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Study on Goods and Passenger Loading Performance Index of air Transportation Logistics: Vietnam Case

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Abstract: The objective of this paper is to measure the Air Transportation Logistics Performance bymethodology is Maximum Log Likelihood-Assessing fit of a Logistics Regression and multivariate regression which focusing on analysing and justifying two factors that are passenger load index and goods load index. There are eight independent variables, in whichfour independent variablesX_1 to X_4 belong to passenger load index and $X_5$to X_8belong to goods load index. The highlight findings are while number of passengers have been transport by air in local Vietnam without distinguishing of the lengh of transported distance and number of passengers have been transport by air from Vietnam to oversease without distinguishing of the lengh of transported distance haveimpact, number of passengers have been transport by air in local Vietnam multiplying by the actual lengh of transported distance does not have impact on revenue from express service supply of postal companies. While volume of goods have been carried by air in local Vietnam without distinguishing of the lengh of transported distance andvolume of goods have been carried by air from Vietnam to oversease without distinguishing of the lengh of transported distance and volume of goods have been carried by air from Vietnam to overseasemultiplying by the actual lengh of transported distancehave impact, volume of goods have been carried by air in local Vietnammultiplying by the actual lengh of transported distance doesn't have impact on revenue from passenger transportation service supply of travel and tourist companies

Key words: Air transportation logistics, goods load index, passenger load index.

I. Introcution

Air transportation is instrumental in encouraging and supporting commerce and trade between the diffirent countries of the world, it is rapidly taking its place among the outstanding industries of the world. Since World War II, international air transport has developed in rapid strides. All countries of any sizes have some types of international air transportation. There were leaps and bounds since the historical flight on December 17, 1903 of the Wright brothers at Kitty Hawk, North Carolia. There was declaration of the Air Commerce Act of 1926 in the United States that completed and was exclusive sovereignty of the airspace over the lands and water of the United States (James Preston Payne, Jr.1951 p1, p3, p10, p11). Air transporation has transformed our lives at all aspects and help us experience different cultures and make new relationships around the world, Air transporation is providing service for not only about passengers but it also supply servie for cargo transportation between countries acn continents. Airlogistics is a phenomenal indusry which has become even more important not only to success of airlines, but also to every consumer and business leader all over the world. From early 1900s, the goods which are transported by air has developed into a key component of world trade as global consumer society in today. Despite handling an estimated 3 percent of toalworld tonnage, it is the 35 percent and upwards value of goods that makes it such an extremely important business.The air cargo logistics industy has responsibility to transport over 35 percent of the value of total global trade which is in excess of $5.1 trillion, air cargo that sometimes be known as air fright helps to catalyse economic prospecrity for almost every country, encouraging business travel and acts as leading economic indicator. Almost every passenger flight carries some fright underneath the feet of its passengers and alongside their baggage. In America, the US Postal Service alone leases space on some 15,000 of an estimated 25,000 scheduled passenger flights in the air ever day. SkyCargo, the air frieght wing of Dubai-based Emirates Airline, complements the bellyhold space of its widebody fleet with a mid-sized fllet of freighter aircraft and notches up about 19-20 percent of its revenue from carrying cargo. Cathay Pacific in Hong Kong earns around one-third of its evenue from carrying freight; Taiwan's China Airlines around 40 percent and Korean Air Cargo about half of its sales earnings(Michael Sales, 2013).Air transportation accounts for a high proportion of the products' final cost in which some cases up to 40 percent, due to a variety of factors involved, international shipments that clearly have demand of a careful and detailed costing, the choice of transport mode of

course depends on the type of cargo, and there is clear difference between transporting cargo and passengers. Many people arenot aware that much of which factors impact on air transporation logistics performance in which cargo transport or passengers transport are much different and resulting the different effectiveness too (Michael Sales, 2016).

The objective of this paper aims to assess Air Transportation Logistics Performance (ATLP) byMaximum Log Likelihood-Assessing fit of a Logistics Regression(MLLH-AFLR) and Logistics-multivariate regression (LMR). There are two factors which are passenger load index (PLI)and goods load index (GLI), PLI and GLI are dependent variables (DV), there are eight independents variables (IVs). PLI has four IVs which are X_1, X_2, X_3, $X_4$and GLI has four IVs are X_5, X_6, X_7, X_8. The contentsof DVs and IVswill be explainned clearly in section 3.2. The study results and findings are to specify and justify which IVsimpact on DV andhow weight of each IVimpacts on DV.This is the new approach of the paper or it is the study gap of the paper.

The contentsof paper are section 1 is introduction, section 2 is to have literature review, section 3 isabout methodology and data, section 4will present the study results and findings,section 5 is discussion about study results and findings of section 4, and the last is section 6 to have conclusion including limitation and future direction

II. Literature review

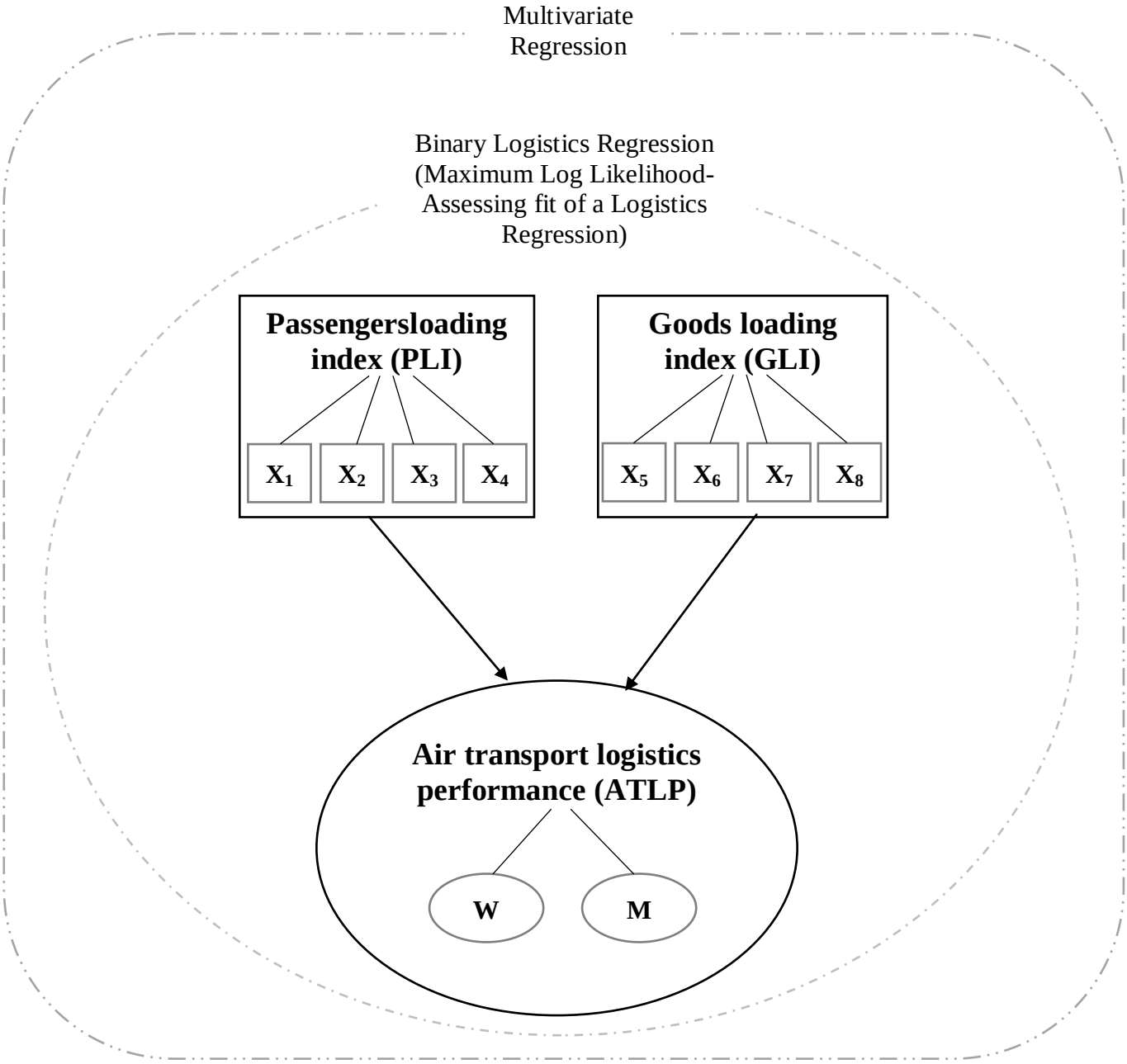
Air transportation logisitcs brings several unique selling points to the supply chain; Just-in-time due to rapid air transport, the high value of some consignments and their vulnerability to theft, counterfeiting and temperture make it to vital to deliver quickly by air, rapid delivery of spare parts to maintain an industrial process, perishables and pharmanceuticals need fast and temperature – controlled environments, as societhy changes ever faster, air cargo can be abe to continue to be a growth industry catering for the needs at any places in the world, average end to end transporting goods by air takes remained stubbornly roughly six and half days, even though less than 24 hours in flying time to connnect any two points on our plannet, an air industry which depends on speed which is very conservative and relatively slow to change system and prodedures as there aree many reason for this, including the lower volume of transactions, the number of parties involved, and the fact that for most passenger airlines, cargo makes up a relatively low proportion of its revenues(Michael Sales, 2016, p6,p11, p49). Economic growth has a tremendous impact on air transportation logistics, it is important due to it broadly influences the demand for air transportation service which for goods and passengers transport, in turn, affects aircrafts orders and deliveries, the passenger load factor for world airlines rose during the latter half of the 1990s, the passenger load factor is used to measure airline apacity untilization, the number of passengers flown to to available seats, load factors are high, airlines have less excess lift capacty than when load factors are low which is related to indicator that is expressed by a percentage of number of passengers, air commercial transports are expensive assets, which need to demonstrate to potential invenstors that their operations are profitable. Direct impacts are those financial transactions linked to the provision of air passenger and air cargo services and the provision of aircrat(Joh G. Wensveen, 2007, p16, p17, p23). Air transport are often irrelevant to or negatively affect economic growth, mostly in developing nations (Jin Suk Park et al., 2019). Analysis of key statistics of air transportation which can include load factors such as revenue which is passenger miles, larger passenger aircraft that has affected the economics of all cargo operation, The basic premise is that given a high volume it should be possible to run an air service simply for the passenger merely turns up and takes off without making a reservation (Thomas Telford, 1984, p51, p58, p83). The factors influence the coordinated development of air logistics in Beijing, Tianjin, and Hebei are five variables which are input level, output benefit, potential development, innovation capability, and air logistics demand (Danyang Shenet al., 2019). There are two types of goods shipped by airfreight which first is only cargo transported by aircraft calling freighters or passenger aircraft where the goods be stored under the main desk, and second is transportation calling belly freight, in Korea passenger aircraft accounted for more than 30 percent of the total cargo transported in 2017 (Hyuksoo Cho, Jungsun Lee, 2020). A policy scenario created by the 2003 deregulation of the Chinese aviation sector was applied in all provinces of China except Beijing and Tibet that resulted in substantial growth in air transport passengers and cargo, a consequently is to excite an increase of air passengers and cargo, there is indication that an increase of air transport capacity, in terms of air passengers and air cargo which has a significant effect on the economy(Jose M. Carbo, Daniel J. Graham, 2020). There is a finding that 1% decline in travel time by air transportation will lead to increase in venture capital investment deals by 0.02 (Liaoliao Duan et al., 2020). Air international transport has become vital to satisfy the ever-growing requests of fast deliveries, one of the main figures in air international transport is the freight forwarders which organize the shipment of goods for their customers, the space for goods in passenger flights is limited to the lower cargo deck (Claudia Archetti, Lorenzo Peirano, 2019). Air transportation has one stop routes add better accessibility for a lower subsidy comparing with non-stop routes but also bring longer travel times and additional inconvenience for the passengers which means that less people will use them (Alan Kineneet al., 2020). Air-railways passengers carried positively influenced Energy demand in low-income and lower middle-income countries (Haroon Ur Rashid Khanet al., 2018). There is a lot about the implications of the 1978 Act for the US passenger airline sector, there is less about the European situation, the analysis of passenger airlines is often more focused on issues of efficiency in individual industries – airlines, airports, air traffic control, information systems, and etc. Air transportation economics has to be cognizant of the limitations of continuing to assume that homo economicus is the norm (Kenneth Button, 2019).As in (Tao Li, Yan Wan, 2019) "The originating air travel demand and its geographic distribution play an important role in the analysis of major changes in airport use, airport and airline marketing, and airport planning". Air transportation may benefit from a thoughtful assessment of outbound trip

generation, Airlines can leverage an origin- based approach, passenger distributions among both itineraries and destinations to obtain valuable insights into route development and network planning (Sebastian Birolini et al., 2020). Air Transportation Freight Forwarder Service has to send shipments from origins to destinations at minimum cost by using different air transportation services (Enrico Angelelli et al., 2020).

In air transportation, managing the passenger traffic flows is important, the extreme difficulty is to analyse passenger traffic in both short and medium terms due to the oscillation and irregularity inherent in air passenger traffic flows dynamics (Yi Xiaoet al., 2015). The monotonic increasing relationship of air transport passengers who are carried and bilateral aid flow is established with the natural resource rents. The results of research analysis show that air transport passengers carried, energy demand, and bilateral aid is the key predictor (Hummera Saleem et al., 2018). As in (Syed Abdul Rehman Khan et al., 2017) "The main constructs of inbound tourism index include international tourists' arrival, tourism receipts, receipts of passengers' transports items and travel items. The presence of air transportation positively affects inbound tourism index. The causality results confirm the bidirectional relationship between inbound tourism, air transportation passengers carried, trade openness and travel and transport services"

III. Methodology and data

3.1 Study model



3.2 Hypothesis and variables.

PLI and GLI are factors, PLI has four independent variablesX_1, X_2, X_3, X_4, GLIhas four independent variables X_5, X_6, X_7, X_8.
X_1 is independent variable (IV)= total number of passengers have been transport by air in local Vietnam without distinguishing of the lengh of transported distance. Unit isthousand people
$X_2$is IV= total number of passengers have been transport by air from Vietnam to oversease without distinguishing of the lengh of transported distance. Unit isthousand people
$X_3$is IV= total number of passengers have been transport by air in local Vietnam, multiply by the actual lengh of transported distance. Unit isthousand people
$X_4$is IV= total number of passengers have been transport by air from Vietnam to oversease, multiply by the actual lengh of transported distance. Unit isthousand people
X_5 is IV = total volume of goods have been carried by air in local Vietnam without distinguishing of the lengh of transported distance. Unit isthousand tons
X_6 is IV= total volume of goods have been carried by air from Vietnam to oversease without distinguishing of the lengh of transported distance. Unit isthousand tons
X_7 is IV= total volume of goods have been carried by air in local Vietnam, multiply by the actual lengh of transported distance. Unit ismillion tons/million kilometers.
$X_8$is IV= total volume of goods have been carried by air from Vietnam to oversease, multiply by the actual lengh of transported distance. Unit ismillion tons/million kilometers.

ATLP is named Y, Y has two dependents variables W and M which are impacted by X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8.
W is revenue from express service supply of postal companies
M is revenue from passengers transportation service supply of travel and tourist companies

There are two assumptions of Y which are follwoing:
Y = 1: Yis impacted by X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8
Y = 0:Yis not impacted by X_1, X_2, X_3, X_4, X_6, X_7, X_8

3.3 Maximum Log Likelihood-Assessing fit of a Logistics Regression(MLLH-AFLR)

3.3.1 Maximum Log Likelihood(MLLH)

Logarit for the Impact = Log $\left(\frac{P(I)}{1-(P(I)}\right)$

Log $\left(\frac{P(I)}{1-(P(I)}\right) = W_0 + W_1X_1 + W_2X_2 +, \ldots, W_nX_n$

Where
P is given as a value to measure the probability of a variable.
I isimpact
n are 1, 2, 3,…, n
W_0 is intercept by regression line
$W_1, W_2, \ldots, W_n$ are parameters which are estimated by regression line
$X_1, X_2, \ldots, X_n$ are independent variables (prediction variables)

$$P = \frac{e^{-\log(score)}}{1+e^{-\log(score)}} \quad (1)$$

As Equation 1 states:
Where,

$$e^{-\log(score)} = e^{-\log(Log(P))}$$

$$= e^{-\log(\text{Intercept's Coefficient} + \text{sumproduct (coefficient [X1:X8, inputdata] X1:X8)})}$$

$$1 + e^{-\log(score)} = 1 + e^{-\log(\log(p))}$$

$$= 1 + e^{-\log(\text{Intercept's Coefficient} + \text{sumproduct (Coefficient [X1:X8, inputdata] } X1:X8)}$$

Score = log(p) = Intercept's Coefficient + sumproduct(coefficent | X_1: X_8, inputdata | X_1: X_8)

$$\text{Y's Probability} = \frac{e^{-\log(score\ |X1:X8)}}{1+e^{-\log(score\ |X1:X8)}} \quad (2)$$

As Equation 2 states the Y's Probability, which meansProbability of Y to happen:

Where,
Likelihood (LH):
Y = 1 that means LH = probability of Y

$$LH = \frac{e^{-\log(score\ |X1:X8)}}{1 + e^{-\log(score\ |X1:X8)}}$$

Y = 0 that means LH = 1 – P(E)

$$LH = \frac{1 - e^{-\log(score\ |X1:X8)}}{1 + e^{-\log(score\ |X1:X8)}}$$

Log – Likelihood = Logarit of LH
Y = 1: Log likelihood = LN

$$LN = \left(\frac{e^{-\log(score\ |X1:X8)}}{1 + e^{-\log(score\ |X1:X8)}}\right)$$

Y= 0: Log likelihood = LN

$$LN = \left(\frac{1 - e^{-\log(score\ |X1:X8)}}{1 + e^{-\log(score\ |X1:X8)}}\right)$$

3.3.2 Assessing fit of a Logistics Regression(AFLR)

Sort by Score on Values order Largest to Smallest
DV is impacted by IVs: DV_{im}, where im = impacted
$DV_{im(t)}$ = DV | 1/0, where 1 is impacted, 0 is no impacted
$DV_{im(t)+1} = DV_{imt} + DV_t$, where imt = impacted at the time t
Propensity rankings (PR) by order number from t_0 to t_n, where t_0 is time 0, t_n is time n
Cumulative percentage (%) of impact (CPI)
$CPI = DV_{im(t)} / DV_{im(n)}$
Cumulative % of DV be impacted(CADVIP)
$CADVIP = PR_t/PR_n$
Charting scatter

3.3.3 Logistics-multivariate regression (LMR)

Step 1: assessing one by one of IVs from X_1 to $X_8$by MLLH–AFLR
Step 2: CPI sare equal or over than 10% (CPI>=10%) is acceptable, CPI<10% is rejected
Model LMR1:$W = w_0 + w_1 CPI_1 | X_1 + w_2 CPI_2 | X_2 + w_3 CPI_3 | X_3 + w_4 CPI_4 | X_4 + e$
Model LMR2: $M = m_0 + m_5 CPI_5 | X_5 + m_6 CPI_6 | X_6 + m_7 CPI_7 | X_7 + m_8 CPI_8 | X_8 + e$

Where,
w_o and m_0 are the intersections of vertical axis and lines of regression.
e is other factors beyond X_1, X_2, X_3, X_4, X_5, X_6, X_7, and X_8 that this paper does not have analysis
$CPI_1 | X_1$means CPI_1 of X_1,$CPI_2 | X_2$means CPI_2 of X_2, …, $CPI_8 | X_8$means CPI_8 of X_8
CPIs are equal or over than 10% (CPI>=10%).
According to (Keshab Bhattarai, 2015, p. 55) and (Jeffrey M. Wooldridge, 2020, p. 126), that
$w_o + w_1 + w_2 + w_3 + w_4 = 0$,$m_0 + m_5 + m_6 + m_7 + m_8 = 0$ are defines Model LMR 1and Model LMR 2 do not have been built suitably to the input data and they do not have statistics significance, respectively and separately
$w_o + w_1 + w_2 + w_3 + w_4 \neq 0$, $m_0 + m_5 + m_6 + m_7 + m_8 \neq 0$ are defines Model LMR 1 and Model LMR 2 have been built suitably to the input data and they have statistics significance, respectively and separately
$w_o + w_1 + w_2 + w_3 + w_4 > 0$, $m_0 + m_5 + m_6 + m_7 + m_8 > 0$ are defines Model LMR 1 and Model LMR 2 have been built suitably to the input data and they have statistics significance, respectively and separately
$w_0 + w_1 + w_2 + w_3 + w_4 > 0$ which is meant that X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8impact on W, M, respectively and separately.
$w_0 + w_1 + w_2 + w_3 + w_4 <= 0$ which is meant that X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8 do not impact on W, M, respectively and separately

3.4 Data

Time series data is between 1995 and 2018 which come from General statistics department of Vietnam that has been collected and extracted by manual method by the author Vu Thi Kim Hanh

IV. Study results

4.1 Maximum Log Likelihood-Assessing fit of a Logistics Regression(MLLH-AFLR)

Table 1: Output regression result.

R Square	0.69759722	
Adjusted R Square	0.53631575	
Significant F	0.00712293	
Intercept	0.13500875	
Regression Coefficient (Estimating Parameters)	X_1	-0.0002545
	X_2	-0.0001809
	X_3	0.0003348
	X_4	0.0000989
	X_5	-0.0200661
	X_6	-0.0611081
	X_7	0.0292681
	X_8	0.0099441
P-value	X_1	0.0662542
	X_2	0.5471368
	X_3	0.0066469
	X_4	0.5263855
	X_5	0.1140188
	X_6	0.0194397
	X_7	0.0145435
	X_8	0.1845917

Source: Data from VN GSO, consolidated and calculated by author

Table 1 is to show values which author uses regression to estimate the parameters of X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, and intercept for then standardizing them by MLLH at the below table 2. Author does not deeply analyse all these data of table 1 due to they are not officially used for analysis for this paper. However, R Square = 0.697597228, Adjusted R Square = 0.53631575, and Significance F = 0.00712293 is to prove that these estimating parameters of X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, and intercept are reliable through the model is built suitably.

Table 2: MLLH

Parameters after maximum Likelihood	Intercept	Regression coefficient of X1	Regression coefficient of X2	Regression coefficient of X3	Regression coefficient of X4	Regression coefficient of X5	Regression coefficient of X6	Regression coefficient of X7	Regression coefficient of X8			Maximum Likelihood	-3.76761
	-0.48150	-0.00571	-0.02135	0.01005	0.00516	-0.10132	-0.39621	0.20798	0.08624				
No	A/DV	X1	X2	X3	X4	X5	X6	X7	X8	SCORE	Impact probability of IVs on DV	Likelihood	Log-Likelihood
1	1	1,454.3	980.7	1,350.3	2,744.0	17.4	14.6	36.2	63.2	3.43648	0.96883	0.96883	-0.03167
2	0	1,662.3	1,092.2	1,347.0	2,601.0	27.3	20.5	30.8	76.3	-4.23674	0.01425	0.98575	-0.01435
3	1	1,641.0	1,003.0	1,320.0	2,602.0	27.8	22.3	31.2	89.0	-2.06208	0.11284	0.11284	-2.18181
4	0	1,632.0	939.0	1,355.0	2,512.0	24.6	20.0	30.0	87.1	0.06555	0.51638	0.48362	-0.72646
5	0	1,655.0	1,044.0	1,365.0	2,677.0	23.0	19.5	26.0	80.5	-2.39700	0.08340	0.91660	-0.08709
6	0	1,683.0	1,123.0	1,393.0	2,990.0	24.2	21.0	27.4	86.7	-2.23764	0.09642	0.90358	-0.10139
7	0	2,226.0	1,626.8	1,869.5	4,241.2	34.4	32.4	38.9	119.4	-5.18897	0.00555	0.99445	-0.00556
8	0	2,530.9	1,914.1	2,073.2	5,028.2	39.5	32.5	44.2	127.6	-5.70359	0.00332	0.99668	-0.00333
9	0	2,688.0	1,831.0	2,688.0	4,424.0	48.2	41.5	53.8	156.8	-1.69503	0.15512	0.84488	-0.16855
10	0	3,120.0	2,411.0	2,565.0	6,811.0	51.8	46.4	59.6	176.2	-4.89553	0.00742	0.99258	-0.00745
11	0	3,680.0	2,815.0	2,985.7	8,138.5	65.0	46.0	71.4	167.9	-5.08239	0.00617	0.99383	-0.00619
12	0	4,313.5	3,132.0	3,551.9	9,264.7	73.2	47.6	81.2	188.2	-1.64213	0.16218	0.83782	-0.17695
13	1	5,478.4	3,419.2	4,685.6	9,996.0	86.5	43.1	94.7	185.2	3.72882	0.97654	0.97654	-0.02374
14	1	6,820.9	3,379.1	5,541.0	10,611.3	83.7	47.7	88.3	207.3	7.73045	0.99956	0.99956	-0.00044
15	1	7,844.9	3,120.1	6,846.8	9,660.8	95.6	44.1	106.0	210.6	19.82512	1.00000	1.00000	0.00000
16	1	9,927.2	4,268.2	8,412.3	12,749.7	121.6	68.5	121.2	305.6	14.14682	1.00000	1.00000	0.00000
17	1	10,780.6	4,361.7	9,085.1	14,183.9	128.5	71.8	127.5	299.2	20.19229	1.00000	1.00000	0.00000
18	1	9,751.2	5,318.3	7,316.2	16,309.8	114.4	76.6	132.2	342.9	3.10004	0.95689	0.95689	-0.04406
19	1	10,956.6	5,934.4	8,686.5	18,191.2	101.3	82.4	106.4	363.4	1.97538	0.87819	0.87819	-0.12989
20	0	17,513.5	6,917.9	11,022.9	23,684.6	111.8	90.2	109.4	425.0	-2.84871	0.05475	0.94525	-0.05630
21	0	22,475.6	8,674.4	14,271.1	27,797.3	130.2	99.4	125.1	474.4	-12.79718	0.00000	1.00000	0.00000
22	0	28,517.7	10,073.3	15,310.0	32,926.6	201.2	84.4	147.1	557.9	-29.73048	0.00000	1.00000	0.00000
23	0	31,875.6	12,680.4	17,131.9	37,182.5	230.5	87.4	168.6	580.2	-62.06240	0.00000	1.00000	0.00000
24	0	33,399.9	15,676.9	34,189.2	33,666.8	264.8	139.6	102.1	735.1	-6.04245	0.00237	0.99763	-0.00237

Source: Data from VN GSO, consolidated and calculated by author

Values of table 2 are information of IVs and result of MLLH which are scores of the IVs and parameters of regression coefficients: regression coefficients ofX_3, X_4, X_7, $X_8$are 0.01005, 0.00516, 0.20798, 0.08624, and X_1, X_2, X_5, X_6 are -0.00571, -0.02135, -0.10132, -0.39621, respectively, intercept = -0.48150 to show the interception between the vertical axis and the regression lines is under the horizontal axis.

Before having MLLH, the total values regression coefficients for all IVs from X_1 to X_8 is (-0.0003 -0.0002 + 0.0003 + 0.0001-0.0201-0.0611 + 0.0293 + 0.0099) = - 0.0420. And After having MLLH, it is (-0.00571-0.02135 + 0.01005 + 0.00516 - 0.10132-0.39621 + 0.20798 + 0.08624) = -0.2152. These values - 0.0420 and -0.2152, and the intercept before having MLLH is 0.1350 and the one after MLLHis-0.48150 which indicate that the interception point between the vertical axis and the regression lines has been moved from the point over the horizontal axis to the point under point the horizontal axis before and after MLLH, respectively. And it is also shown that all IVs from X_1 to X_8trends to have a decrease of impact on DV after MLLH.

Table 3: AFLR

Time (Year)	No	DV	SCORE	DV be impacted	Propensity rankings	CPI	CADVIP
2011	17	1	20.19229	1	1	11.1%	4.2%
2009	15	1	19.82512	2	2	22.2%	8.3%
2010	16	1	14.14682	3	3	33.3%	12.5%
2008	14	1	7.73045	4	4	44.4%	16.7%
2007	13	1	3.72882	5	5	55.6%	20.8%
1995	1	1	3.43648	6	6	66.7%	25.0%
2012	18	1	3.10004	7	7	77.8%	29.2%
2013	19	1	1.97538	8	8	88.9%	33.3%
1998	4	0	0.06555	8	9	88.9%	37.5%
2006	12	0	-1.64213	8	10	88.9%	41.7%
2003	9	0	-1.69503	8	11	88.9%	45.8%
1997	3	1	-2.06208	9	12	100.0%	50.0%
2000	6	0	-2.23764	9	13	100.0%	54.2%
1999	5	0	-2.39700	9	14	100.0%	58.3%
2014	20	0	-2.84871	9	15	100.0%	62.5%
1996	2	0	-4.23674	9	16	100.0%	66.7%
2004	10	0	-4.89553	9	17	100.0%	70.8%
2005	11	0	-5.08239	9	18	100.0%	75.0%
2001	7	0	-5.18897	9	19	100.0%	79.2%
2002	8	0	-5.70359	9	20	100.0%	83.3%
2018	24	0	-6.04245	9	21	100.0%	87.5%
2015	21	0	-12.79718	9	22	100.0%	91.7%
2016	22	0	-29.73048	9	23	100.0%	95.8%
2017	23	0	-62.06240	9	24	100.0%	100.0%

Source: Data from VN GSO, consolidated and calculated by author

These values of table 3 are to give us result of AFLR which the most important value is the cumulative percentage (%) of impact (CPI) of total eight IVs from X_1 to $X_8$to indicate that they are all impact on DV, in which the smallest CPI is 11.1% just in 1997, the largest CPI is 100% of total 13 years consists of 1997, 2000, 1999, 2014, 1996, 2004, 2005, 2001, 2002, 2018, 2015, 2016, and 2017. While CPI of 2011 is 11.1%, the one of 2009 is double at 22.2%. The years 2010, 2008, 2007, 1995, 2012 show the year after by ordered the CPI increases 11.1% in comparing with the before one. However, the years 2013, 1998, 2006, and 2003 which their CPIs are the same at 88.9%.

In details, the year 2011 which the smallest CPI is11.1% impacts on CADVIP at 4.2%. The biggest CPI at 100% for 13 years which are 1997, 2000, 1999, 2014, 1996, 2004, 2005, 2001, 2002, 2018, 2015, 2016, and 2017 which impact on CADVIP from 50% to 100%,respectively. More detailing, the year 2017 has biggest values is 100% for both CPI and CADVIP, the

year 2011 has smallest values of CPI and CADVIP are 11.1% , 4.2%, respectively. Finally, CPI of all eightIVs from X1 to X8 impact on DV at the different levels.

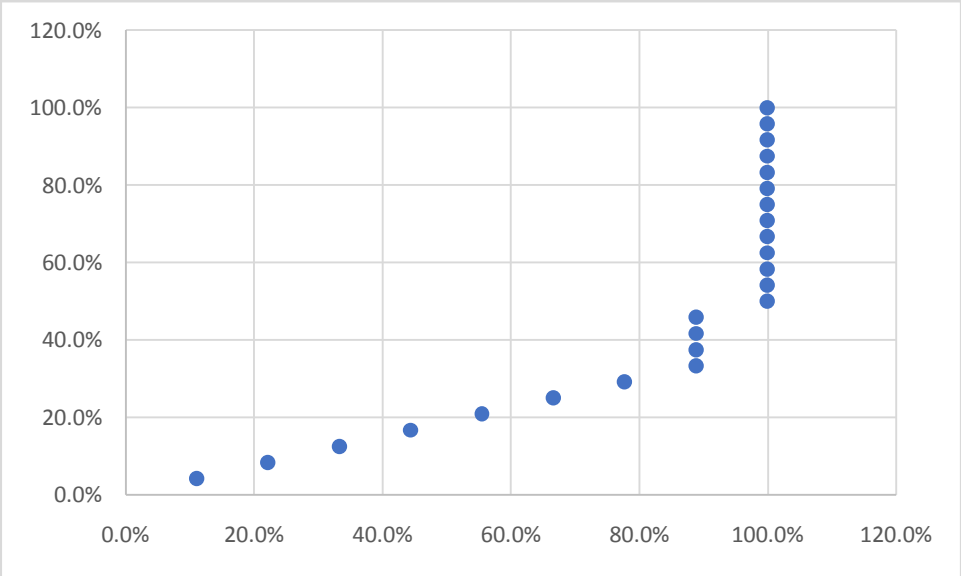


Figure 1: CPI and CADVIP
Source: Data from VN GSO, consolidated and charted by author

Figure 1 shows the scatter between CPI of all IVs from X1 to X8andCADVIP. CPI is illustrated by horizontal asix, CADVIP is described by vertical axis. The scatter chart gives us the overall quick looking easiy that;Firstly, there are seven years CPI are steadily being increased year by year which described by seven dots starting from 11.1% and end at 77.8% on the horizontal axis. Secondly, CPI keeps stood at the same level that illustrated by four dots corresponding to four years at the point of 88.9%on the horizontal axis. Finally, there are 13 dots together stand vertically at point 100% on the horizontal axis which described for 13 years has CPI as 100%.

4.2 Result for Cumulative percentage of impact

Table4: CPI of IVs of allX_1, X_2, X_3, X_5, X_6, X_8

Time (Year)	X1	X2	X3	X5	X6	X7	X8
1995	11.1%	11.1%	22.2%	11.1%	11.1%	88.9%	11.1%
1996	22.2%	22.2%	11.1%	11.1%	11.1%	100.0%	11.1%
1997	22.2%	22.2%	11.1%	22.2%	22.2%	100.0%	22.2%
1998	11.1%	0.0%	22.2%	11.1%	11.1%	100.0%	11.1%
1999	22.2%	22.2%	22.2%	11.1%	11.1%	100.0%	11.1%
2000	22.2%	22.2%	22.2%	11.1%	11.1%	100.0%	11.1%
2001	22.2%	22.2%	22.2%	22.2%	22.2%	77.8%	22.2%
2002	22.2%	22.2%	22.2%	22.2%	22.2%	77.8%	22.2%
2003	22.2%	22.2%	22.2%	22.2%	22.2%	77.8%	22.2%
2004	22.2%	22.2%	22.2%	22.2%	44.4%	77.8%	22.2%
2005	22.2%	22.2%	22.2%	22.2%	44.4%	77.8%	22.2%
2006	22.2%	33.3%	22.2%	22.2%	44.4%	77.8%	33.3%
2007	33.3%	55.6%	33.3%	44.4%	33.3%	66.7%	33.3%
2008	44.4%	44.4%	44.4%	33.3%	55.6%	77.8%	44.4%
2009	55.6%	33.3%	55.6%	55.6%	44.4%	55.6%	55.6%
2010	77.8%	66.7%	77.8%	88.9%	66.7%	33.3%	77.8%

2011	88.9%	77.8%	100.0%	100.0%	77.8%	22.2%	66.7%
2012	66.7%	88.9%	66.7%	77.8%	88.9%	11.1%	88.9%
2013	100.0%	100.0%	88.9%	66.7%	100.0%	44.4%	100.0%
2014	100.0%	100.0%	100.0%	66.7%	100.0%	33.3%	100.0%
2015	100.0%	100.0%	100.0%	100.0%	100.0%	22.2%	100.0%
2016	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%
2017	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%
2018	100.0%	100.0%	100.0%	100.0%	100.0%	55.6%	100.0%

Source: Data from VN GSO, consolidated and calculated by author

Table 4 is to illustrate the CPIs of all seven IVs consists of X_1, X_2, X_3, X_5, X_6, X_7, and X_8. The reason for not including $X_4$is because MLLH could not achieve the result of IV X_4. For this reason, IV X_4 is taken out. Other all seven IVs have their CPI in different levels. In detail,X_2 has CPI = 0% in 1998 and X_7 has CPI = 0% in two years 2016 – 2017. Based on step 2 of section 3.3.3that "CPIs are equal or over than 10% (CPI>=10%) is acceptable, CPI<10% is rejected". Therefore, CPI of X_2 in 1998 is taken out, and CPI of X_7in 2016 – 2017 have not chosen of LMR model 1 and LMR model 2, respectively.

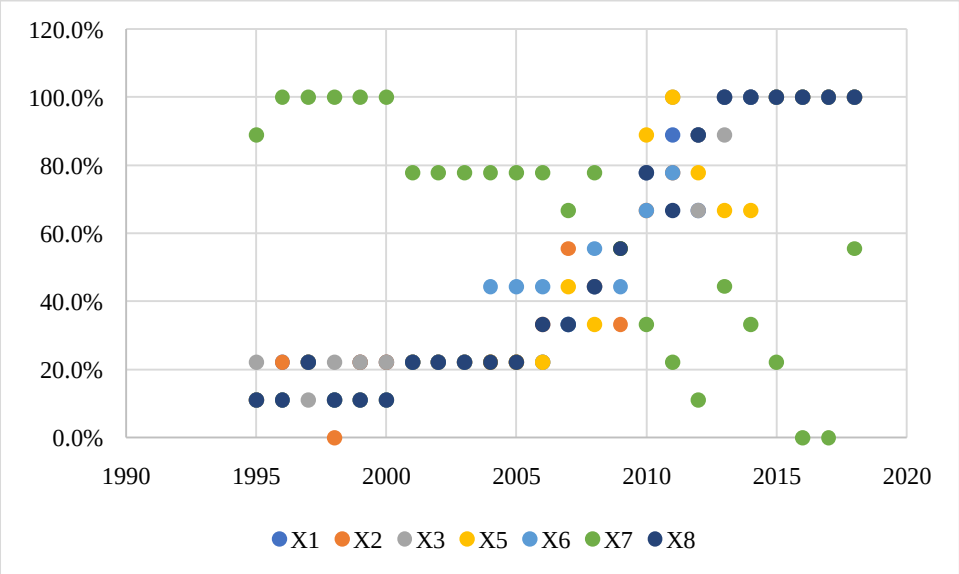


Figure 2: The scatter chart of CPI
Source: Data from VN GSO, consolidated and charted by author

The above chart is scattered the CIP of seven IVs which they are X_1, X_2, X_3, X_5, X_6, X_7, and X_8, there is not X_4 due to X_4 could not gained results of MLLH as per study result and explained under table 4. Here is to describes clearly, while X_1, X_2, X_3, X_5, X_6, and $X_8$are trended to have CIP at high level between 2013 and 2018, X_7 has reversed CIP that from 1996 to 2000 its CPI is 100%, 1995 is 88.9%, 2001-2006 and 2008 it is 77.8%. However, in the opposite way that CPI of X_1, X_2, X_5, X_6, and X_8 which almost their CPI is smallest values from 1995, having then fluctuation in increasing direction to the years after. Nonetheless, X_3 works in a little different way that started at 22.2% in 1995 then comes back to the lowest value in 1996 at 11.1%, it is from 1996 to the time after has similar situation as per X_1, X_2, X_5, X_6, and X_8.

Table5:Result of LMR of model 1.

R Square	0.92437047	
Adjusted R Square	0.90924457	
Significant F ($SF_{(W)}$)	0.0000000121889	
Intercept	1034.28262	
Regression Coefficient	$CPI_1 \mid X_1$	0.91569534
	$CPI_2 \mid X_2$	0.7992279
	$CPI_3 \mid X_3$	-0.0208841
P-value	$CPI_1 \mid X_1$	0.07020939
	$CPI_2 \mid X_2$	0.64340006
	$CPI_3 \mid X_3$	0.96255381

Source: Data from VN GSO, consolidated and calculated by author

Table 5is result of LMR of model 1 which there are three IVs consists of $CPI_1 \mid X_1$, $CPI_2 \mid X_2$, and $CPI_3 \mid X_3$. CPI | X is explained theoretically in section 4.3 "CPI is equal or over than 10% (CPI>=10%) be acceptable", that means IVs X have to be based on CPI which CPI>=10%. Model 1 does not include X_4due to explanation under table4 that "MLLH could not achieve the result of IV X_4"

The values of table 5give us information that is necessary of great value which is R Square (RS) and Adjusted R Square (ARS) to indicate the accuracy of comparison the regression and the input data (sometimes input data is called actual data), the above output result shown RS is 0.9244 (92%), ARS is 0.9092 (91%). ARS is 91% means that the accuracy of model 1 is 91%, or in other words it can be said that the model 1 is built with 93% accuracy, and ARS is also proven that the variance of output variables has been described by the variance of input variables. $SF_{(W)}$ is to show the probability of regression output and it is evidence of the regression output that could have been achieved by chance, $SF_{(W)}$ is $0.0000000121889 \neq 0$ and $0 < 0.0000000121889 < 0.005$ which means model 1 is built suitably and has highly statistical significance. Intercept value is to tell the location of interception point between the vertical axis and horizontal axis, this intercept is 1034.28262 means that interception point is above the horizontal axis. Regression coefficients of $CPI_1 \mid X_1$, $CPI_2 \mid X_2$, are 0.91569534, 0.7992279, respectively which both are > 0 is meant that $CPI_1 \mid X_1$ and $CPI_2 \mid X_2$impact on A/DV W, and $CPI_3 \mid X_3$is (0.0208841)< 0 means $CPI_3 \mid X_3$ does not impact on W. In other words, $CPI_1 \mid X_1$ and $CPI_2 \mid X_2$impact but $CPI_3 \mid X_3$does not impact on revenue from express service supply of postal companies. P-values are to indicate how actual of likelihood of output and coefficients are high value if the P-values are low. P-values of $CPI_1 \mid X_1$, $CPI_2 \mid X_2$, and $CPI_3 \mid X_3$ are 0.07020939, 0.64340006, and 0.96255381, respectively. Coefficient of $CPI_1 \mid X_1$ is the highest value, the lowest one is $CPI_3 \mid X_3$.

Table6:Data of LMR for model 1.

Year	W (Bil VND)	X1	X2	X3
2000	1,190.0	1,683.0	1,123.0	1,393.0
2001	2,009.0	2,226.0	1,626.8	1,869.5
2002	2,430.4	2,530.9	1,914.1	2,073.2
2003	2,633.2	2,688.0	1,831.0	2,688.0
2004	3,302.1	3,120.0	2,411.0	2,565.0
2005	4,761.2	3,680.0	2,815.0	2,985.7
2006	5,304.7	4,313.5	3,132.0	3,551.9
2007	7,712.0	5,478.4	3,419.2	4,685.6
2008	8,409.6	6,820.9	3,379.1	5,541.0
2009	10,278.4	7,844.9	3,120.1	6,846.8
2010	15,539.3	9,927.2	4,268.2	8,412.3
2011	18,091.6	10,780.6	4,361.7	9,085.1
2012	18,852.9	9,751.2	5,318.3	7,316.2
2013	24,820.6	10,956.6	5,934.4	8,686.5

2014	27,799.4	17,513.5	6,917.9	11,022.9
2015	30,444.1	22,475.6	8,674.4	14,271.1
2016	32,530.3	28,517.7	10,073.3	15,310.0
2017	36,111.8	31,875.6	12,680.4	17,131.9
2018	40,371.2	33,399.9	15,676.9	34,189.2

Source: Data from VN GSO, consolidated and calculated by author

Table 6 is input data of LMR for model 1 which result of LMR for model 1 is shown in table 5. This data consists of dependent variable W is at the second column from the left in Billion VND (W is revenue from express service supply of postal companies). And there are three IVs including X_1, X_2, and X_3 in other three columns on the right respectively. It does not include X_4due to explanation under table4 that "MLLH could not achieve the result of IV X_4".X_1, X_2, and X_3 have been done by MLLH and have been selected CPI is equal or over than 10% (CPI>=10%).

Table7: Result of LMR of model 2.

R Square	0.99610289	
Adjusted R Square	0.99298519	
Significant F ($SF_{(M)}$)	0.000003309	
Intercept	-5550.13003	
Regression Coefficient	$CPI_5 \mid X_5$	26.31734
	$CPI_6 \mid X_6$	77.5066586
	$CPI_7 \mid X_7$	-7.4991564
	$CPI_8 \mid X_8$	14.056622
P-value	$CPI_5 \mid X_5$	0.02738734
	$CPI_6 \mid X_6$	0.26094098
	$CPI_7 \mid X_7$	0.63435264
	$CPI_8 \mid X_8$	0.30165647

Source: Data from VN GSO, consolidated and calculated by author

Table 7 is result of LMR of model 2 which there are three IVs consists of $CPI_5 \mid X_5$, $CPI_6 \mid X_6$, $CPI_7 \mid X_7$, and $CPI_8 \mid X_8$. CPI | X is explained theoretically in section 4.3 "CPI is equal or over than 10% (CPI>=10%) be acceptable", that means IVs X have to be based on CPI which CPI>=10%. Model 2 has total enough four IVs X from X_5 to X_8 which all have CPI >=10%. The values of table 7shows the most important of model 2 through the values are RS and ARS that indicate the accuracy of comparison the regression and the input data or actual data. The output result in table 15 shown RS is 0.99610289 (100%), ARS is 0.99298519(99%). ARS is 99% means that the accuracy of model 2 is 99%. In other words, it can be said that the model 2 is accuracy at 99%, and ARS is evidence for the variance of output variables has been illustrated by the variance of input variables. $SF_{(M)}$ is to show the probability of regression output and it is indication of the regression output that could have been achieved by chance, $SF_{(M)}$ is 0.000003309≠ 0 and 0 <0.000000028 < 0.005 that means model 2 is built suitably and has extremely highly statistical significance. Intercept value is to give the location of interception point between the vertical axis and horizontal axis, intercept of model 2 is (5550.13003) means that interception point is under the horizontal axis. Regression coefficients of $CPI_5 \mid X_5$, $CPI_6 \mid X_6$, and $CPI_8 \mid X_8$are 26.31734, 77.5066586, and 14.056622, respectively which all are > 0 is to mean that $CPI_5 \mid X_5$, $CPI_6 \mid X_6$, and $CPI_8 \mid X_8$impact on dependent variable M, and $CPI_7 \mid X_7$is (7.4991564)< 0 means $CPI_7 \mid X_7$ does not impact on M. In other words, While $CPI_5 \mid X_5$, $CPI_6 \mid X_6$, and $CPI_8 \mid X_8$impact, $CPI_7 \mid X_7$does not impact on revenue from passenger transportation service supply of travel and tourist companies. P-values are to prove how actual of likelihood of output. The coefficients will be high value if the P-values are low. P-values of $CPI_5 \mid X_5$, $CPI_6 \mid X_6$, $CPI_8 \mid X_8$, and $CPI_7 \mid X_7$ are 0.02738734, 0.26094098, 0.30165647, and 0.63435264, respectively, given coefficient of $CPI_5 \mid X_5$ is the highest value, the following is $CPI_6 \mid X_6$, then $CPI_8 \mid X_8$, and the lowest value is $CPI_7 \mid X_7$.

Table8: Data of LMR for model 2.

Year	M(Bil VND)	X5	X6	X7	X8
2007	1611.4	86.5	43.1	94.7	185.2
2008	2315.3	83.7	47.7	88.3	207.3
2009	3141.8	95.6	44.1	106.0	210.6
2010	6048	121.6	68.5	121.2	305.6
2011	6731.7	128.5	71.8	127.5	299.2
2012	7251	114.4	76.6	132.2	342.9
2013	8447.4	101.3	82.4	106.4	363.4
2014	9434.4	111.8	90.2	109.4	425.0
2015	10961.1	130.2	99.4	125.1	474.4
2018	21853.5	264.8	139.6	102.1	735.1

Source: Data from VN GSO, consolidated and calculated by author

Table 8 is input data of LMR model 2 which result shows in table 7. This data includes dependent variable M is in the second column from the left in Billion VND (M is revenue from passenger transportation service supply of travel and tourist companies). And there are four IVs including X_5, X_6, X_7, and X_8 in other four columns on the right respectively. X_5, X_6, X_7, and X_8 have been done by MLLH and have been selected CPI is equal or over than 10% (CPI>=10%). So, data of table 8 does not include year 2016 and 2017.

V. Discussion and Conclusion

5.1 Discussion

This paper uses Maximum Log Likelihood-Assessing fit of a Logistics Regression and Logistics-multivariate regression to assess Air Transportation Logistics Performance by eight independent variables which are X_1, X_2, X_3, X_4, X_5, X_6, X_7, and X_8, in which $X_1$to X_4 are independent variables of factor index of passenger load, X_5 to X_8 are independent variables of factor index of goods load.

The study highlight findings are below:

The first: Output of Maximum Log Likelihood-Assessing fit of a Logistics Regression is all of eight in dependent variables impact on Air Transportation Logistics Performance with the lowest of cumulative percentage of impact is 11.1% and the highest of cumulative percentage of impact is 100%.

The second: Maximum Log Likelihood-Assessing fit of a Logistics Regression assesses one by one independent variables X_1, X_2, X_3, X_4, X_5, X_6, X_7, and X_8. The result isX_4could not been achieved by Maximum Log Likelihood, and X_2 has cumulative percentage of impact = 0% in 1998 and X_7 has cumulative percentage of impact = 0% in 2016 and 2017.

The third: Scatter chart illustrates that while cumulative percentage of impact of X_1, X_2, X_3, X_5, X_6, and $X_8$are trended to have the biggest level at 100% between 2013 and 2018, cumulative percentage of impact of X_7 which the highest level is 100% from 1996 to 2000. While X_1, X_2, X_5, X_6, and X_8have cumulative percentage of impact which are almost at the lowest from 1995, cumulative percentage of impact X_7 is 0% in two years 2016, 2017, and is 11.1% in 2012. In other way, cumulative percentage of impact of X_3 is 22.2% in 1995, it then went down to 11.1% is the smallest in 1996.

*The fourth:*Logistics-multivariate regression model 1 and model 2 shown results that Adjusted R Squares are 91% and 92 %, Significant $F_{(W)}$ is 0.0000000121889, Significant $F_{(M)}$ is 0.000003309, respectively, which is to indicate that the input data is suitable to models and they have high statistical significance.

5.2 Conclusion

Cumulative percentage of impactof X_1 = 0.91569534, cumulative percentage of impactof X_2 = 0.7992279, cumulative percentage of impactof X_3= -0.0208841, cumulative percentage of impact of X_5 = 26.31734, cumulative percentage of impact of X_6 = 77.5066586,cumulative percentage of impactof $X_7$is -7.4991564, and cumulative percentage of impactof X_8= 14.056622 which is to confirm that X_1(total number of passengers have been transport by air in local Vietnam without distinguishing of the lengh of transported distance) and X_2 (total number of passengers have been transport by air from Vietnam to oversease without distinguishing of the lengh of transported distance) impact on revenue from express service supply of postal companies. X_3(total number of passengers have been transport by air in local Vietnam, multiply by the actual lengh of transported distance) does not impact on revenue from express service supply of postal companies.X_5 (total volume of goods have been carried by air in local Vietnam without distinguishing of the lengh of

transported distance), X_6 (total volume of goods have been carried by air from Vietnam to oversease without distinguishing of the lengh of transported distance) and X_8(total volume of goods have been carried by air from Vietnam to oversease, multiply by the actual lengh of transported distance) impact on revenue from passenger transportation service supply of travel and tourist companies. X_7(total volume of goods have been carried by air in local Vietnam, multiply by the actual lengh of transported distance) does not impact on revenue from passenger transportation service supply of travel and tourist companies

Contribution

The paper found out that index of passengers and goods loading have Cumulative percentage of impact at the different levels at different years and periods on Air transport logistics performance. Index loadding of passengers and goods without distinguishing of the lengh of transported distance and the ones that multiplying by the actual lengh of transported distance have different impacts on Air transport logistics performance too.

Future direction

Author has plan to study the similar content by using methodology are Cronbach's Alpha, Exploratory factor analysis, Pearson correlation and Multivariate regression or Multinomial logistic regression in order to assess and compare if the study results have any discrepancy.

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References:

[1.] James Preston Payne, Jr., 1952. A. B., William Jewell College, 1942. M.S., Oklahome A & M College., 1948. Thesis submitted in partial fulfilment of the requirements for the degree of doctor of philosophy in economics in the graduate college of the university of illinois.

[2.] Michael Sales, 2013. The air logistics handbook: air freight and the global supply chain. 2 Park Square, Milon Park, Abingdon, Oxon OX14 4RN. Simultaneously published in the USA and Canada.

[3.] Michael Sales, 2016. Aviation Logistics The dynamic partnership of air freight and supply chain. First published in Great Britain and the United States in 2016 by Kogan Page Limited.

[4.] Joh G. Wensveen, 2007. Air Transportation: A management perspective. Ashgate Publishing Limited, England, and Ashgate Pubishing Company, USA.

[5.] Jin Suk Park et al. 2019. The role of maritime, land, and air transportation in economic growth: Panel evidence from OECD and non-OECD countries. Research in Transportation Economics.

[6.] Thomas Telford, 1984. Economics of air transportation. British Library Cataloguing in Publication data.

[7.] Danyang Shen et al. 2019. Evaluation on the coordinated development of air logistics in Beijing-Tianjin-Hebei. Transportation Research Interdisciplinary Perspectives 1 (2019) 100034.

[8.] Hyuksoo Cho, Jungsun Lee. 2020. Does transportation size matter for competitiveness in the logistics industry? The cases of maritime and air transportation. The Asian Journal of Shipping and Logistics 36 (2020) 202–211.

[9.] Jose M. Carbo, Daniel J. Graha. 2020. Quantifying the impacts of air transportation on economic productivity: a quasi-experimental causal analysis. Economics of Transportation 24 (2020) 100195.

[10.] Liaoliao Duan et al. 2020. Transportation network and venture capital mobility: An analysis of air travel and high-speed rail in China. Journal of Transport Geography 88 (2020) 102852.

[11.] Claudia Archetti, Lorenzo Peirano. 2019. Air intermodal freight transportation: The freight forwarder service problem. Omega, https://doi.org/10.1016/j.omega.2019.02.009.

[12.] Alan Kinene et al. 2020. Decision Support for an Optimal Choice of Subsidised Routes in Air Transportation. Journal of Air Transport Management 82 (2020) 101724.

[13.] Haroon Ur Rashid Khanet al. 2018. The impact of air transportation, railways transportation, and port container T traffic on energy demand, customs duty, and economic growth: Evidence from a panel of low-, middle-, and high -income countries. Journal of Air Transport Management 70 (2018) 18–35.

[14.] Kenneth Button. 2019. Applied economics and understanding trends in air transportation policy. Transport Policy 80 (2019) 78–85.

[15.] Tao Li, Yan Wan. 2019. Estimating the geographic distribution of originating air travel demand using a bi-level optimization model. Transportation Research Part E 131 (2019) 267–291.

[16.] Sebastian Birolini et al. 2020. Integrated origin-based demand modelling for air transportation. Transportation Research Part E 142 (2020) 102050.

[17.] Enrico Angelelli et al. 2020. A Matheuristic for the Air Transportation Freight Forwarder Service Problem. Journal Pre-proofs S0305-0548(20)30119-2.

[18.] Yi Xiao et al. 2015. Oscillations extracting for the management of passenger flows in the airport of Hong Kong. Transportmetrica A: Transport Science, https://doi.org/10.1080/23249935.2015.1099576.

[19.] Hummera Saleem et al. 2018. The impact of air-railways transportation, energy demand, bilateral aid flows, and population density on environmental degradation: Evidence from a panel of next-11 countries. Transportation Research Part D 62 (2018) 152–168.

[20.] Syed Abdul Rehman Khan et al. 2017. Travel and tourism competitiveness index: The impact of air transportation, railways transportation, travel and transport services on international inbound and outbound tourism. Journal of Air Transport Management 58 (2017) 125-134[

[21.] Keshab Bhattarai, 2015. Research Methods for Economics and Related Studies. University of Hull Business School, Hull, England, UK

[22.] Jeffrey M. Wooldridge, 2020. Introductory Econometrics: A Modern Approach, Seventh Edition. Michigan State University, America