The Empirical Econometrics and Quantitative Economics Letters
ISSN 2286 – 7147
Volume 1, Number 3 (September 2012), pp. 9 – 18.

Demand for bus services between Bangkok and other provinces

Chariya Suwan* and Anupak Saosaovaphak

Faculty of Economics, Chiang Mai University
**E-mail: goodijan_13@hotmail.com*

ABSTRACT

The purpose of the study is to study the factors affecting the behavior and the demand for using buses between Bangkok and other provinces. This study examines the four main factors affecting the number of passengers. The factors consist of i) personal factors, ii) social factors, iii) carrier transport factors and iv) the beginning and end points of the trip factors. To fulfill the purpose of the study, the Poisson approach was employed. The data used in this study is the primary data obtained from samples of passengers who travel by bus between Bangkok and other provinces. 400 samples in total were selected from the bus terminal in Bangkok. The result shows that the Poisson approach cannot be explained by using the specification test for over dispersion; yet the marginal effect after the negative binomial regression can estimate the result with significance at five percent. Generally, there are 13 variables that affect the number of passengers: education, role of the family, schedules, entertainment (movie), entertainment (game), picking up and dropping passenger outside the terminal, number of seats per bus, role of the travel agent, time spent on the bus, facade of the bus, snack on the bus, promotion of bus transport, and promotion of other modes of transports.

Keywords: Passenger, Terminal, Bus

JEL Classification: L92, N75, R41

1. Introduction. Nowadays, transportation has played a crucial role. Because the economy is growing rapidly, transportation systems are needed to develop and to support the growth of the economy occurring in both urban and rural areas. For Thailand, there are many different modes of transportation available for passengers: road, water, rail and air. As those services can be accessed more easily, domestic passenger transportation has become convenient choices. (Kainate, 1998; Sakoltaluck, 1986)

One of the public transportations is bus; its main objectives are to carry passengers and to facilitate process of travelling for passengers. The development of bus transportation among public and private providers can generate the competitive environment, yet passengers can gain benefits from that. However, there are some problems. For instance, the bus system cannot provide specific services in some areas since the bus transport between Bangkok to other provinces is subjected to the monopoly. This is mainly because the government decides to limit the issuance of licenses to only some providers. (Kainate, 1998)

It has been proposed that there is a need to improve the link between the capital and other provinces by using the bus transportation system. Therefore, this study tries to examine the demand for bus transportation system so as to advance the quality of the service for such a system.

2. Methodology

2.1 Poisson Regression

The basic Poisson regression model relates the probability function of a dependent variable y_i to a vector of independent variables x_i . Let k be the number of regressors. x_i is then a column vector of dimension ($k \times 1$). lastly, n is the number of observations in the sample. (Rainer, 2008)

The standard univariate Poisson regression model make the following three assumptions. Assumptions 1 and 2 can be collective to obtain the following conditional probability function:

$$f(y|x) = \frac{\exp(-\exp(x'\beta))\exp(yx'\beta)}{y!} \qquad y = 0,1,2,\ldots$$

The Poisson distribution has only one parameter that concurrently determines conditional mean and variance. Therefore, the Poisson regression model as distinct by the assumptions above implies an exponential mean function,

$$E(y|x) = \lambda = \exp(x'\beta)$$

and an exponential conditional variance function

$$Var(y|x) = \lambda = \exp(x'\beta)$$

Where y_i = number of time to use terminal of bus

λ_i = parameter

x_i = independent variables or the factors that effect to number of time to use terminal of bus

β = coefficient of Independent variables

2.2 Negative Binomial Regression. The maximum likelihood procedure used to i) derive the estimates and ii) provide the estimated variability (standard errors) of those estimates in Poisson regression makes a strong (and testable) assumption that every subject within a covariate group (a population that has all the same values for $X_1, X_2, ..., X_p$) has the same underlying rate of the outcome.

As mentioned above, this also implies that the variability of counts within covariate group is equal to the mean, or:

$$Var(Y(X_1, X_2, ..., X_p)) = \exp(a + b_1 X_1 + b_2 X_2 + ... + b_p X_p)$$

If this fails to be true, the estimates of the coefficients can still be reliable using Poisson regression, but the standard errors can be biased and they will be too small. More usually than not, we would not expect that we have measured every variable that contributes to the rates of events, so there will always be residual variation in the rates of events among people who all have the same covariate values.(Cameron & Trivedi, 1986)

2.3 Overdispertion. Overdispertion is a concern in count data modeling because the standard Poisson regression model makes no allowance for it. The rate, at which event occur, $\lambda = \exp(x'\beta)$, is a deterministic function of the regressors. The dependent variable is random, conditional on λ because $x'\beta$ determines only the rate at which events occur, but not the event counts themselves, which are subject to the essential randomness of the Poisson process. If there are other variables that affect the rate at which events occur but are unobserved by the econometrician, and thus unaccounted for in the specification of the rate, we face a problem of overdispertion or unobserved heterogeneity. (Rainer, 2008; Trivedi & Cameron, 1998)

3. Data. The Data can divide in to 5 part of questionnaire. The first part is number of time to use the bus per year. Next past is personal factor (X_1) by this factor having 4 sub-factors, sex, age, education, income and objective of travel. Third is social factor (X_2) having 5 sub-factors, culture and traditions, role of family, classes of social, reference group influences and role of travel agent. Next factor is carrier transport (X_3) having 10 sub-factors, cost, other cost, schedules, period time on bus, equipment, entertainment, service, distribution and promotion. And the last factor is start and end of travel (X_4) having 2 sub-factors, Place of terminal (Start) and Place of terminal (End)

4. Results and Discussions. The result was estimated by Poisson Regression Approach has already shown that 29 of the 31 repressors in estimate for women and 27 of the 31 repressors in estimate for men. There are statistically significant at the conventional significant levels. However, this estimation cannot be passed by the specification test for overdispersion. Consequently, this estimation was not preferred to explain the bus demand. Therefore, the Negative Binomial Regression Model was conducted to estimate the model. (Cameron & Trivedi, 1986; Trivedi & Cameron, 1998)

TABLE 1. The estimation based on Poisson Regression model for women

Poisson regression			Number of obs = 157			
LR chi2(31) = 21644.38			Prob > chi2 = 0.0000			
Log likelihood = -4185.8927			Pseudo R2 = 0.7211			
y	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
)x12)	-0.11332	0.00435	-26.05	0.000	-0.12185	-0.1048
(x13)	-0.04734	0.010874	-4.35	0.000	-0.06866	-0.02603
(x14)	2.91E-05	4.15E-06	7.02	0.000	0.000021	3.73E-05
(x21)	0.305036	0.020015	15.24	0.000	0.265808	0.344264
(x22)	-0.21719	0.019674	-11.04	0.000	-0.25575	-0.17863
(x23)	-0.00755	0.025925	-0.29	0.771	-0.05836	0.043261
(x241)	-0.21071	0.023513	-8.96	0.000	-0.2568	-0.16463
(x242)	0.802257	0.024841	32.3	0.000	0.753569	0.850945
(x25)	-0.71393	0.026925	-26.51	0.000	-0.7667	-0.66115
(x31)	-0.47215	0.022353	-21.12	0.000	-0.51596	-0.42834
(x32)	-0.29111	0.021868	-13.31	0.000	-0.33397	-0.24825
(x33)	0.062151	0.02817	2.21	0.027	0.006939	0.117363
(x34)	-0.34751	0.025687	-13.53	0.000	-0.39786	-0.29717
(x35)	1.194712	0.03105	38.48	0.000	1.133855	1.255568
(x361)	-1.05915	0.032884	-32.21	0.000	-1.1236	-0.9947
(x362)	-0.35061	0.032084	-10.93	0.000	-0.4135	-0.28773
(x363)	-0.48202	0.025986	-18.55	0.000	-0.53295	-0.43109
(x371)	-0.20338	0.0309	-6.58	0.000	-0.26395	-0.14282
(x372)	0.777297	0.030518	25.47	0.000	0.717483	0.837111
(x373)	-0.25579	0.028021	-9.13	0.000	-0.31071	-0.20087
(x381)	0.881605	0.028019	31.46	0.000	0.826689	0.936522
(x382)	0.528874	0.024872	21.26	0.000	0.480126	0.577623
(x383)	-0.07174	0.03044	-2.36	0.018	-0.1314	-0.01208
(x384)	0.013041	0.029782	0.44	0.661	-0.04533	0.071412
(x391)	0.286312	0.023648	12.11	0.000	0.239963	0.33266
(x392)	0.268770	0.029655	9.06	0.000	0.210647	0.326892
(x393)	0.220727	0.030991	7.12	0.000	0.159986	0.281468
(x310)	0.360871	0.031547	11.44	0.000	0.29904	0.422702
(x311)	-0.16496	0.028259	-5.84	0.000	-0.22035	-0.10958
(x41)	0.097962	0.039965	2.45	0.014	0.019632	0.176293
(x42)	0.569934	0.039476	14.44	0.000	0.492562	0.647306
_cons	1.177517	0.256651	4.59	0.000	0.674491	1.680543

Measures of Fit for poisson of y			
Log-Lik Intercept Only: -15008.082		Log-Lik Full Model: -4185.893	
D(122): 5341.839	LR(31): 21644.379		Prob > LR: 0.000
McFadden's R2: 0.721			McFadden's Adj R2 : 0.719
Maximum Likelihood R2: 1.000			Cragg & Uhler's R2: 1.000
AIC: 53.731	AIC*n: 8435.785	BIC: 7739.755	BIC': -21487.635

TABLE 2. The estimation based on Poisson Regression model for men

Poisson regression			Number of obs = 198			
LR chi2(31) = 16950.13			Prob > chi2 = 0.0000			
Log likelihood = -6273.528			Pseudo R2 = 0.5746			
y	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
)x12)	-0.14229	0.003532	-40.28	0.000	-0.14921	-0.13536
(x13)	0.336527	0.011692	28.78	0.000	0.313612	0.359442
(x14)	2.86E-06	2.00E-06	1.43	0.153	-1.06E-06	6.78E-06
(x21)	-0.05415	0.016657	-3.25	0.001	-0.0868	-0.0215
(x22)	0.448502	0.021668	20.7	0.000	0.406034	0.49097
(x23)	-0.25185	0.021758	-11.58	0.000	-0.29449	-0.20921
(x241)	0.414974	0.019188	21.63	0.000	0.377367	0.45258
(x242)	-0.08818	0.021256	-4.15	0.000	-0.12984	-0.04652
(x25)	0.004944	0.018592	0.27	0.790	-0.03149	0.041383
(x31)	-0.27917	0.017154	-16.28	0.000	-0.31279	-0.24555
(x32)	-0.0119	0.022773	-0.52	0.601	-0.05654	0.032731
(x33)	0.400605	0.022947	17.46	0.000	0.35563	0.445579
(x34)	-0.87769	0.020184	-43.49	0.000	-0.91725	-0.83813
(x35)	0.340641	0.023508	14.49	0.000	0.294566	0.386716
(x361)	-0.13521	0.022945	-5.89	0.000	-0.18018	-0.09024
(x362)	0.312884	0.021941	14.26	0.000	0.269879	0.355888
(x363)	0.544038	0.021239	25.62	0.000	0.502411	0.585665
(x371)	0.844594	0.021008	40.2	0.000	0.80342	0.885768
(x372)	0.043105	0.022369	1.93	0.054	-0.00074	0.086947
(x373)	-0.55835	0.024977	-22.36	0.000	-0.60731	-0.5094
(x381)	0.125067	0.023941	5.22	0.000	0.078143	0.171991
(x382)	0.124424	0.021469	5.8	0.000	0.082346	0.166501
(x383)	-0.07712	0.031607	-2.44	0.015	-0.13907	-0.01517
(x384)	-0.37561	0.022782	-16.49	0.000	-0.42026	-0.33096
(x391)	-0.44561	0.020388	-21.86	0.000	-0.48557	-0.40565
(x392)	0.614377	0.024967	24.61	0.000	0.565443	0.663311
(x393)	0.535702	0.026219	20.43	0.000	0.484315	0.587089
(x310)	0.264208	0.022609	11.69	0.000	0.219895	0.308521
(x311)	0.137974	0.021483	6.42	0.000	0.095868	0.18008
(x41)	-0.08400	0.028392	-2.96	0.003	-0.13965	-0.02835
(x42)	-0.23249	0.025908	-8.97	0.000	-0.28327	-0.18171
_cons	-4.05728	0.23941	-16.95	0.000	-4.52652	-3.58805
Measures of Fit for poisson of y						
Log-Lik Intercept Only: -14748.594			Log-Lik Full Model: -6273.528			
D(166): 12547.056		LR(31): 16950.131		Prob > LR: 0.000		
McFadden's R2: 0.575			McFadden's Adj R2: 0.572			
Maximum Likelihood R2: 1.000			Cragg & Uhler's R2: 1.000			
AIC: 63.692	AIC*n: 12611.056		BIC: 11669.204		BIC': -16786.195	

TABLE 3. The estimation based on Negative binomial regression for women

Negative binomial regression		Number of obs = 157				
LR chi2(29) = 136.53		Dispersion = mean		Prob > chi2 = 0.0000		
Log likelihood = -611.24937			Pseudo R2 = 0.1005			
y	Coef.	Std. Err.	z	P>z	[95% Conf.Interval]	
)x12)	-0.00684	0.024313	-0.28	0.779	-0.05449	0.040816
(x13)	0.01426	0.056045	0.25	0.799	-0.09559	0.124106
(x14)	-9.97E-08	2.03E-05	0.00	0.996	-4E-05	3.97E-05
(x21)	0.189832	0.120104	1.58	0.114	-0.04557	0.425232
(x22)	-0.07487	0.123893	-0.60	0.546	-0.31769	0.167959
(x241)	-0.18489	0.150084	-1.23	0.218	-0.47905	0.10927
(x242)	0.291589	0.148265	1.97	0.049	0.000995	0.582183
(x25)	-0.47036	0.13613	-3.46	0.001	-0.73717	-0.20355
(x31)	-0.28246	0.139335	-2.03	0.043	-0.55555	-0.00937
(x32)	-0.08963	0.138517	-0.65	0.518	-0.36112	0.181857
(x33)	-0.12116	0.173468	-0.70	0.485	-0.46115	0.218826
(x34)	-0.1848	0.150326	-1.23	0.219	-0.47944	0.109831
(x35)	0.692705	0.151687	4.57	0.000	0.395404	0.990007
(x361)	-0.60181	0.155615	-3.87	0.000	-0.90681	-0.29681
(x362)	-0.0533	0.042385	-1.26	0.209	-0.13637	0.02977
(x363)	-0.14752	0.162231	-0.91	0.363	-0.46549	0.170446
(x371)	-0.00047	0.066006	-0.01	0.994	-0.12983	0.128903
(x372)	0.399672	0.142796	2.80	0.005	0.119796	0.679548
(x373)	-0.02405	0.034499	-0.70	0.486	-0.09166	0.043567
(x381)	0.271492	0.128344	2.12	0.034	0.019943	0.523042
(x382)	0.189337	0.139437	1.36	0.175	-0.08396	0.462629
(x383)	-0.19456	0.188722	-1.03	0.303	-0.56445	0.175328
(x391)	0.186991	0.143346	1.30	0.192	-0.09396	0.467945
(x392)	0.189384	0.167502	1.13	0.258	-0.13891	0.517682
(x393)	0.153447	0.209410	0.73	0.464	-0.25699	0.563883
(x310)	0.357939	0.187025	1.91	0.056	-0.00862	0.7245
(x311)	-0.19023	0.162086	-1.17	0.241	-0.50791	0.127455
(x41)	0.120507	0.205125	0.59	0.557	-0.28153	0.522546
(x42)	0.213448	0.224488	0.95	0.342	-0.22654	0.653436
_cons	1.224908	1.591307	0.77	0.441	-1.894	4.343812
/lnalpha	.2659848	0.102338			0.065405	0.466564
alpha	1.304715	0.133522			1.067591	1.594507
Likelihood-ratio test of alpha=0: chibar2(01) = 7149.52 Prob>=chibar2 = 0.000						
Measures of Fit for nbreg of y						
Log-Lik Intercept Only: -679.513			Log-Lik Full Model: -611.249			
D(126): 1222.499		LR(29): 136.528		Prob > LR: 0.000		
McFadden's R2: 0.100			McFadden's Adj R2: 0.055			
Maximum Likelihood R2: 0.462			Cragg & Uhler's R2: 0.462			
AIC: 8.182	AIC*n: 1284.499		BIC: 585.412		BIC': 10.103	

TABLE 4. Show the estimated based on Negative binomial regression for men

Negative binomial regression				Number of obs = 157		
LR chi2(27) = 167.12	Dispersion = mean			Prob > chi2 = 0.0000		
Log likelihood = -595.95503				Pseudo R2 = 0.1230		
y	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
)x12)	-0.00597	0.009882	-0.60	0.546	-0.02534	0.013403
(x13)	0.134551	0.03761	3.58	0.000	0.060836	0.208266
(x21)	-0.16477	0.116278	-1.42	0.156	-0.39267	0.063126
(x22)	0.201918	0.120228	1.68	0.093	-0.03372	0.43756
(x23)	-0.02493	0.098941	-0.25	0.801	-0.21886	0.168987
(x241)	0.164887	0.112269	1.47	0.142	-0.05516	0.384931
(x242)	0.105509	0.11076	0.95	0.341	-0.11158	0.322594
(x31)	-0.10406	0.120456	-0.86	0.388	-0.34015	0.132029
(x33)	0.116224	0.123121	0.94	0.345	-0.12509	0.357537
(x34)	-0.20271	0.126956	-1.60	0.110	-0.45154	0.04612
(x35)	-0.05134	0.138698	-0.37	0.711	-0.32319	0.220499
(x361)	0.058967	0.140302	0.42	0.674	-0.21602	0.333955
(x362)	-0.08366	0.136259	-0.61	0.539	-0.35072	0.183402
(x363)	0.471442	0.117405	4.02	0.000	0.241332	0.701551
(x371)	0.342656	0.12307	2.78	0.005	0.101444	0.583868
(x373)	0.102742	0.140483	0.73	0.465	-0.1726	0.378084
(x381)	-0.27089	0.172909	-1.57	0.117	-0.60979	0.068004
(x382)	0.094256	0.123081	0.77	0.444	-0.14698	0.33549
(x383)	0.046414	0.189484	0.24	0.806	-0.32497	0.417796
(x384)	-0.15613	0.121951	-1.28	0.200	-0.39515	0.082889
(x391)	-0.16367	0.127499	-1.28	0.199	-0.41356	0.086224
(x392)	0.162419	0.133847	1.21	0.225	-0.09992	0.424754
(x393)	0.165627	0.170467	0.97	0.331	-0.16848	0.499737
(x310)	0.053363	0.121594	0.44	0.661	-0.18496	0.291682
(x311)	0.018574	0.130679	0.14	0.887	-0.23755	0.274701
(x41)	-0.05466	0.194304	-0.28	0.778	-0.43549	0.326167
(x42)	-0.09808	0.18092	-0.54	0.588	-0.45267	0.256521
_cons	-0.85662	1.25132	-0.68	0.494	-3.30916	1.595926
/lnalpha	0.266560	0.088306			0.093483	0.439639
alpha	1.305467	0.115281			1.097992	1.552146
Likelihood-ratio test of alpha=0: chibar2(01) = 4150.41 Prob>=chibar2 = 0.000						
Measures of Fit for nbreg of y						
Log-Lik Intercept Only: -906.771			Log-Lik Full Model: -841.451			
D(182): 1682.903	LR(27): 130.640		Prob > LR: 0.000			
McFadden's R2: 0.072			McFadden's Adj R2: 0.040			
Maximum Likelihood R2: 0.462			Cragg & Uhler's R2: 0.462			
AIC: 8.251	AIC*n: 1740.903		BIC: 708.865		BIC': 13.860	

TABLE 5. The estimation based on Marginal effect for women

Average marginal effects			Number of obs = 157			
Model VCE : OIM						
	Delta-method					
	dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
)x12)	-0.19836	0.699314	-0.28	0.777	-1.56899	1.172271
(x13)	0.413774	1.635326	0.25	0.800	-2.79141	3.618954
(x14)	-2.89E-06	0.000589	0.00	0.996	-0.00116	0.001152
(x21)	5.508119	3.695826	1.49	0.136	-1.73557	12.75181
(x22)	-2.17231	3.617687	-0.6	0.548	-9.26285	4.918227
(x241)	-5.36469	4.592107	-1.17	0.243	-14.3651	3.635672
(x242)	8.460657	4.584422	1.85	0.065	-0.52465	17.44596
(x25)	-13.6478	4.845846	-2.82	0.005	-23.1455	-4.15015
(x31)	-8.19582	4.345123	-1.89	0.059	-16.7121	0.320461
(x32)	-2.60073	4.002387	-0.65	0.516	-10.4453	5.243802
(x33)	-3.51567	5.126862	-0.69	0.493	-13.5641	6.532794
(x34)	-5.3622	4.506223	-1.19	0.234	-14.1942	3.469833
(x35)	20.09935	5.726451	3.51	0.000	8.87571	31.32298
(x361)	-17.4619	5.395205	-3.24	0.001	-28.0363	-6.88751
(x362)	-1.54661	1.264587	-1.22	0.221	-4.02516	0.931936
(x363)	-4.28044	4.787271	-0.89	0.371	-13.6633	5.102444
(x371)	-0.01352	1.915264	-0.01	0.994	-3.76737	3.740328
(x372)	11.59678	4.766365	2.43	0.015	2.254872	20.93868
(x373)	-.6977976	1.006307	-0.69	0.488	-2.670124	1.274529
(x381)	7.877541	3.899123	2.02	0.043	0.235399	15.51968
(x382)	5.493741	4.109025	1.34	0.181	-2.5598	13.54728
(x383)	-5.6453	5.698256	-0.99	0.322	-16.8137	5.523077
(x391)	5.425693	4.320848	1.26	0.209	-3.04302	13.8944
(x392)	5.495121	5.021728	1.09	0.274	-4.34729	15.33753
(x393)	4.45238	6.137939	0.73	0.468	-7.57776	16.48252
(x310)	10.38585	5.754923	1.80	0.071	-0.89359	21.66529
(x311)	-5.51959	4.767049	-1.16	0.247	-14.8628	3.823653
(x41)	3.496606	6.028323	0.58	0.562	-8.31869	15.3119
(x42)	6.193336	6.551474	0.95	0.344	-6.647317	19.03399

Measures of Fit for nbreg of y			
Log-Lik Intercept Only: -679.513		Log-Lik Full Model: -611.249	
D(126): 1222.499	LR(29): 136.528	Prob > LR: 0.000	
McFadden's R2: 0.100		McFadden's Adj R2: 0.055	
Maximum Likelihood R2: 0.581		Cragg & Uhler's R2: 0.581	
AIC: 8.182	AIC*n: 1284.499	BIC: 585.412	BIC': 10.103

Table 3 and 4 present the result from estimation based on Negative Binomial Regression Model and also this table is not present the regression cannot be explained by simple way. The results were estimated by Negative Binomial Regression Model has already shown that 7 of the 29 exogenous variable of model for women and 3 of the 27 exogenous variable of model for men are statistic significant at the conventional significant levels. In table 5 and 6 present the marginal effect. The exogenous variable are statistically significant at the conventional significant levels were conducted to consider the elasticity measurement. These exogenous variable impacts to the number of Buses Demand Operating between Bangkok and Other Provinces can divide in 2 results, the result of Marginal effect for women and the result of Marginal effect for men.

TABLE 6. Show the estimated based on Marginal effect for men

Average marginal effects				Number of obs = 157		
Model VCE : OIM						
	Delta-method					
	dy/dx	Std. Err.	z	P>z	[95% Conf.	Interval]
)x12)	-.1663385	.2728431	-0.61	0.542	-0.7011	0.368424
(x13)	3.751199	1.143501	3.28	0.001	1.509978	5.992421
(x21)	-4.593822	3.322127	-1.38	0.167	-11.1051	1.917427
(x22)	5.629371	3.469442	1.62	0.105	-1.17061	12.42935
(x23)	-.6951617	2.763132	-0.25	0.801	-6.1108	4.720478
(x241)	4.596977	3.158275	1.46	0.146	-1.59313	10.78708
(x242)	2.941535	3.134036	0.94	0.348	-3.20106	9.084132
(x31)	-2.901175	3.381044	-0.86	0.391	-9.5279	3.72555
(x33)	3.240264	3.458027	0.94	0.349	-3.53735	10.01787
(x34)	-5.651442	3.563769	-1.59	0.113	-12.6363	1.333417
(x35)	-1.431441	3.891194	-0.37	0.713	-9.05804	6.195159
(x361)	1.643971	3.942355	0.42	0.677	-6.0829	9.370845
(x362)	-2.332384	3.845171	-0.61	0.544	-9.86878	5.204013
(x363)	13.14355	3.976212	3.31	0.001	5.350317	20.93678
(x371)	9.553068	3.603976	2.65	0.008	2.489405	16.61673
(x373)	2.864402	4.019945	0.71	0.476	-5.01455	10.74335
(x381)	-7.552292	5.094723	-1.48	0.138	-17.5378	2.433181
(x382)	2.627799	3.433921	0.77	0.444	-4.10256	9.35816
(x383)	1.293991	5.296688	0.24	0.807	-9.08733	11.67531
(x384)	-4.352809	3.513208	-1.24	0.215	-11.2386	2.532954
(x391)	-4.563033	3.628181	-1.26	0.209	-11.6741	2.548071
(x392)	4.528155	3.775435	1.20	0.230	-2.87156	11.92787
(x393)	4.617601	4.790624	0.96	0.335	-4.77185	14.00705
(x310)	1.487731	3.393815	0.44	0.661	-5.16402	8.139486
(x311)	.5178242	3.641089	0.14	0.887	-6.61858	7.654228
(x41)	-1.523957	5.414328	-0.28	0.778	-12.1358	9.08793
(x42)	-2.73429	5.075204	-0.54	0.590	-12.6815	7.212927
Measures of Fit for nbreg of y						
Log-Lik Intercept Only: -906.771				Log-Lik Full Model:		-841.451
D(123): 1682.903			LR(27): 130.640		Prob > LR:	0.000
McFadden's R2: 0.072				McFadden's Adj R2:		0.040
Maximum Likelihood R2: 0.462				Cragg & Uhler's R2:		0.462
AIC:8.251		AIC*n: 1740.903		BIC : 708.865		BIC': 13.860

The result of Marginal effect for women: The marginal effect of the role of the travel agent (X25) is -13%, indicating that if a passenger uses the information from the agency to decide to travel then they will use bus transportation around 13% less. The marginal effect of period time on bus (X35) is 20%, indicating that if passenger can manage a plan of activities on the bus then they will use bus transportation around 20% more. The marginal effect of facade of bus (X361) is -17%, indicating that if a passenger sees an interesting promotion then they will use bus transportation around 17% less. The marginal effect of entertainment (game) (X372) is 11%, indicating that if a passenger

sees an interesting entertainment (game) then they will use bus transportation around 11% more. The marginal effect of Snack on the bus (X381) is 78%, indicating that if a passenger plans to eat on the bus then they will use bus transportation around 78% more.

The result of Marginal effect for men: The marginal effect of education (X13) is 37%, indicating that if a passenger's strict in schedules of travel then they will use bus transportation around 37% more. The marginal effect of number of seat per bus (X363) is 13%, indicating that if a passenger chooses a normal bus that has many seats then they will use bus transportation around 13% more. The marginal effect of entertainment (movie) (X371) is 95%, indicating that if passenger wants to watch a movie during the trip then they will use bus transportation around 95% more.

7. Conclusions. This research study entitled "Demand for Bus Services Between Bangkok and Other Provinces" aims to examine the factors affecting the behavior and the demand of passengers for using bus services between Bangkok and other provinces employing the Poisson approach. Four main factors affecting the number of passengers consist of i) personal factors, ii) social factors, iii) carrier transport factors and iv) the beginning and end points of the trip factors. 400 samples were drawn from passengers in a Bus Terminal in Bangkok. Five variables affect women and Three variables affect men. Aspects which affect the number of passengers include education, entertainment (movie), entertainment (game), number of seat per bus, role of the travel agent, period the time on the bus, facade of the bus, and snacks on the bus. In addition, certain suggestions are proposed from questionnaire answers. The numbers of buses in some other provinces are rather limited. Some passengers expect more comfort and security and express a need of having more channels through which tickets can be purchased. All these suggestions should be considered and included in a plan to improve bus transport services in both public and private sectors to respond to the actual needs of most passengers.

REFERENCES

Barry, J. S. (1994). *Urban transportation*: New York Metropolitan Transportation Council.

Button, K. (2010). *Transport Economics* (3rd Edition ed.). Edward Elgar Publishing Limited.

Cameron, A. C., & Trivedi, P. K. (1986). econometric models based on count data: comparisons and applicationof some estimators and tests. *journal of applied econometrics* 29-53.

Coyle, J. J., Edward J., Bardi., & Robert A.N. (2005). *Transportation*.

Donald, F. W. (2012). Transportation Economics Available from http://www.britannica.com/EBchecked/topic/603153/transportation-economics/64325/Demand-for-passenger-transportation#ref528596

Emile, Q., Roger, V., & W., V. R. (2005). *Principles of Transport Economics*. Edward Elgar Publishing Limited.

Kainate, P. (1998). *Passenger transportation* :Bangkok: Ramkhamhaeng University Press.

Kanuk, G. S. L. (2004). *consumer behavior* (8th ed.).

Paul, P. J. (2004). *Consumer Behavior and Marketing Strategy* (8th ed.): McGraw-Hill/Irwin.

Rainer, W. (2008). *Econometric Analysis of Count Data* (fifth ed.). Springer: Library of Congress Control.

Sakoltaluck, P. (1986). *Economic transport* . Bangkok: Chulalongkorn University Press.

Schiffman, L. G. (2006). *Consumer Behavior* (9th ed.): Prentice Hall

Trivedi, P. K., & Cameron, A. C. (1998). Regression Analysis of Count Data (Econometric Society Monographs)