$	BDH$_8$	BDH$_9$	BDH$_{10}$
13	KON TUM (KTM)	KTM$_1$	KTM$_2$	KTM$_3$	KTM$_4$	KTM$_5$	KTM$_6$	KTM$_7$	KTM$_8$	KTM$_9$	KTM$_{10}$
14	QUANG NGAI (QNI)	QNI$_1$	QNI$_2$	QNI$_3$	QNI$_4$	QNI$_5$	QNI$_6$	QNI$_7$	QNI$_8$	QNI$_9$	QNI$_{10}$
15	QUANG NAM (QNM)	QNM$_1$	QNM$_2$	QNM$_3$	QNM$_4$	QNM$_5$	QNM$_6$	QNM$_7$	QNM$_8$	QNM$_9$	QNM$_{10}$
16	DA NANG (DNG)	DNG$_1$	DNG$_2$	DNG$_3$	DNG$_4$	DNG$_5$	DNG$_6$	DNG$_7$	DNG$_8$	DNG$_9$	DNG$_{10}$
17	THUA T HUE (TTH)	TTH$_1$	TTH$_2$	TTH$_3$	TTH$_4$	TTH$_5$	TTH$_6$	TTH$_7$	TTH$_8$	TTH$_9$	TTH$_{10}$
18	QUANG TRI (QTI)	QTI$_1$	QTI$_2$	QTI$_3$	QTI$_4$	QTI$_5$	QTI$_6$	QTI$_7$	QTI$_8$	QTI$_9$	QTI$_{10}$
19	QUANG BINH (QBH)	QBH$_1$	QBH$_2$	QBH$_3$	QBH$_4$	QBH$_5$	QBH$_6$	QBH$_7$	QBH$_8$	QBH$_9$	QBH$_{10}$
20	HA TINH (HTH)	HTH$_1$	HTH$_2$	HTH$_3$	HTH$_4$	HTH$_5$	HTH$_6$	HTH$_7$	HTH$_8$	HTH$_9$	HTH$_{10}$
21	NGHE AN (NAN)	NAN$_1$	NAN$_2$	NAN$_3$	NAN$_4$	NAN$_5$	NAN$_6$	NAN$_7$	NAN$_8$	NAN$_9$	NAN$_{10}$
22	HUNG YEN (HYN)	HYN$_1$	HYN$_2$	HYN$_3$	HYN$_4$	HYN$_5$	HYN$_6$	HYN$_7$	HYN$_8$	HYN$_9$	HYN$_{10}$
23	HAI PHONG (HPG)	HPG$_1$	HPG$_2$	HPG$_3$	HPG$_4$	HPG$_5$	HPG$_6$	HPG$_7$	HPG$_8$	HPG$_9$	HPG$_{10}$
24	HA NOI (HNI)	HNI$_1$	HNI$_2$	HNI$_3$	HNI$_4$	HNI$_5$	HNI$_6$	HNI$_7$	HNI$_8$	HNI$_9$	HNI$_{10}$
25	BAC NINH (BNH)	BNH$_1$	BNH$_2$	BNH$_3$	BNH$_4$	BNH$_5$	BNH$_6$	BNH$_7$	BNH$_8$	BNH$_9$	BNH$_{10}$
26	BAC GIANG (BGG)	BGG$_1$	BGG$_2$	BGG$_3$	BGG$_4$	BGG$_5$	BGG$_6$	BGG$_7$	BGG$_8$	BGG$_9$	BGG$_{10}$
27	PHU THO (PTO)	PTO$_1$	PTO$_2$	PTO$_3$	PTO$_4$	PTO$_5$	PTO$_6$	PTO$_7$	PTO$_8$	PTO$_9$	PTO$_{10}$
28	VINH PHUC (VPC)	VPC$_1$	VPC$_2$	VPC$_3$	VPC$_4$	VPC$_5$	VPC$_6$	VPC$_7$	VPC$_8$	VPC$_9$	VPC$_{10}$
29	THAI NGUYEN (TNN)	TNN$_1$	TNN$_2$	TNN$_3$	TNN$_4$	TNN$_5$	TNN$_6$	TNN$_7$	TNN$_8$	TNN$_9$	TNN$_{10}$
30	YEN BAI (YBI)	YBI$_1$	YBI$_2$	YBI$_3$	YBI$_4$	YBI$_5$	YBI$_6$	YBI$_7$	YBI$_8$	YBI9$_9$	YBI$_{10}$
31	TUYEN QUANG (TQG)	TQG$_1$	TQG$_2$	TQG$_3$	TQG$_4$	TQG$_5$	TQG$_6$	TQG$_7$	TQG$_8$	TQG$_9$	TQG$_{10}$

Source: studied by author

(3.3) Variables explanation

Independent variable 1: Number of passengers who have been transported that multiply by the actual lengh of transported distance, unit is mmillion passengers/km

Independent variable 2: Volume of freight which have been carried that multiply by the actual lengh of transported distance, unit is million tons/km

Independent variable 3: Population growth rate = $\left(\frac{(\sum_{i=1}^{n} Pit) - (\sum_{i=1}^{n} Pit-1)}{\sum_{i=1}^{n} Pit-1} \right)$ x 100 (1)

As Equation (1) states:
Where,
P is population of City-Province i
i is called Cities or Provinces, i is is between 1 and 31 [1,31]. In other words, n = 31, i = 1
t is the current year which is called year t
t – 1 is the previous year which comparing with the current year t
Unit is %

Independent variable 4: Immigration rate = $\left(\frac{\sum_{i=1}^{n} IPit}{\sum_{i=1}^{n} Pit} \right)$ x 1000 (2)

As Equation (2) states:
Where,
P is population of City-Province i
IP is number of immigrated population of City-Province i
i is called Cities or Provinces, i is is between 1 and 31 [1,31]. In other words, n = 31, i = 1
t is the current year which is called year t
Unit is ‰

Independent variable 5: Emigration rate = $\left(\frac{\sum_{i=1}^{n} EPit}{\sum_{i=1}^{n} Pit} \right)$ x 1000 (3)

As Equation (3) states:
Where,
P is population of City-Province i
EP is number of emigrated population of City-Province i
i is called Cities or Provinces, i is is between 1 and 31 [1,31]. In other words, n = 31, i = 1
t is the current year which is called year t
Unit is ‰

Independent variable 6: Migration rate = $\left(\frac{\sum_{i=1}^{n} MPit}{\sum_{i=1}^{n} Pit} \right)$ x 1000 (4)

As Equation (4) states:
Where,
P is population of City-Province i
MP is number of migrated population of City-Province i
i is called Cities or Provinces, i is is between 1 and 31 [1,31]. In other words, n = 31, i = 1
t is the current year which is called year t
Unit is ‰

Independent variable 7: Population is total number of people of City-Provinces, unit is thousand people
Independent variable 8: Urban residents are people who live in City-Provinces, unit is thousand people
Independent variable 9: Area is the area of City-Province, unti is km2
Independent variable 10: Population density is the rate of number of people calculated per km2, unit is thousand people/km2, unit is thousand people/km2

(3.4) Cronbach's Alpha

Cronbach's Alpha is used to measure the reliability between three hundred and ten independent variables which are described clearly by Table 1. For instance, LAN has LAN_1, LAN_2, LAN_3, LAN_4, LAN_5, LAN_6, LAN_7, LAN_8, LAN_9, LAN_{10}, HCM has HCM_1, HCM_2, HCM_3, HCM_4, HCM_5, HCM_6, HCM_7, LAN_8, HCM_9, HCM_{10}, HNI has HNI_1, HNI_2, HNI_3, HNI_4, HNI_5, HNI_6, HNI_7, HNI_8, HNI_9, HNI_{10}.

Cronbach's Alpha (C-Alpha), (Lee Cronbach, 1951)

$$\text{C-Alpha} = \frac{n}{n-1}\left(1-\frac{\sum_{j=1}^{n} ð_j^2}{ð_{ov}^2}\right) \qquad (5)$$

As Equation (5) states:

Where,

n is number of observed variables, in this paper n = 310 consists of LAN_1, LAN_2, ..., LAN_{10}, ..., HCM_1, HCM_2, ..., HCM_{10}, ..., HNI_1, HNI_2, ..., HNI_{10}, ..., and TQG_1, TQG_2, ..., TQG_{10}. Detail of 310 observed variables which are described clearly by Table 1.

ov is observed variables

$ð_{ov}^2 = \sum_{j=1}^{n} ð_j^2 + \sum_{j=1}^{n} \quad \sum_{z\neq j}^{n} a_{jz}$

z is [1, 310] and z ≠ j

(3.5) Pearson Correlation (PC)

PC is to be used to check up how strong and which direction of the relations between three hundred and ten independent variables of thirty-one City-Provinces. One City-Province has ten independent variables, meaning thirty-one City-Province has total three hundred and ten independent variables, with a huge number such three hundred and ten independent variables is that impossibe to assess Correlation one by one. Whereby, the method is to be used that is calculating the average of ten independent variables into one independent variable which represents one City-Province, so total thirty-one City-Province will have thirty-one independent variables, perspectively.

A PC coefficient has significance in [0,1]

$$\text{PC coefficient} = \frac{n(\sum X1.X2....,X10)-(\sum X1)(\sum X2),...,\sum X31)}{\sqrt{n[\sum X1^2-(\sum X1)^2][\sum X2^2-(\sum X2)^2]...,[\sum X31^2-(\sum X31)^2]}} \qquad (6)$$

As Equation (6) states:

Where,

n is number of observed variables, in this paper n = 31 including LAN, TGG, DTP, BTE, CTO, HCM, BRVT, DNI, BDG, TNH, BPC, BDH, KTM, QNI, QNM, DNG, TTH, QTI, QBH, HTH, NAN, HYN. In this formula they are call X_1, X_2, X_3, ..., X_{29}, X_{30}, X_{31}, respectively.

LAN = X_1 = Average [LAN_1, LAN_2, LAN_3, LAN_4, LAN_5, LAN_6, LAN_7, LAN_8, LAN_9, LAN_{10}]
TGG = X_2 = Average [TGG_1, TGG_2, LAN_3, TGG_4, TGG_5, TGG_6, TGG_7, TGG_8, LAN_9, TGG_{10}]
DTP = X_3 = Average [DTP_1, DTP_2, DTP_3, DTP_4, DTP_5, DTP_6, DTP_7, DTP_8, DTP_9, DTP_{10}]
.
.
.
TNN = X_{29} = Average [TNN_1, TNN_2, TNN_3, TNN_4, TNN_5, TNN_6, TNN_7, TNN_8, TNN_9, TNN_{10}]
YBI = X_{30} = Average [YBI_1, YBI_2, YBI_3, YBI_4, YBI_5, YBI_6, YBI_7, YBI_8, YBI_9, YBI_{10}]
TQG = X_{31} = Average [TQG_1, TQG_2, TQG_3, TQG_4, TQG_5, TQG_6, TQG_7, TQG_8, TQG_9, TQG_{10}]
The detail of thirty-one City-Provinces and their three hundred and ten independent variables are described in Table 1.

(3.6) Multinomial logistics regression

T = 0: T is not impacted by LAN_1, LAN_2, ..., LAN_{10}, ..., HCM_1, HCM_2, ..., HCM_{10}, ..., HNI_1, HNI_2, ..., HNI_{10}, ..., and TQG_1, TQG_2, ..., TQG_{10}. Detail of 310 observed variables which are described clearly by Table 1.

T = 1: T is slightly impacted by LAN_1, LAN_2, ..., LAN_{10}, ..., HCM_1, HCM_2, ..., HCM_{10}, ..., HNI_1, HNI_2, ..., HNI_{10}, ..., and TQG_1, TQG_2, ..., TQG_{10}. Detail of 310 observed variables which are described clearly by Table 1.

T = 2: T is heavily impacted by LAN_1, LAN_2, ..., LAN_{10}, ..., HCM_1, HCM_2, ..., HCM_{10}, ..., HNI_1, HNI_2, ..., HNI_{10}, ..., and TQG_1, TQG_2, ..., TQG_{10}. Detail of 310 observed variables which are described clearly by Table 1.

Logarit for the Impact = $\text{Log}\left(\frac{Ti}{Tj}\right)$

$$\text{Log}\left(\frac{Ti}{Tj}\right) = a_{0ij} + a_{1,ij}X_1 + a_{2,ij}X_2 + \ldots a_{31,ij}X_{31} + f_{ij} \qquad (7)$$

As Equation (7) states:

Therefore,

$$\text{Log}\left(\frac{T0}{T1}\right) = a_{01} + a_{1,01}X_1 + a_{2,01}X_2 + a_{3,01}X_3 + a_{4,01}X_4 + a_{5,01}X_5 + a_{6,01}X_6 + a_{7,01}X_7 + a_{8,01}X_8 + a_{9,01}X_9 + a_{10,01}X_{10} + f_{01} \qquad (8)$$

$$\text{Log}\left(\frac{T0}{T2}\right) = a_{02} + a_{1,02}X_1 + a_{2,02}X_2 + a_{3,02}X_3 + a_{4,02}X_4 + a_{5,02}X_5 + a_{6,02}X_6 + a_{7,02}X_7 + a_{8,02}X_8 + a_{9,02}X_9 + a_{10,02}X_{10} + f_{02} \qquad (9)$$

$$\text{Log}\left(\frac{T1}{T2}\right) = a_{12} + a_{1,12}X_1 + a_{2,12}X_2 + a_{3,12}X_3 + a_{4,12}X_4 + a_{5,12}X_5 + a_{6,12}X_6 + a_{7,12}X_7 + a_{8,12}X_8 + a_{9,12}X_9 + a_{10,12}X_{10} + f_{12} \qquad (10)$$

As Equation (8), (9), (10) state:

Where

f is other factors beyond 310 independent variables in Table 1 which this paper does not have analysis

X_1 is LAN_1, ..., TQG_1 are number of passengers who have been transported, detail of 31 observed independent variables which are described clearly at column "Number of passengers transported" in Table 1.

X_2 is LAN_2, ..., TQG_2 are volume of freight which have been carried, detail of 31 observed independent variables which are described clearly at column "Volume of freight carried" in Table 1.

X_3 is LAN_3, ..., TQG_3 are population growth rate, detail of 31 observed independent variables which are described clearly at column "Population growth rate" in Table 1.

X_4 is LAN_4, ..., TQG_4 are immigration rate, detail of 31 observed independent variables which are described clearly at column "Immigration rate" in Table 1.

X_5 is LAN_5, ..., TQG_5 are emigration rate, detail of 31 observed independent variables which are described clearly at column "Emigration rate" in Table 1.

X_6 is LAN_6, ..., TQG_6 are migration rate, detail of 31 observed independent variables which are described clearly at column "Migration rate" in Table 1.

X_7 is LAN_7, ..., TQG_7 are population, detail of 31 observed independent variables which are described clearly at column "Population" in Table 1.

X_8 is LAN_8, ..., TQG_8 are rrban residents, detail of 31 observed independent variables which are described clearly at column "Urban residents" in Table 1.

X_9 is LAN_9, ..., TQG_9 are areas, detail of 31 observed independent variables which are described clearly at column "Area" in Table 1.

X_{10} is LAN_{10}, ..., TQG_{10} are population density, detail of 31 observed independent variables which are described clearly at column "Population density" in Table 1.

(3.7) Hypothesis: H_1, H_2, H_3

H_1 is T is not impacted by LAN_1, LAN_2, ..., LAN_{10}, ..., HCM_1, HCM_2, ..., HCM_{10}, ..., HNI_1, HNI_2, ..., HNI_{10}, ..., and TQG_1, TQG_2, ..., TQG_{10}.

H_2 is T is slightly impacted by LAN_1, LAN_2, ..., LAN_{10}, ..., HCM_1, HCM_2, ..., HCM_{10}, ..., HNI_1, HNI_2, ..., HNI_{10}, ..., and TQG_1, TQG_2, ..., TQG_{10}.

H_3 is T is impacted by LAN_1, LAN_2, ..., LAN_{10}, ..., HCM_1, HCM_2, ..., HCM_{10}, ..., HNI_1, HNI_2, ..., HNI_{10}, ..., and TQG_1, TQG_2, ..., TQG_{10}.

Detail of 310 observed variables which are described clearly by Table 1.

(4) INTRODUCTION OF THIRTY-ONE CITY-PROVINCES IN VIETNAM

(4.1) Mekong Delta Area in the South Vietnam: Long A province, Tien Giang province, Dong Thap province, Ben Tre, province, Can Tho province

The Mekong Delta which is also called the Mekong Triangle, it is located at the southernmost point of Vietnam. That is the most fertile land which is the largest delta in Southeast Asia. There is a densely distributed river network, small boat trips, free travel in interwoven rivers, immense rice fields, there are four-season fruit orchards with the sweet aroma of tropical fruits and Southern folk delicacies. The Mekong Delta includes 13 provinces which are Can Tho city, An Giang province, Dong Thap province, Long An province, Tien Giang province, Vinh Long province, Ben Tre province, Tra Vinh province, Soc Trang province, Hau Giang province, Bac Lieu province, Ca Mau province and Kien Giang province.

The Mekong River originates in Zadoi County, Tibet Autonomous Prefecture of Yushu ethnic group, Qinghai Province, China. It is called the Lancang River in China. After passing through Yunnan province out of the Chinese border, it flows through Myanmar, Laos, Thailand and Cambodia, and then flows into the East Sea at the estuaries of southern Vietnam. The Mekong Delta is a part of the Mekong River Delta with an area of 40.6 thousand km^2. It is clocated adjacent to the Southeast region, the North borders Cambodia, the Southwest is the Gulf of Thailand, the Southeast is the East Sea. The Mekong Delta consists of three sub-regions. Upland in the west includes the upstream provinces of the Mekong River which are Dong Thap, An Giang, Can Tho. The western part of Long An, Tien Giang, Vinh Long, Hau Giang and the eastern part of Kien Giang. This area is often flooded in the rainy season by the rising water of the Mekong River. The lowlands in the east coast include the provinces of Ben Tre, Tra Vinh, Bac Lieu, Ca Mau. The eastern part of Long An, Tien Giang, Vinh Long, Hau Giang and the coastal part of Kien Giang, this area is often affected by saline intrusion in the dry season [20].

(4.2) The southeast of Vietnam: Ho Chi Minh City, Ba ria Vung Tau province, Dong Nai province, Binh Duong province, Tay Ninh province, Binh Phuoc province

The Southeast is one of two parts of the South of Vietnam, it also has another short name is usually called by the people of South Vietnam as the East which. The Southeast region has one city directly under the central government is Ho Chi Minh City, and 5 provinces are Ba Ria - Vung Tau, Binh Duong, Binh Phuoc, Dong Nai and Tay Ninh.

The population of the Southeast region accounts for 16.34% of the population of Vietnam, where is the region with the highest population growth rate in the Vietnam country, due to attracting many immigrants from other regions. The Southeast is the most developed economic region in Vietnam, leading the country in terms of exports, foreign direct investment, GDP, as well as many other socio-economic factors, contributing more than two-thirds of annual budget revenue, with an urbanization rate of 62.8%.

The industry-construction sector grows rapidly, accounting for the largest proportion of the region's GDP, the production structure was balanced including heavy industry, light industry and food processing. A number of industries are forming and developing such as petroleum, electronics, and high technology.

The Southeast is an important agricultural growing area of the country, such as peanuts, beans. Tay Ninh is the province with the largest area of sugarcane, pasta, and peanuts which is the strength of the region. The livestock and poultry industry are focused, the fishing industry on fishing grounds brings great economic benefits.

Foreign direct investment of this region leads the country in highlights in the provinces are Dong Nai, Binh Duong and Ho Chi Minh City [21].

(4.3) The Middle Vietnam: Binh Dinh province, Kon Tum province, Quang Ngai province, Quang Nam province, Da Nang city, Thua Thien Hue province, Quang Tri province, Quang Binh province, Ha Tinh province, Nhe An province

The Middle region has many hills and mountains spreading to the sea, dividing the narrow plains. The climate and most of the land are generally harsher than the other two regions. The Middle Region is now divided into 3 smaller regions which are the North Middle Coast, the South Middle Coast and the Middle Highlands with the central city of Da Nang.

Economy of Middle region with a concentration of five key economic provinces that has many advantages of strategic location including human resources, seventeen seaports, fifteen economic zones, twenty industrial parks, two export processing zones, eight airports, two trans-Vietnam highways, East-West economic corridor. The deep-water seaports of Vung Ang - Son Duong in Ha Tinh province, Chan May in Thua Thien Hue province, Tien Sa in Da Nang City, Ky Ha in Quang Nam province and Dung Quat in Quang Ngai province. Industrial parks and export processing are in the absence of domestic and foreign enterprises that attach importance and interest in investment.

The key economic regions of the Middle region include five city - provinces which are Da Nang city, Thua Thien Hue province, Quang Nam province, Quang Ngai province, Binh Dinh province with a total area of about 27,884 km^2. These economic areas not only play the role of driving force for socio-economic development of the Central and Central Highlands regions, but also play an important role in the socio-economic development strategy of the whole country in terms of geography, economy, politics, culture and national security. As the frontage of the Mekong sub-region where can have trade with countries such as Laos, Cambodia, Thailand, Myanmar and further south Asian countries and southwestern China [22].

(4.4) The Northeast Vietnam: Hung Yen province, Hai Phong city, Ha Noi capital, Bac Ninh province, Bac Giang province, Phu Tho province, Vinh Phuc province, Thai Nguyen province, Yen Bai province, Tuyen Quang province

The North consists of three sub-regions are the North West, the North East and the Red River Delta. Sometimes the two sub-regions of the Northwest and the Northeast are combined into the Northern Midlands and Mountains. The North is located in the northernmost region of Vietnam's territory, bordering China to the north, Laos to the west, and the East Sea to the east. The East-West width is 600 km which is the widest compared to the Central and Southern regions.

It is a place with very favourable geographical position and natural conditions. Natural resources are abundant and diverse, densely populated, and people's ground is high. A place with a long tradition of intensive wet rice cultivation, industrial centre and developed urban systems. The North is a region with a long coastline, a large and important gateway to trade with neighbour areas and the world through Hai Phong seaport. Natural resources including quarries in Hai Phong City, Ha Nam and Ninh Binh provinces.

However, the North is still an area that lacks raw materials for developing industries and always has to import from other regions. A large number of resources are being degraded due to over-exploitation. Due to its location in the tropical and monsoon climate zone, the region's economy in general is also affected by risks caused by natural disasters [23].

(5) DATA SOURCE

Data is time series data in 2005 and from 2007 to 2020 is from General statistics department of Vietnam.

(6) STUDY RESULTS

(6.1) Cronbach's Alpha analysis

TABLE 2: Cronbach's Alpha Result

No.	Cities / Provinces	Reliability Statistics before item deleted			Reliability Statistics after item deleted		
		Cronbach 's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items	Cronbach 's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
1	LAN	.511	.829	9	-12.955	.	2
2	TGG	.587	.778	9	.632	.987	6
3	DTP	.171	.255	8	.360	.874	5
4	BTE	.318	.752	8	.347	.928	5
5	CTO	.272	.761	9	.271	.967	4
6	HCM	.624	-.356	10	.704	.989	5
7	BRVT	.470	-.082	10	.539	.916	5
8	DNI	.623	.329	10	.712	.983	5
9	BDG	.838	.660	10	.906	.984	6
10	TNH	.701	.679	9	.775	.994	4
11	BPC	.530	.565	9	.574	.988	6
12	BDH	.569	.811	9	.696	.929	3
13	KTM	.624	.308	10	.731	.994	5
14	QNI	.568	.743	9	.659	.565	4
15	QNM	.673	.784	9	.677	.976	5
16	DNG	.641	.442	10	.725	.956	5
17	TTH	.538	.487	9	.756	.971	5
18	QTI	.392	.773	9	.075	.861	3
19	QBH	.585	.651	9	.720	.994	5
20	HTH	.518	.477	9	.563	.973	6
21	NAN	.478	.740	9	.513	.987	6
22	HYN	.736	.834	10	.831	.983	5
23	HPG	.408	.725	10	.480	.974	6
24	HNI	.750	.538	10	.698	.929	6
25	BNH	.859	.847	10	.967	.987	5
26	BGG	.716	.838	9	.728	.982	6
27	PTO	.741	.820	9	.773	.978	7
28	VPC	.526	.200	9	.631	.884	4
29	TNN	.756	.582	9	.845	.993	5
30	YBI	.769	.842	9	.853	.993	5
31	TQG	.599	.854	9	.323	.985	4

Source: study result by author

Table 2 shows result of Cronbach's Alpha before deleted items are LAN = .511, TGG = .587, DTP = .171, BTE = .318, CTO = .272, HCM = .624, BRVT = .470, DNI = .623, BDG = .838, TNH = .701, BPC = .530, BDH = .569, KTM = .624, QNI = .568, QNM = .673, DNG = .641, TTH = .538, QTI = .392, QBH = .585, HTH = .518, NAN = .478, HYN = .736, HPG = .408, HNI = .750, BNH = .859, BGG = .716, PTO = .741, VPC = .526, TNN = .756, YBI = .769, TQG = .599. They are almost between .511 and .859 except DTP = .171, BTE = .318, CTO = .272, BRVT = .470, QTI = .392, NAN = .478 and HPG = .408. However, all coefficients Cronbach's Alpha of thirty-one City-provinces are in [0,1].

Cronbach's Alpha after deleted items are LAN = -12.955, TGG = .632, DTP = .360, BTE = .347, CTO = .271, HCM = .704, BRVT = .539, DNI = .712, BDG = .906, TNH = .775, BPC = .574, BDH = .696, KTM = .731, QNI = .659, QNM = .677, DNG = .725, TTH = .756, QTI = .075, QBH = .720, HTH = .563, NAN = .513, HYN = .831, HPG = .480, HNI = .698, BNH = .967, BGG = .728. Except LAN = -12.955, all of others are in [0,1]. Especially there are HCM = .704, DNI = .712, TNH = .775, KTM = .731, DNG = .725, TTH = .756, QBH = .720, BGG = .728, and HYN = .831, BDG = .906, BNH = .967. According to Lee J. Cronbach (1951) that is to mean Cronbach's Alpha after deleted items are quite qualified except "LAN = -12.955" which will be deleted before doing analysis of Pearson Correlation

TABLE 3: Item-Total Statistics of choosing items

Independent variables	Corrected Item-Total Correlation Before/After		Cronbach's Alpha if Items Deleted Before/After		Independent variables	Corrected Item-Total Correlation Before/After		Cronbach's Alpha if Items Deleted Before/After		Independent variables	Corrected Item-Total Correlation Before/After		Cronbach's Alpha if Items Deleted Before/After	
LAN_6	.860	-1.000	.256	.	BPC_{10}	.977	.976	.519	.578	HYN_{10}	.991	.991	.676	.804
LAN_{10}	.904	-1.000	.461	.	BDH_1	.858	.899	.241	.272	HPG_1	.877	.909	.173	.187
TGG_1	.942	.927	.627	.549	BDH_2	.879	.922	.168	.129	HPG_2	.871	.913	.542	.509
TGG_2	.942	.939	.353	.636	BDH_8	.948	.755	.522	.874	HPG_7	.938	.942	.368	.456
TGG_7	.927	.946	.494	.700	KTM_1	.934	.955	.430	.545	HPG_8	.822	.835	.386	.475
TGG_8	.939	.940	.575	.398	KTM_2	.975	.985	.610	.783	HPG_9	.875	.888	.406	.492
TGG_9	.908	.910	.594	.656	KTM_7	.974	.983	.474	.615	HPG_{10}	.881	.887	.390	.479
TGG_{10}	.935	.935	.557	.616	KTM_8	.955	.972	.588	.733	HNI_1	.915	.970	.724	.630
DTP_1	.799	.958	-1.565[a]	.461	KTM_{10}	.981	.988	.616	.763	HNI_2	.941	.985	.741	.429
DTP_2	.896	.921	-.123[a]	.122	QNI_1	.973	.987	.575	.091	HNI_3	.993	.418	.606	.727
DTP_5	.356	.326	.169	.380	QNI_2	.987	.993	.106	.124	HNI_8	.896	.978	.653	.631
DTP_8	.851	.820	.105	.326	QNI_3	.994	-.253	.146	.742	HNI_9	.986	.741	.706	.725
DTP_9	.809	.840	.156	.367	QNI_8	.976	.647	.567	.713	HNI_{10}	.727	.876	.759	.668
BTE_1	.988	.987	.566	.653	QNM_2	.823	.930	.572	.830	BNH_1	.865	.914	.822	.966
BTE_2	.992	.992	.131	.150	QNM_7	.929	.969	.628	.623	BNH_2	.977	.981	.798	.947
BTE_7	.860	.860	.289	.331	QNM_8	.893	.938	.591	.554	BNH_7	.980	.978	.798	.949
BTE_8	.687	.685	.319	.365	QNM_9	.790	.859	.590	.543	BNH_8	.925	.943	.830	.980
BTE_9	.818	.822	.275	.313	QNM_{10}	.898	.921	.679	.715	BNH_{10}	.977	.976	.799	.949
CTO_1	.813	.898	.601	.597	DNG_1	.510	.509	.559	.668	BGG_1	.839	.861	.690	.667
CTO_7	.929	.910	.240	.254	DNG_2	.747	.752	.617	.735	BGG_2	.946	.927	.521	.497
CTO_8	.881	.879	.130	.096	DNG_7	.969	.969	.556	.663	BGG_3	.909	.912	.726	.758
CTO_{10}	.858	.861	.260	.282	DNG_8	.969	.969	.563	.671	BGG_7	.962	.950	.627	.634
HCM_1	.946	.946	.675	.806	DNG_{10}	.971	.971	.577	.688	BGG_9	.873	.869	.705	.731
HCM_2	.989	.989	.396	.475	TTH_1	.796	.822	.155	.573	BGG_{10}	.969	.958	.703	.729
HCM_{10}	.944	.944	.593	.705	TTH_2	.793	.878	.151	.604	PTO_1	.924	.922	.589	.630
HCM_7	.935	.935	.556	.662	TTH_7	.973	.974	.494	.765	PTO_2	.910	.913	.623	.663
HCM_8	.912	.911	.580	.691	TTH_8	.864	.838	.349	.669	PTO_3	.854	.857	.753	.795
$BRVT_1$	.816	.847	.708	.850	TTH_{10}	.934	.961	.530	.793	PTO_7	.974	.974	.647	.686
$BRVT_2$	.390	.381	.433	.524	QTI_1	.824	.697	-.219[a]	.072	PTO_8	.891	.889	.711	.752
$BRVT_7$	.870	.876	.353	.437	QTI_3	.760	.701	.397	.097	PTO_9	.849	.851	.752	.795
$BRVT_8$	.892	.901	.338	.419	QTI_{10}	.846	.690	.379	.003	PTO_{10}	.979	.979	.722	.764
$BRVT_{10}$	.882	.889	.413	.504	QBH_1	.989	.989	.248	.562	VPC_1	.688	.796	.315	.303
DNI_1	.990	.990	.609	.736	QBH_2	.990	.996	.183	.399	VPC_2	.877	.854	.077	.146
DNI_2	.983	.986	.385	.472	QBH_7	.989	.994	.538	.714	VPC_3	.684	.607	.534	.710
DNI_7	.989	.992	.537	.653	QBH_8	.921	.931	.522	.698	VPC_8	.737	.701	.480	.644
DNI_8	.779	.803	.578	.702	QBH_{10}	.979	.988	.587	.761	TNN_1	.983	.982	.590	.701
DNI_{10}	.989	.992	.614	.741	HTH_1	.968	.969	.311	.384	TNN_2	.982	.981	.667	.792
BDG_1	.986	.986	.784	.874	HTH_2	.983	.984	.141	.178	TNN_7	.962	.964	.684	.805
BDG_2	.994	.994	.759	.846	HTH_3	.711	.710	.526	.586	TNN_8	.980	.981	.701	.825

Independent variables	Corrected Item-Total Correlation Before/After		Cronbach's Alpha if Items Deleted Before/After		Independent variables	Corrected Item-Total Correlation Before/After		Cronbach's Alpha if Items Deleted Before/After		Independent variables	Corrected Item-Total Correlation Before/After		Cronbach's Alpha if Items Deleted Before/After	
BDG_7	.998	.997	.777	.865	HTH_7	.953	.953	.496	.555	TNN_{10}	.967	.968	.743	.873
BDG_8	.972	.973	.764	.851	HTH_8	.876	.876	.490	.548	YBI_1	.964	.966	.684	.795
BDG_9	.757	.761	.848	.944	HTH_{10}	.956	.956	.521	.581	YBI_2	.986	.985	.618	.719
BDG_{10}	.998	.998	.818	.911	NAN_1	.990	.989	.548	.610	YBI_7	.985	.985	.652	.759
TNH_1	.944	.969	.495	.459	NAN_2	.980	.980	.225	.251	YBI_8	.944	.945	.746	.868
TNH_2	.979	.967	.479	.463	NAN_3	.852	.852	.486	.534	YBI_{10}	.990	.989	.760	.886
TNH_7	.991	.988	.646	.768	NAN_7	.983	.984	.398	.439	TQG_2	.877	.936	.327	.725
TNH_{10}	.990	.987	.696	.847	NAN_8	.971	.970	.456	.502	TQG_7	.923	.939	.547	.140
BPC_1	.987	.989	.771	.862	NAN_{10}	.985	.986	.481	.529	TQG_8	.954	.912	.587	.296
BPC_2	.993	.993	.404	.454	HYN_1	.966	.970	.565	.675	TQG_{10}	.930	.948	.598	.327
BPC_7	.973	.972	.400	.451	HYN_2	.984	.985	.653	.773					
BPC_8	.992	.993	.454	.508	HYN_7	.992	.991	.678	.806					
BPC_9	.857	.858	.533	.593	HYN_8	.845	.846	.716	.854					

Source: Source: study result by author

Table 3 shows Item-Total Statistics of choosing independent variables that have Coefficients of Corrected Item-Total Correlation > Cronbach's Alpha Based on Standardized Items in Table 2 in both before and after items have been deleted, respectively and separately.

Coefficients of Corrected Item-Total Correlation Before items deleted are on the left in the second column from the left, Coefficients are between .356 and .993, they are in [8,9]

Coefficients of Corrected Item-Total Correlation After items deleted are on the right in the second column from the left. Except LAN6 and LAN10 = -1.000 and QNI3 = -.253, they are all between .381 and .996, they are almost in [8,9]

Comparing in Cronbach's Alpha Based on Standardized Items in Table 2 that Coefficients of Corrected Item-Total Correlation Before and After items deleted are > Coefficients Cronbach's Alpha Based on Standardized Items.

Some representatives for instance, Cronbach's Alpha Based on Standardized Items before/after items have been deleted of TGG = .778/.987, HNI = .538/ .929, YBI = .842 / .993

Corrected Item-Total Correlation Before/After items have been deleted TGG1 = .942/.927, TGG2 = .942/.939, TGG7 = .927/.946, TGG8 = .939/.940, TGG9 = .908/.910, TGG10 = .935/.935. HNI1 = .915/.970, HNI2 = .941/.985, HNI3 = .993/ .418, HNI8 =. .896/.978, HNI9 = .986/.741, HNI10 = .727/.876. YBI1 = .964/.966, YBI2 = .986/.985, YBI7 = .985/.985, YBI8 = .944/.945, YBI10 = .990/.989

According to Nunnally, J. (1978) that variables have Corrected item -Total correction >= 0.3 is to mean they are qualified; Table 2 presents all independent variables which all have Corrected item -Total correction are between .356 and .993 before and between .381 and .996 after items have been deleted. Comparing in Cronbach's Alpha Based on Standardized Items in Table 2. So, there are 132 independents variable which be presented in Table 4 that have Corrected Item-Total Correlation < Cronbach's Alpha Based on Standardized Items present in Table 2, respectively and separately.

TABLE 4: Total Statistics of deleting items

Independent variables	Corrected Item-Total Correlation	Cronbach's Alpha if Items Deleted	Independent variables	Corrected Item-Total Correlation	Cronbach's Alpha if Items Deleted	Independent variables	Corrected Item-Total Correlation	Cronbach's Alpha if Items Deleted
LAN_1	.729	.643	BPC_3	-.714	.539	NAN_4	.034	.486
LAN_2	.673	.462	BPC_4	-.505	.541	NAN_5	-.128	.486
LAN_3	.483	.519	BPC_5	-.575	.543	NAN_9	-.911	.488
LAN_4	.098	.519	BDH_3	.005	.578	HYN_3	.812	.745
LAN_5	-.618	.522	BDH_4	-.190	.578	HYN_4	-.337	.746
LAN_8	.619	.492	BDH_5	.454	.577	HYN_5	-.494	.747
LAN_9	.778	.517	BDH_7	.625	.576	HYN_6	.330	.745
TGG_3	.462	.596	HCM_9	-.806	.633	HYN_9	.832	.743
TGG_4	-.408	.599	BDH_9	.720	.574	HPG_3	-.012	.413
TGG_5	-.596	.600	BDH_{10}	.367	.577	HPG_4	-.510	.414
DTP_4	-.225	.176	KTM_3	-.748	.633	HPG_5	-.503	.414
DTP_7	-.789	.300	KTM_4	-.312	.637	HPG_6	-.287	.414
DTP_{10}	-.774	.215	KTM_5	-.432	.635	HNI_4	.424	.760
BTE_4	-.025	.325	KTM_6	-.175	.634	HNI_5	-.812	.760
BTE_5	-.226	.327	KTM_9	-.674	.646	HNI_6	-.680	.760
BTE_{10}	.363	.321	QNI_4	-.253	.577	HNI_7	-.459	.760
CTO_2	.267	.250	QNI_5	-.223	.578	BNH_3	.838	.869
CTO_3	-.542	.277	QNI_7	-.176	.578	BNH_4	.464	.866
CTO_4	.227	.276	QNI_9	.649	.556	BNH_5	-.755	.870
CTO_5	.173	.276	QNI_{10}	.578	.576	BNH_6	.600	.865
CTO_9	.654	.262	QNM_1	.494	.613	BNH_9	.139	.869
HCM_3	-.710	.631	QNM_3	.315	.683	BGG_4	-.237	.727
HCM_4	-.650	.632	QNM_4	-.211	.684	BGG_5	-.431	.728
HCM_5	-.418	.632	QNM_5	-.452	.686	BGG_8	.719	.692
HCM_6	-.491	.632	DNG_3	-.640	.650	PTO_4	-.505	.755
$BRVT_3$	-.695	.476	DNG_4	-.215	.651	PTO_5	-.400	.756
$BRVT_4$	-.443	.479	DNG_5	-.164	.650	VPC_4	-.171	.534
$BRVT_5$	-.544	.478	DNG_6	-.124	.650	VPC_5	-.454	.537
$BRVT_6$	-.224	.477	DNG_9	-.752	.650	VPC_7	.039	.534
$BRVT_9$	-.666	.481	TTH_3	-.058	.546	VPC_9	-.150	.534
DNI_3	-.801	.631	TTH_4	-.381	.550	VPC_{10}	.056	.532
DNI_4	-.308	.631	TTH_5	-.376	.548	TNN_3	.543	.767
DNI_5	-.765	.631	TTH_9	-.814	.687	TNN_4	-.476	.769
DNI_6	.001	.630	QTI_2	.696	-.235[a]	TNN_5	-.459	.769
DNI_9	-.782	.637	QTI_4	.257	.396	TNN_9	-.624	.770
BDG_3	-.692	.849	QTI_5	.120	.396	YBI_3	.293	.781
BDG_4	-.110	.849	QTI_9	-.737	.589	YBI_4	-.481	.783
BDG_5	-.491	.849	QBH_3	.355	.594	YBI_5	.157	.780
BDG_6	.075	.848	QBH_4	-.120	.595	YBI_9	.806	.779
TNH_3	.345	.712	QBH_5	-.116	.596	TQG_1	.841	.282
TNH_4	-.054	.712	QBH_9	-.794	.657	TQG_3	.689	.608
TNH_5	-.671	.714	HTH_4	-.401	.528	TQG_4	-.582	.610
TNH_8	.663	.662	HTH_5	-.883	.531	TQG_5	.271	.606
TNH_9	.168	.712	HTH_9	-.830	.530	TQG_9	.754	.608

Source: study result by author

Table 4 shows Item-Total Statistics of deleting independents variables that have Coefficients of Corrected Item-Total Correlation < Cronbach's Alpha Based on Standardized Items in Table 2 at column 4 from the left "before items have been deleted", respectively and separately.

(6.2) Pearson Correlation

TABLE 5: Result of Pearson correlation analysis

		BTE_1	BTE_2	BTE_3	BTE_8	BTE_9
BTE_1	Pearson Correlation	1	.993**	.859**	.697**	.821**
	Sig. (2-tailed)		.000	.000	.004	.000
	N	15	15	15	15	15
BTE_2	Pearson Correlation	.993**	1	.840**	.721**	.802**
	Sig. (2-tailed)	.000		.000	.002	.000
	N	15	15	15	15	15
BTE_3	Pearson Correlation	.859**	.840**	1	.261	.837**
	Sig. (2-tailed)	.000	.000		.346	.000
	N	15	15	15	15	15
BTE_8	Pearson Correlation	.697**	.721**	.261	1	.379
	Sig. (2-tailed)	.004	.002	.346		.164
	N	15	15	15	15	15
BTE_9	Pearson Correlation	.821**	.802**	.837**	.379	1
	Sig. (2-tailed)	.000	.000	.000	.164	
	N	15	15	15	15	15

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

		VPC_1	VPC_2	VPC_3	VPC_8
VPC_1	Pearson Correlation	1	.835**	.545*	.566*
	Sig. (2-tailed)		.000	.044	.028
	N	15	15	14	15
VPC_2	Pearson Correlation	.835**	1	.613*	.853**
	Sig. (2-tailed)	.000		.020	.000
	N	15	15	14	15
VPC_3	Pearson Correlation	.545*	.613*	1	.560*
	Sig. (2-tailed)	.044	.020		.037
	N	14	14	14	14
VPC_8	Pearson Correlation	.566*	.853**	.560*	1
	Sig. (2-tailed)	.028	.000	.037	
	N	15	15	14	15

** Correlation is significant at the 0.01 level (2-tailed). * 0.05 level (2-tailed).

		QBH1	QBH2	QBH7	QBH8	QBH10
QBH1	Pearson Correlation	1	.993**	.987**	.918**	.979**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	15	15	15	15	15
QBH2	Pearson Correlation	.993**	1	.995**	.942**	.989**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	15	15	15	15	15
QBH7	Pearson Correlation	.987**	.995**	1	.960**	.997**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	15	15	15	15	15
QBH8	Pearson Correlation	.918**	.942**	.960**	1	.960**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	15	15	15	15	15
QBH10	Pearson Correlation	.979**	.989**	.997**	.960**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	15	15	15	15	15

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

		YBI1	YBI2	YBI7	YBI8	YBI10
YBI1	Pearson Correlation	1	.967**	.962**	.911**	.962**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	15	15	15	15	15
YBI2	Pearson Correlation	.967**	1	.988**	.949**	.988**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	15	15	15	15	15
YBI7	Pearson Correlation	.962**	.988**	1	.964**	1.000**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	15	15	15	15	15
YBI8	Pearson Correlation	.911**	.949**	.964**	1	.964**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	15	15	15	15	15
YBI10	Pearson Correlation	.962**	.988**	1.000**	.964**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	15	15	15	15	15

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

Table 5 shows Pearson correlation result of separated City-Province for BTE, QBH, VPC and YBI that Statistical significance of QBH, VPH and YBI are all < 0.05 is to mean the input data and the model was built has statistical significance. However, BTE has Statistical significance of BTE_8 and BTE_3 = .346, and BTE_8 and BTE_9 = .164 > 0.05 is to mean the input data and the model was built seems do not have statistical significance

TABLE 6: Result of Pearson correlation analysis for thirty-one City-Province by calculating average each one

	TGG	DTP	BTE	CTO	HCM	BRVT	DNI	BDG	TNH	BPC	BDH	KTM	QNI	QNM	DNG	TTH	QTI	QBH	HTH	NAN	HYN	HPG	HNI	BNH	PTO	VPC	TNN	YBI	TQG
TGG_Pearson Correlation	1	.882**	.941**	.885**	.977**	.969**	.930**	.922**	.942**	.940**	.953**	.931**	.949**	.929**	.951**	.952**	.681**	.919**	.964**	.927**	.905**	.860**	.904**	.937**	.923**	.852**	.945**	.959**	.834**
Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
DTP_Pearson Correlation	.882**	1	.957**	.892**	.938**	.892**	.969**	.966**	.972**	.965**	.941**	.951**	.963**	.950**	.943**	.964**	.883**	.970**	.928**	.969**	.965**	.948**	.982**	.972**	.955**	.840**	.971**	.950**	.952**
Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
BTE_Pearson Correlation	.941**	.957**	1	.925**	.972**	.919**	.977**	.985**	.993**	.996**	.991**	.985**	.992**	.986**	.969**	.993**	.784**	.989**	.977**	.987**	.988**	.969**	.984**	.995**	.971**	.828**	.994**	.992**	.948**
Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
CTO_Pearson Correlation	.885**	.892**	.925**	1	.915**	.891**	.958**	.942**	.903**	.911**	.919**	.888**	.945**	.857**	.962**	.936**	.816**	.939**	.869**	.913**	.889**	.835**	.927**	.906**	.855**	.932**	.932**	.929**	.845**
Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
HCM Pearson Correlation	.977**	.938**	.972**	.915**	1	.982**	.956**	.949**	.970**	.970**	.984**	.949**	.985**	.963**	.969**	.988**	.786**	.954**	.967**	.952**	.947**	.916**	.945**	.971**	.947**	.844**	.973**	.976**	.916**
Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
BRVT Pearson Correlation	.969**	.892**	.919**	.891**	.982**	1	.913**	.898**	.925**	.921**	.943**	.892**	.947**	.907**	.935**	.951**	.772**	.897**	.910**	.892**	.884**	.846**	.889**	.919**	.903**	.851**	.925**	.936**	.862**
Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
DNI Pearson Correlation	.930**	.969**	.977**	.958**	.956**	.913**	1	.992**	.977**	.976**	.963**	.966**	.983**	.944**	.983**	.980**	.833**	.991**	.985**	.982**	.964**	.926**	.993**	.975**	.948**	.912**	.988**	.979**	.914**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
BDG Pearson Correlation	.922**	.966**	.985**	.942**	.949**	.898**	.992**	1	.985**	.985**	.970**	.981**	.982**	.958**	.971**	.979**	.798**	.998**	.970**	.993**	.983**	.953**	.996**	.984**	.969**	.885**	.993**	.987**	.929**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
TNH Pearson Correlation	.942**	.972**	.993**	.903**	.970**	.925**	.977**	.985**	1	.998**	.983**	.988**	.987**	.988**	.961**	.989**	.794**	.987**	.979**	.989**	.990**	.973**	.988**	.996**	.988**	.834**	.995**	.990**	.949**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
BPC Pearson Correlation	.940**	.965**	.996**	.911**	.970**	.921**	.976**	.985**	.998**	1	.989**	.989**	.989**	.990**	.960**	.990**	.781**	.988**	.974**	.987**	.991**	.974**	.986**	.998**	.981**	.819**	.995**	.992**	.955**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15

	TGG	DTP	BTE	CTO	HCM	BRVT	DNI	BDG	TNH	BPC	BDH	KTM	QNI	QNM	DNG	TTH	QTI	QBH	HTH	NAN	HYN	HPG	HNI	BNH	PTO	VPC	TNN	YBI	TQG
BDH Pearson Correlation	.953**	.941**	.991**	.919**	.984**	.943**	.963**	.970**	.983**	.989**	1	.976**	.993**	.981**	.960**	.991**	.756**	.976**	.970**	.972**	.979**	.959**	.966**	.989**	.962**	.811**	.987**	.992**	.948**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
KTM Pearson Correlation	.931**	.951**	.985**	.888**	.949**	.892**	.966**	.981**	.988**	.989**	.976**	1	.969**	.977**	.940**	.973**	.728**	.982**	.967**	.988**	.991**	.974**	.978**	.991**	.985**	.807**	.986**	.989**	.937**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
QNI Pearson Correlation	.949**	.963**	.992**	.945**	.985**	.947**	.983**	.982**	.987**	.989**	.993**	.969**	1	.974**	.979**	.996**	.817**	.987**	.976**	.978**	.976**	.949**	.981**	.989**	.958**	.859**	.993**	.990**	.947**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
QNM Pearson Correlation	.929**	.950**	.986**	.857**	.963**	.907**	.944**	.958**	.988**	.990**	.981**	.977**	.974**	1	.934**	.977**	.753**	.966**	.959**	.971**	.984**	.979**	.963**	.990**	.975**	.749**	.979**	.974**	.957**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
DNG Pearson Correlation	.951**	.943**	.969**	.962**	.969**	.935**	.983**	.971**	.961**	.960**	.960**	.940**	.979**	.934**	1	.976**	.816**	.970**	.980**	.968**	.939**	.892**	.967**	.959**	.927**	.924**	.977**	.969**	.875**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
TTH Pearson Correlation	.952**	.964**	.993**	.936**	.988**	.951**	.980**	.979**	.989**	.990**	.991**	.973**	.996**	.977**	.976**	1	.823**	.983**	.977**	.977**	.977**	.953**	.978**	.991**	.967**	.852**	.991**	.989**	.948**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
QTI Pearson Correlation	.681**	.883**	.784**	.816**	.786**	.772**	.833**	.798**	.794**	.781**	.756**	.728**	.817**	.753**	.816**	.823**	1	.806**	.554	.780**	.770**	.752**	.807**	.787**	.750**	.765**	.795**	.754**	.819**
Sig. (2-tailed)	.005	.000	.001	.000	.001	.001	.000	.000	.000	.001	.001	.002	.000	.001	.000	.000		.000	.062	.001	.001	.001	.000	.001	.001	.001	.000	.001	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
QBH Pearson Correlation	.919**	.970**	.989**	.939**	.954**	.897**	.991**	.998**	.987**	.988**	.976**	.982**	.987**	.966**	.970**	.983**	.806**	1	.967**	.993**	.988**	.962**	.997**	.989**	.968**	.867**	.995**	.987**	.942**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
HTH Pearson Correlation	.964**	.928**	.977**	.869**	.967**	.910**	.985**	.970**	.979**	.974**	.970**	.967**	.976**	.959**	.980**	.977**	.554	.967**	1	.972**	.950**	.911**	.966**	.972**	.974**	.817**	.985**	.986**	.846**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.062	.000		.000	.000	.000	.000	.000	.000	.001	.000	.000	.001
N	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
NAN Pearson Correlation	.927**	.969**	.987**	.913**	.952**	.892**	.982**	.993**	.989**	.987**	.972**	.988**	.978**	.971**	.968**	.977**	.780**	.993**	.972**	1	.989**	.964**	.993**	.989**	.978**	.859**	.994**	.986**	.926**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
HYN Pearson Correlation	.905**	.965**	.988**	.889**	.947**	.884**	.964**	.983**	.990**	.991**	.979**	.991**	.976**	.984**	.939**	.977**	.770**	.988**	.950**	.989**	1	.991**	.986**	.995**	.984**	.794**	.988**	.984**	.965**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000		.000	.000	.000	.000	.001	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
HPG Pearson Correlation	.860**	.948**	.969**	.835**	.916**	.846**	.926**	.953**	.973**	.974**	.959**	.974**	.949**	.979**	.892**	.953**	.752**	.962**	.911**	.964**	.991**	1	.962**	.978**	.975**	.719**	.962**	.956**	.974**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000		.000	.000	.000	.004	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15

	TGG	DTP	BTE	CTO	HCM	BRVT	DNI	BDG	TNH	BPC	BDH	KTM	QNI	QNM	DNG	TTH	QTI	QBH	HTH	NAN	HYN	HPG	HNI	BNH	PTO	VPC	TNN	YBI	TQG
NHI Pearson Correlation	.904**	.982**	.984**	.927**	.945**	.889**	.993**	.996**	.988**	.986**	.966**	.978**	.981**	.963**	.967**	.978**	.807**	.997**	.966**	.993**	.986**	.962**	1	.988**	.974**	.867**	.994**	.980**	.943**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	12	14	14	14	14	14	14	14	14	14	14
BNH Pearson Correlation	.937**	.972**	.995**	.906**	.971**	.919**	.975**	.984**	.996**	.998**	.989**	.991**	.989**	.990**	.959**	.991**	.787**	.989**	.972**	.989**	.995**	.978**	.988**	1	.983**	.816**	.995**	.992**	.961**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
PTO Pearson Correlation	.923**	.955**	.971**	.855**	.947**	.903**	.948**	.969**	.988**	.981**	.962**	.985**	.958**	.975**	.927**	.967**	.750**	.968**	.974**	.978**	.984**	.975**	.974**	.983**	1	.813**	.975**	.977**	.937**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
VPC Pearson Correlation	.852**	.840**	.828**	.932**	.844**	.851**	.912**	.885**	.834**	.819**	.811**	.807**	.859**	.749**	.924**	.852**	.765**	.867**	.817**	.859**	.794**	.719**	.867**	.816**	.813**	1	.862**	.857**	.697**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.002	.000	.000	.001	.000	.001	.000	.001	.004	.000	.000	.000		.000	.000	.006
N	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	12	14	14	14	14	14	14	14	14	14	14
TNN Pearson Correlation	.945**	.971**	.994**	.932**	.973**	.925**	.988**	.993**	.995**	.995**	.987**	.986**	.993**	.979**	.977**	.991**	.795**	.995**	.985**	.994**	.988**	.962**	.994**	.995**	.975**	.862**	1	.994**	.941**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
YBI Pearson Correlation	.959**	.950**	.992**	.929**	.976**	.936**	.979**	.987**	.990**	.992**	.992**	.989**	.990**	.974**	.969**	.989**	.754**	.987**	.986**	.986**	.984**	.956**	.980**	.992**	.977**	.857**	.994**	1	.931**
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
TQG Pearson Correlation	.834**	.952**	.948**	.845**	.916**	.862**	.914**	.929**	.949**	.955**	.948**	.937**	.947**	.957**	.875**	.948**	.819**	.942**	.846**	.926**	.965**	.974**	.943**	.961**	.937**	.697**	.941**	.931**	1
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.000	.006	.000	.000	
N	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	15	15	15	14	15	15	14	15	15	15
** Correlation is significant at the 0.01 level (2-tailed).																													

Source: study result by author

Table 6 shows Pearson correlation result of thirty-one independent variables representing thirty-one City-provinces by calculating an average value of 155 independent variables after removed 132 independent variables in Table 4 which have Corrected Item-Total Correlation < Cronbach's Alpha Based on Standardized Items in Table 2 at column 4 from the left "before items have been deleted", respectively and separately.

Statistical significance of these thirty independent variables is all = .000 < 0.05 is to mean the input data and the model was built has statistical significance. There is only Pearson Correlation of variable QTI and HTH has Statistical significance = .062 > 0.05 which seem to mean the input data and the model was built that do not reach the expected level of statistical significance

Pearson Correlation of all thirty-one independent variables are > 0. In other words, Correlation is significant at the 0.01 level (2-tailed), which is to mean that one specific variable has the positive direction correlation with other variables.

(6.3) Multinomial Logistics Regression analysis results.

TABLE 7: Models fitting information

			Model Fitting Criteria			Likelihood Ratio Tests		
		Model	**AIC**	**BIC**	**-2 Log Likelihood**	**Chi-Square**	**df**	**Sig.**
No.	Cities / Provinces	Intercept Only	36.556	37.972	32.556			
1	TGG	Final	40.017	48.514	16.017	16.538	10	.085
2	DTP	Final	47.351	55.848	23.351	9.204	10	.513
3	BTE	Final	35.440	43.937	11.440	21.116	10	.020
4	CTO	Final	43.306	50.387	23.306	9.250	8	.322
5	HCM	Final	43.155	51.652	19.155	13.401	10	.202
6	BRVT	Final	50.233	58.730	26.233	6.322	10	.787
7	DNI	Final	45.465	53.961	21.465	11.091	10	.350
8	BDG	Final	41.690	48.770	21.690	10.866	8	.209
9	TNH	Final	50.907	57.988	30.907	1.649	8	.990
10	BPC	Final	40.874	50.787	12.874	19.682	12	.073
11	BDH	Final	40.734	46.399	24.734	7.821	6	.251
12	KTM	Final	44.268	52.764	20.268	12.288	10	.266
13	QNI	Final	37.428	44.508	17.428	15.128	8	.057
14	QNM	Final	26.834	33.914	6.834	25.722	8	.001
15	DNG	Final	47.694	54.774	27.694	4.862	8	.772
16	TTH	Final	45.452	53.948	21.452	11.104	10	.349
17	QTI	Final	45.682	51.346	29.682	2.874	6	.825
18	QBH	Final	25.172	33.669	1.172	31.383	10	.001
19	HTH	Final	40.975	47.763	12.975	12.887	12	.377
20	NAN	Final	50.906	59.403	26.906	5.649	10	.844
21	HYN	Final	52.556	61.052	28.556	4.000	10	.947
22	HPG	Final	50.874	59.370	26.874	5.682	10	.841
23	HNI	Final	32.824	41.771	4.824	25.388	12	.013
24	BNH	Final	44.309	51.389	24.309	8.247	8	.410
25	BGG	Final	51.785	61.697	23.785	8.771	12	.722
26	PTO	Final	50.449	58.945	26.449	6.107	10	.806
27	VPC	Final	20.000	26.391	.000	30.212	8	.000
28	TNG	Final	50.326	58.823	26.326	6.230	10	.796
29	YBI	Final	29.093	36.174	9.093	23.462	8	.003
30	TQG	Final	42.676	48.340	26.676	5.880	6	.437

Source: study result by author

Table 7 gives results of model fitting of Multinomial logistics regression (MLR). The results are thirty MLR models for thirty Cities-provinces, respectively, separately. It does not include LAN province because their two independent variables LAN6 and LAN10 which have coefficients Corrected Item-Total Correlation After item deleted are -1.000 which are presented in Table 3.

Model fitting information has likelihood Ratio Chi-square tests, comparing the full model contains all the predictors (independents variables) against a null or intercept only model or no predictors. In this result, the model has statistical significance indicates that the full models represent significant improvements in fit over the null model, they are below
BTE: Chi - square X2(10) = 21.116 and sig = .020
QNM: Chi - square X2(8) = 25.722 and sig = .001
QBH: Chi - square X2(10) = 31.383 and sig = .001
HNI: Chi - square X2(12) = 25.388 and sig = .013
VPC: Chi - square X2(8) = 30.212 and sig = .000
YBI: Chi - square X2(8) = 23.462 and sig = .003

TABLE 8: Goodness of Fit

No	Cities / Provinces		Chi-Square	df	Sig.	No	Cities / Provinces		Chi-Square	df	Sig.
1	TGG	Pearson	12.953	18	.794	16	TTH	Pearson	30.472	18	.033
		Deviance	16.017	18	.591			Deviance	21.452	18	.257
2	DTP	Pearson	25.959	18	.101	17	QTI	Pearson	28.958	22	.146
		Deviance	23.351	18	.177			Deviance	29.682	22	.126
3	BTE	Pearson	8.786	18	.965	18	QBH	Pearson	.609	18	1.000
		Deviance	11.440	18	.875			Deviance	1.172	18	1.000
4	CTO	Pearson	28.395	20	.100	19	HTH	Pearson	10.113	10	.431
		Deviance	23.306	20	.274			Deviance	12.975	10	.225
5	HCM	Pearson	24.466	18	.140	20	NAN	Pearson	28.682	18	.052
		Deviance	19.155	18	.382			Deviance	26.906	18	.081
6	BRVT	Pearson	26.198	18	.095	21	HYN	Pearson	31.293	18	.027
		Deviance	26.233	18	.095			Deviance	28.556	18	.054
7	DNI	Pearson	24.245	18	.147	22	HPG	Pearson	26.044	18	.099
		Deviance	21.465	18	.257			Deviance	26.874	18	.081
8	BDG	Pearson	22.647	20	.306	23	HNI	Pearson	3.323	14	.998
		Deviance	21.690	20	.358			Deviance	4.824	14	.988
9	TNH	Pearson	29.053	20	.087	24	BNH	Pearson	23.912	20	.246
		Deviance	30.907	20	.056			Deviance	24.309	20	.229
10	BPC	Pearson	8.998	16	.913	25	BGG	Pearson	21.700	16	.153
		Deviance	12.874	16	.682			Deviance	23.785	16	.094
11	BDH	Pearson	24.852	22	.304	26	PTO	Pearson	24.935	18	.127
		Deviance	24.734	22	.310			Deviance	26.449	18	.090
12	KTM	Pearson	24.906	18	.128	27	VPC	Pearson	.000	18	1.000
		Deviance	20.268	18	.318			Deviance	.000	18	1.000
13	QNI	Pearson	18.652	20	.545	28	TNG	Pearson	29.341	18	.044
		Deviance	17.428	20	.625			Deviance	26.326	18	.093
14	QNM	Pearson	6.057	20	.999	29	YBI	Pearson	7.177	20	.996
		Deviance	6.834	20	.997			Deviance	9.093	20	.982
15	DNG	Pearson	28.276	20	.103	30	TQG	Pearson	25.664	22	.266
		Deviance	27.694	20	.117			Deviance	26.676	22	.224

Source: study result by author

Table 8 gives information of Goodness of Fit which contains the Deviance and Pearson chi-square tests that are useful for determining whether models show good fit to the data.

Pearson's chi-square test indicates that the models fit the data well consists of all twenty-seven models includes TGG has Chi - square X2(18) = 12.953 and sig = .794, DTP has Chi - square X2(18) = 25.959 and sig = .101, KTM has Chi - square X2(18) = 24.906 and sig = .128 … and TQG has Chi - square X2(22) = 25.664 and sig = .266.

Pearson's chi-square test indicates that the models do not fit the data well consists of three models includes TTH has Chi - square X2(18) = 30.472 and sig = .033, HYN has Chi - square X2(18) = 31.293 and sig = .027 and TNG has Chi - square X2(18) = 29.341 and sig = .044

TABLE 9: Pseudo R – Square

No.	Cities / Provinces			No.	Cities / Provinces			No.	Cities / Provinces		
1	TGG	Cox and Snell	.668	11	BDH	Cox and Snell	.406	21	HYN	Cox and Snell	.234
		Nagelkerke	.754			Nagelkerke	.459			Nagelkerke	.264
		McFadden	.508			McFadden	.240			McFadden	.123
2	DTP	Cox and Snell	.459	12	KTM	Cox and Snell	.559	22	HPG	Cox and Snell	.315
		Nagelkerke	.518			Nagelkerke	.631			Nagelkerke	.356
		McFadden	.283			McFadden	.377			McFadden	.175
3	BTE	Cox and Snell	.755	13	QNI	Cox and Snell	.635	23	HNI	Cox and Snell	.837
		Nagelkerke	.853			Nagelkerke	.717			Nagelkerke	.946
		McFadden	.649			McFadden	.465			McFadden	.840
4	CTO	Cox and Snell	.460	14	QNM	Cox and Snell	.820	24	BNH	Cox and Snell	.423
		Nagelkerke	.520			Nagelkerke	.926			Nagelkerke	.477
		McFadden	.284			McFadden	.790			McFadden	.253
5	HCM	Cox and Snell	.591	15	DNG	Cox and Snell	.277	25	BGG	Cox and Snell	.443
		Nagelkerke	.667			Nagelkerke	.313			Nagelkerke	.500
		McFadden	.412			McFadden	.149			McFadden	.269
6	BRVT	Cox and Snell	.344	16	TTH	Cox and Snell	.523	26	PTO	Cox and Snell	.334
		Nagelkerke	.388			Nagelkerke	.590			Nagelkerke	.378
		McFadden	.194			McFadden	.341			McFadden	.188
7	DNI	Cox and Snell	.523	17	QTI	Cox and Snell	.174	27	VPC	Cox and Snell	.884
		Nagelkerke	.590			Nagelkerke	.197			Nagelkerke	1.000
		McFadden	.341			McFadden	.088			McFadden	1.000
8	BDG	Cox and Snell	.515	18	QBH	Cox and Snell	.877	28	TNG	Cox and Snell	.340
		Nagelkerke	.582			Nagelkerke	.990			Nagelkerke	.384
		McFadden	.334			McFadden	.964			McFadden	.191
9	TNH	Cox and Snell	.104	19	HTH	Cox and Snell	.658	29	YBI	Cox and Snell	.791
		Nagelkerke	.117			Nagelkerke	.745			Nagelkerke	.893
		McFadden	.051			McFadden	.498			McFadden	.721
10	BPC	Cox and Snell	.731	20	NAN	Cox and Snell	.314	30	TQG	Cox and Snell	.324
		Nagelkerke	.825			Nagelkerke	.354			Nagelkerke	.366
		McFadden	.605			McFadden	.174			McFadden	.181

Source: study result by author

Table 9 shows results of Pseudo-R-square values which are treated as rough analogues to the R-square value in OLS regression. According to (Lomax & Hahs-Vaugn, 2012; Osborne, 2015; Pituch & Stevens, 2016; Smith & Mckenna, 2013) that generally there is no strong guidance in the literature on how these should be used or interpreted.

TABLE 10: Likelihood Ratio Tests

			Model Fitting Criteria			Likelihood Ratio Tests		
No.	**Cities / Provinces**	**Effect Variable**	**AIC of Reduced Model**	**BIC of Reduced Model**	**-2 Log Likelihood of Reduced Model**	**Chi-Square**	**df**	**Sig.**
1	TGG	TGG_8	46.226	53.306	26.226b	10.208	2	.006
2	DTP	DTP_9	48.935	56.016	28.935	5.584	2	.061
3	BTE	BTE_1	41.327	48.407	21.327	9.887	2	.007
4	BTE	BTE_7	45.073	52.154	25.073	13.633	2	.001
5	BTE	BTE_8	48.832	55.913	28.832	17.392	2	.000
6	CTO	CTO_1	46.437	52.101	30.437	7.131	2	.028
7	HCM	HCM_1	45.718	52.798	25.718	6.563	2	.038
8	HCM	HCM_2	46.945	54.025	26.945	7.790	2	.020
9	HCM	HCM_7	46.582	53.663	26.582	7.427	2	.024
10	HCM	HCM_{10}	47.455	54.535	27.455	8.300	2	.016
11	BDG	BDG_2	44.609	50.273	28.609	6.919	2	.031
12	BDG	BDG_1	48.090	56.586	24.090a	11.216	2	.004
13	BDG	BDG_{10}	46.205	54.701	22.205a	9.331	2	.009
14	KTM	BDG_8	48.882	55.963	28.882	8.615	2	.013
15	QNI	QNI_8	43.533	49.198	27.533	10.106	2	.006
16	QNM	QNM_2	38.740	44.404	22.740	15.906	2	.000
17	QNM	QNM_8	39.557	45.221	23.557	16.723	2	.000
18	QBH	QBH_7	30.234	37.315	10.234a	9.062	2	.011
19	QBH	QBH_8	36.486	43.567	16.486	15.314	2	.000
20	QBH	QBH_{10}	27.891	34.971	7.891a	6.718	2	.035
21	HTH	HTH_1	43.192	49.010	19.192	6.217	2	.045
22	HTH	HTH_8	43.098	48.917	19.098	6.124	2	.047
23	HNI	HNI_1	34.592	42.261	10.592	5.769	2	.056
24	HNI	HNI_8	42.534	50.203	18.534	13.711	2	.001
25	VPC	VPC_1	42.613	47.726	26.613	26.613	2	.000
26	VPC	VPC_2	42.437	47.550	26.437	26.437	2	.000
27	VPC	VPC_3	32.822	37.934	16.822	16.822	2	.000
28	VPC	VPC_8	40.392	45.504	24.392	24.392	2	.000
29	YBI	YBI_2	37.136	42.800	21.136	12.043	2	.002
30	YBI	YBI_8	36.079	41.743	20.079	10.986	2	.004

Source: study result by author

Table 10 is presenting results which contain Likelihood Ratio Tests of the overall contribution of each independent variable to the model. There are fifteen independent variables have significant predictors in the models, they are

BTE1 has Chi - square X2(2) = 9.887 and sig = .007

BTE7 has Chi - square X2(2) = 13.633 and sig = .001

BTE8 has Chi - square X2(2) = 17.392 and sig = .000

QNM2 Has Chi - square X2(2) = 15.906 and sig = .000

QNM8 has Chi - square X2(2) = 16.723 and sig = .000

QBH7 has Chi - square X2(2) = 9.062 and sig = .011

QBH8 has Chi - square X2(2) = 15.314 and sig = .000

QBH10 has Chi - square X2(2) = 6.718 and sig = .035

HNI8 has Chi - square X2(2) = 13.711 and sig = .001

VPC1 has Chi - square X2(2) = 26.613 and sig = .000

VPC2 has Chi - square X2(2) = 26.437 and sig = .000

VPC3 has Chi - square X2(2) = 16.822 and sig = .000

VPC8 has Chi - square X2(2) = 24.392 and sig = .000
YBI2 has Chi - square X2(2) = 12.043 and sig = .002
YBI8 has Chi - square X2(2) = 10.986 and sig = .004
And one independent variable has near significant predictors in the model is HNI1 has Chi - square X2(2) = 5.769 and sig = .056

TABLE 11: Parameter Estimates

Cities / Provinces	Traffic_ Impact		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
									Lower Bound	Upper Bound
BTE	1	Intercept	-14639.319	4038.167	13.142	1	.000			
	1	BTE_1	-.378	.520	.528	1	.468	.685	.247	1.900
	1	BTE_7	6.842	1.891	13.084	1	.000	935.946	22.977	38125.142
	1	BTE_8	29.819	20.964	2.023	1	.155	8.913E+12	1.275E-5	6.231E+30
	2	Intercept	-14516.900	2196.194	43.692	1	.000			
	2	BTE_1	-.377	.519	.530	1	.467	.686	.248	1.894
	2	BTE_7	6.784	.000	.	1	.	883.418	883.418	883.418
	2	BTE_8	29.792	19.628	2.304	1	.129	8.683E+12	.000	4.428E+29
QNM	1	Intercept	9460.171	1995.973	22.464	1	.000			
	1	QNM_2	-.391	.219	3.197	1	.074	.676	.441	1.038
	1	QNM_8	2.545	1.267	4.036	1	.045	12.744	1.064	152.608
	2	Intercept	11416.561	1408.536	65.695	1	.000			
	2	QNM_2	-.311	.225	1.909	1	.167	.733	.472	1.139
	2	QNM_8	2.760	1.236	4.985	1	.026	15.796	1.401	178.096
QBH	1	Intercept	-692.851	3924.264	.031	1	.860			
	1	QBH_7	-.079	5.994	.000	1	.990	.924	7.312E-6	116818.269
	1	QBH_8	2.052	1.981	1.073	1	.300	7.784	.160	377.871
	1	QBH_{10}	6.464	25.592	.064	1	.801	641.443	1.055E-19	3.899E+24
	2	Intercept	-5023.524	6603.032	.579	1	.447			
	2	QBH_7	8.677	8.258	1.104	1	.293	5866.289	.001	6.269E+ 10
	2	QBH_8	.747	1.071	.486	1	.486	2.110	.259	17.215
	2	QBH_{10}	-20.165	.000	.	1	.	1.748E-9	1.748E-9	1.748E-9
HNI	1	Intercept	-9942.440	55942.698	.032	1	.859			
	1	HNI_1	-.142	.664	.046	1	.831	.868	.236	3.187
	1	HNI_8	.532	2.021	.069	1	.792	1.702	.032	89.377
	2	Intercept	-5694.094	1563.047	13.271	1	.000			
	2	HNI_1	-.145	.101	2.041	1	.153	.865	.710	1.055
	2	HNI_8	.495	.504	.963	1	.327	1.640	.611	4.404
VPC	1	Intercept	-8120.585	304250.518	.001	1	.979			
	1	VPC_1	3.285	123.959	.001	1	.979	26.701	8.175E-105	8.721E+106
	1	VPC_2	-10.169	381.253	.001	1	.979	3.835E-5	.000	.b
	1	VPC_3	1589.668	58103.798	.001	1	.978	.b	.000	.b
	1	VPC_8	38.368	1446.727	.001	1	.979	4.602E+16	.000	.b
	2	Intercept	-9408.761	338340.558	.001	1	.978			
	2	VPC_1	3.966	141.800	.001	1	.978	52.768	1.051E-119	2.648E+122
	2	VPC_2	-10.696	393.576	.001	1	.978	2.264E-5	.000	.b
	2	VPC_3	983.360	41914.959	.001	1	.981	.b	.000	.b
	2	VPC_8	43.713	1591.907	.001	1	.978	9.644E+ 18	.000	.b
YBI	1	Intercept	-3604.821	5904.662	.373	1	.542			
	1	YBI_2	-3.574	18.822	.036	1	.849	.028	2.670E-18	2.945E+14
	1	YBI_8	12.017	1.456	68.165	1	.000	165568.300	9550.601	2870275.975
	2	Intercept	-3609.679	5894.462	.375	1	.540			
	2	YBI_2	-3.459	18.823	.034	1	.854	.031	2.988E-18	3.309E+14
	2	YBI_8	10.901	.000	.	1	.	54249.110	54249.110	54249.110

Source: study result by author

From the result of Likelihood Ratio Tests presented in Table 10, that there are six City-provinces have independent variables that have significant predictors in the models. Six City-province include fifteen independent variables are described clearly in Table 10 and here Table 11 shows these six City-Provinces' Parameter Estimates consists of BTE, QNM, QBH, HNI, VPC, YBI.

Parameter estimates provides information that compares each independent variable group against 0 (0 represents independent variables have no impact on Traffic congestion). Especially, the regression coefficients indicate which predictors significantly discriminate between 0 and 1 (1 represents independent variables have slight impact on Traffic congestion). Between 0 and 2 (2 represents independent variables have heavy impact on Traffic congestion).

BTE7: coefficients compare between 0 and 1 are B = 6.842, Std. Error = 1.891, Sig. = .000 to show that BTE7 is less likely to 0. The probability ratio of Exp(B) = 935.946 is to indicate that for every unit increase on BTE7, the probability of BTE7 impact on traffic congestion is changed by a factor of 935.946 or it can be said the probability of BTE7 impact on traffic congestion is increased by 935.946.

QNM8: coefficients compare between 0 and 1 are B = 2.545, Std. Error = 1.267, Sig. = .045 to show that QNM8 is less likely to 0. The probability ratio of Exp(B) = 12.744 is to indicate that for every unit increase on QNM8, the probability of QNM8 impact on traffic congestion is changed by a factor of 12.744 or it can be said the probability of QNM8 impact on traffic congestion is increased by 12.744.

QNM8: coefficients compare between 0 and 2 are B = 2.760, Std. Error = 1.236, Sig. = .026 to show that QNM8 is less likely to 0. The probability ratio of Exp(B) = 15.796 is to indicate that for every unit increase on QNM8, the probability of QNM8 impact on traffic congestion is changed by a factor of 15.796 or it can be said the probability of QNM8 impact on traffic congestion is increased by 15.796.

YBI8: coefficients compare between 0 and 1 are B = 12.017, Std. Error = 1.456, Sig. = .000 to show that QNM8 is less likely to 0. The probability ratio of Exp(B) = 165568.300 is to indicate that for every unit increase on QNM8, the probability of YBI8 impact on traffic congestion is changed by a factor of 165568.300 or it can be said the probability of YBI8 impact on traffic congestion is increased by 165568.300.

TABLE 12: Classification

Cities / Provinces	Observed	Predicted			Percent Correct
		0	**1**	**2**	
BTE	0	6	0	0	100.0%
	1	0	2	2	50.0%
	2	0	2	3	60.0%
	Overall Percentage	40.0%	26.7%	33.3%	73.3%
QNM	0	6	0	0	100.0%
	1	0	3	1	75.0%
	2	0	1	4	80.0%
	Overall Percentage	40.0%	26.7%	33.3%	86.7%
QBH	0	6	0	0	100.0%
	1	0	4	0	100.0%
	2	0	0	5	100.0%
	Overall Percentage	40.0%	26.7%	33.3%	100.0%

Cities / Provinces	Observed	Predicted			Percent Correct
		0	1	2	
HNI	0	5	0	1	83.3%
	1	0	4	0	100.0%
	2	0	0	4	100.0%
	Overall Percentage	35.7%	28.6%	35.7%	92.9%
VPC	0	6	0	0	100.0%
	1	0	4	0	100.0%
	2	0	0	4	100.0%
	Overall Percentage	42.9%	28.6%	28.6%	100.0%
YBI	0	6	0	0	100.0%
	1	0	2	2	50.0%
	2	0	2	3	60.0%
	Overall Percentage	40.0%	26.7%	33.3%	73.3%

Source: study result by author

Table 12 shows classification statistics which is to determine which hypothesizes dependent variables are best predicted by the model.

0 is mean not to impact on traffic congestion. 1 is mean to slight impact on traffic congestion. 2 is mean to heavily impact on traffic congestion

BTE has 0 is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 50% and 2 is correctly predicted by the model is 60%.

QNM has 0 is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 75% and 2 is correctly predicted by the model is 80%.

QBH has 0 is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 100% and 2 is correctly predicted by the model is 100%.

HNI has 0 is correctly predicted by the model is 83.3%, 1 is correctly predicted by the model is 100%, and 2 is correctly predicted by the model is 100%.

VPC has 0 is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 100% and 2 is correctly predicted by the model is 100%.

YBI has 0 is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 50% and 2 is correctly predicted by the model is 60%.

(7) DISCUSSION

Based on results in section 6 that all coefficients of Cronbach's Alpha Before and After deleted items are in [0,1] is to mean qualified (Lee J. Cronbach, 1951), except “LAN = -12.955” that is deleted before doing analysis of Pearson Correlation. Coefficients of Corrected Item-Total Correlation Before items deleted are between .356 and .993, they are in [8,9]. Coefficients of Corrected Item-Total Correlation After items deleted are between .381 and .996, they are almost in [8,9], there are only LAN6 and LAN10 = -1.000 and QNI3 = -.253. All Coefficients of Corrected Item-Total Correlation Before and After items deleted are > Coefficients Cronbach's Alpha Based on Standardized Items. Based on Nunnally, J. (1978) that variables have Corrected item -Total correction >= 0.3 is to mean they are qualified. 132 independents variables that have Coefficients of Corrected Item-Total Correlation < Cronbach's Alpha Based on Standardized Items have been deleted which are shown in Table 4.

Table 5 shows Pearson correlation result of four representatives city-provinces are BTE, QBH, VPC and YBI which Statistical significance of QBH, VPH and YBI are all < 0.05 which is to mean the input data and the model was built has statistical significance, except BTE8 and BTE3 = .346, and BTE8 and BTE9 = .164 > 0.05. Pearson correlation result of 155 independent variables shows in Table 6 are all statistical significance = .000 < 0.05 is to mean the input data and the model was built has statistical significance. There is Pearson Correlation of QTI and HTH has Statistical significance = .062 > 0.05 which seem to indicate the input data and the model was built that do not reach the expected level of statistical significance. Pearson Correlation of all thirty-one independent variables are > 0 that can say correlation is significant at the 0.01 level (2-tailed), mean that one specific variable has the positive direction correlation with other variables.

Multinomial Logistics Regression analysis results is illustrated in Table 7 giving results of model fitting of thirty MLR models for thirty Cities-provinces, respectively, separately. Model fitting information has likelihood Ratio Chi-square tests, the model has statistical significance indicates that the full models represent significant improvements in fit over the null model, they are BTE has X2(10) = 21.116 and sig = .020, QNM has X2(8) = 25.722 and sig = .001, QBH has X2(10) = 31.383 and sig = .001, HNI has X2(12) = 25.388 and sig = .013, VPC has X2(8) = 30.212 and sig = .000, YBI has X2(8) = 23.462 and sig = .003. Goodness of Fit is presented in Table 8 to determine that the models fit the data well consists of all twenty-seven models includes TGG has X2(18) = 12.953 and sig = .794, DTP has X2(18) = 25.959 and sig = .101, KTM has X2(18) = 24.906 and sig = .128 ... and TQG has X2(22) = 25.664 and sig = .266. However, the models do not fit the data well consists of three models includes TTH has X2(18) = 30.472 and sig = .033, HYN has X2(18) = 31.293 and sig = .027 and TNG has X2(18) = 29.341 and sig = .044. Likelihood Ratio Tests is shown in Table 10 of overall contribution of each independent variable to the model. There are fifteen independent variables have significant predictors in the models, they are BTE1 has X2(2) = 9.887 and sig = .007, BTE7 has X2(2) = 13.633 and sig = .001, BTE8 has X2(2) = 17.392 and sig = .000, QNM2 has X2(2) = 15.906 and sig = .000, QNM8 has X2(2) = 16.723 and sig = .000, QBH7 has X2(2) = 9.062 and sig = .011, QBH8 has X2(2) = 15.314 and sig = .000, QBH10 has X2(2) = 6.718 and sig = .035, HNI8 has X2(2) = 13.711 and sig = .001, VPC1 has X2(2) = 26.613 and sig = .000, VPC2 has X2(2) = 26.437 and sig = .000, VPC3 has X2(2) = 16.822 and sig = .000, VPC8 has X2(2) = 24.392 and sig = .000, YBI2 has X2(2) = 12.043 and sig = .002, YBI8 has X2(2) = 10.986 and sig = .004, and one independent variable has near significant predictors in the model is HNI1 has Chi - square X2(2) = 5.769 and sig = .056.

Parameter Estimates is described in Table 11 providing information which compares each independent variable group against 0 (0 represents independent variables have no impact on Traffic congestion). The regression coefficients indicate which predictors significantly discriminate between 0 and 1 (1 represents independent variables have slight impact on Traffic congestion). Between 0 and 2 (2 represents independent variables have heavy impact on Traffic congestion); BTE7 has coefficients compare between 0 and 1 are B = 6.842, Std. Error = 1.891, Sig. = .000 to show that BTE7 is less likely to 0. The probability ratio of Exp(B) = 935.946 is to indicate that for every unit increase on BTE7, the probability of BTE7 impact on traffic congestion is changed by a factor of 935.946 increasingly. QNM8 has coefficients compare between 0 and 1 are B = 2.545, Std. Error = 1.267, Sig. = .045 to show that QNM8 is less likely to 0. The probability ratio of Exp(B) = 12.744 is to indicate that for every unit increase on QNM8, the probability of QNM8 impact on traffic congestion is changed by a factor of 12.744 increasingly. QNM8 has coefficients compare between 0 and 2 are B = 2.760, Std. Error = 1.236, Sig. = .026 to show that QNM8 is less likely to 0. The probability ratio of Exp(B) = 15.796 is to indicate that for every unit increase on QNM8, the probability of QNM8 impact on traffic congestion is changed by a factor of 15.796 increasingly. YBI8 has coefficients compare between 0 and 1 are B = 12.017, Std. Error = 1.456, Sig. = .000 to show that QNM8 is less likely to 0. The probability ratio of Exp(B) = 165568.300 is to indicate that for every unit increase on QNM8, the probability of YBI8 impact on traffic congestion is changed by a factor of 165568.300 increasingly.

Classification statistics is shown in Table 12 is to determine which hypothesizes dependent variables are best predicted by the model. BTE has 0 is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 50% and 2 is correctly predicted by the model is 60%. QNM has is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 75% and 2 is correctly predicted by the model is 80%. QBH has 0, 1 and 2 are all correctly predicted by the model is 100%. HNI has 0 is correctly predicted by the model is 83.3%, 1 and 2 are correctly predicted by the model is 100%. VPC has 0, 1 and 2 are all correctly predicted by the model is 100%. YBI has 0 is correctly predicted by the model is 100%, 1 is correctly predicted by the model is 50% and 2 is correctly predicted by the model is 60

(8) CONCLUSION

Based on results in section 6 and discussion in section 7, we have conclusion is Cronbach's Alpha Before and After deleted items of thirty City-provinces except "LAN = -12.955" are in [0,1] are quite qualified (Lee J. Cronbach, 1951). Coefficients of Corrected Item-Total Correlation After items deleted are between .381 and .996, they are almost in [8,9] which all is >= 0.3 is to mean they are qualified (Nunnally, J., 1978), there is only LAN6 and LAN10 = -1.000 and QNI3 = -.253. Pearson correlation result of 155 independent variables have statistical significance = .000 < 0.05 is to mean the input data and the model was built has statistical significance. Pearson Correlation of all thirty-one independent variables are > 0 that can say correlation is significant at the 0.01 level (2-tailed), that is one specific variable has the positive direction correlation with other variables. Model fitting information of thirty MLR models for thirty Cities-provinces has likelihood Ratio Chi-square tests, the model has statistical significance indicates that the full models represent significant improvements in fit over the null model, they are BTE, QNM, QBH, HNI, VPC, YBI. Goodness of Fit is to determine the models fit the data well consists of all twenty-seven models includes TGG, DTP, KTM…TQG. However, the models do not fit the data well consists of three models includes TTH, HYN,TNG. Likelihood Ratio Tests is to define that there are fifteen independent variables have significant predictors in the models, they are BTE1, BTE7, BTE8, QNM2, QNM8, QBH7, QBH8, QBH10, HNI8, VPC1, VPC2, VPC3, VPC8, YBI2, YBI8 and one independent variable has near significant predictors in the model is HNI1.

Parameter Estimates to determinate that BTE7 (Population of Ben Tre province) has B = 6.842, Std. Error = 1.891, Sig. = .000 to show that Population of Ben Tre province is likely to slightly impact on traffic congestion. The probability ratio of Exp(B) = 935.946 is to indicate that for every unit increase on Population of Ben Tre province, the probability of Population of Ben Tre province slightly impacts on traffic congestion is changed by a factor of 935.946 increasingly. QNM8 (Urban residents of Quang Nam province) has B = 2.545, Std. Error = 1.267, Sig. = .045 to show that Urban residents of Quang Nam province is likely to slight impact on traffic congestion. The probability ratio of Exp(B) = 12.744 is to indicate that for every unit increase on Urban residents of Quang Nam province, the probability of Urban residents of Quang Nam province slightly impacts on traffic congestion is changed by a factor of 12.744 increasingly. QNM8 (Urban residents of Quang Nam province) has B = 2.760, Std. Error = 1.236, Sig. = .026 to show that QNM8 is likely to heavily impact on traffic congestion. The probability ratio of Exp(B) = 15.796 is to indicate that for every unit increase on Urban residents of Quang Nam province, the probability of Urban residents of Quang Nam province heavily impacts on traffic congestion is changed by a factor of 15.796 increasingly. YBI8 (Urban residents of Yen Bai province) has B = 12.017, Std. Error = 1.456, Sig. = .000 to show that Urban residents of Yen Bai province is likely to slightly impact on traffic congestion. The probability ratio of Exp(B) = 165568.300 is to indicate that for every unit increase on Urban residents of Yen Bai province, the probability of Urban residents of Yen Bai province slightly impact on traffic congestion is changed by a factor of 165568.300 or it can be said the probability of Urban residents of Yen Bai province slightly impact on traffic congestion is increased by 165568.300.

The classification statistics is to determine which hypothesizes dependent variables are best predicted by the model which are hypothesizes dependent variables for no impact on traffic congestion is of BTE, QNM, QBH, VPC, HNI are all 100% and HNI is 83.3%. Hypothesizes dependent variables for slight impact on traffic congestion are BTE = 50%, QNM = 75%, QBH and VPC and HNI = 100%, YBI is 50%. Hypothesizes dependent variables for heavy impact on traffic congestion are BTE = 60%, QNM = 80%, QBH and VPC = 100%, HNI = 92,2%, and YBI = 73.3%.

Limitations

Firstly, it could not have analysis of Exploratory Factor Analysis, maybe the time series data is short that just in 2005 and from 2007 to 2020

Secondly, based on these study results, there are only four independent variables of three provinces in total thirty-one City-provinces have impact on traffic congestion, author thinks that this is not very good results. Author does hope the next study which author will use a new methodology to study such similar object in order to find out the better study results.

(9) DECLARATION OF COMPETING INTEREST

I declare that I have no significant competing interests including financial or non-financial, professional, or personal interests interfering with the full and objective presentation of the work described in this manuscript.

I have described my financial or non-financial interests in the space below

(10) ACKNOWLEDGEMENT

This study was financially supported by Van Lang University, Vietnam.

(11) FUNDING
The author receives no financial support for the research, authorship, and/or publication of this article.

(12) AUTHOR CONTRIBUTIONS
There is only author Vu Thi Kim Hanh who has done the whole this article

(13) DATA AVAILABILITY STATEMENT
The data is time series data which has been collected and extracted by manual method by the author Vu Thi Kim Hanh, data is in 2005 and from 2007 to 2020 is from General statistics department of Vietnam.

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