

University of Tulsa

Transit Ridership Forecast

Project

In the spring of 2008, the University of Tulsa College of Business Administration quantitative methods classes of Professor Wen-Chyuan Chiang formed teams to study and forecast the passenger ridership of Tulsa Transit's Lift Program service. The teams were asked to deliver a five-year ridership forecast, using the statistical methods and variable samples they felt relevant to the project.

The forecasts were evaluated by staff members from the University of Tulsa and Tulsa Transit, and two teams were recognized as delivering the most thorough and reasonable forecasts. Their findings are summarized below.

University of Tulsa

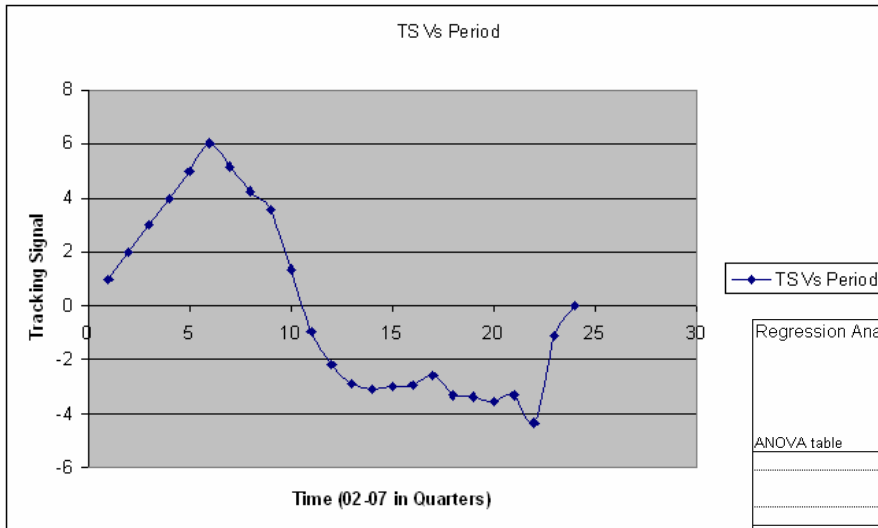
Transit Ridership Forecast

Facts

- The Lift Program represents 28% of the overall Tulsa Transit annual budget.
- As retail gasoline prices continue to increase, demand for paratransit services continue to increase.
- Per the 2000 Census, over 85,000 people with disabilities live in Tulsa County.
- In May 2008 the one-way Lift Program fare was increased from \$2.00 to \$2.50.

University of Tulsa Transit Ridership Forecast

Several statistical methods were used and the results were compared.



Regression Analysis Labor Force

r^2 0.760 n 6
 r 0.872 k 1
 Std. Error 3385.099 Dep. Var. Actual Demand (y)

ANOVA table

Source	SS	df	MS	F	p-value
Regression	145,114,002.0430	1	145,114,002.0430	12.66	.0236
Residual	45,835,577.9570	4	11,458,894.4892		
Total	190,949,580.0000	5			

Regression output

variables	coefficients	std. error	t (df=4)	p-value	95% lower	95% upper
Intercept	-256,809.9216	130,710.8137	-1.965	.1209	-619,721.3206	106,101.4774
Labor Force	1.0439	0.2934	3.559	.0236	0.2295	1.8584

Regression Analysis Population % Change

r^2 0.701 n 6
 r 0.837 k 1
 Std. Error 3779.238 Dep. Var. Actual Demand (y)

ANOVA table

Source	SS	df	MS	F	p-value
Regression	133,819,015.9527	1	133,819,015.9527	9.37	.0376
Residual	57,130,564.0473	4	14,282,641.0118		
Total	190,949,580.0000	5			

Regression output

variables	coefficients	std. error	t (df=4)	p-value	95% lower	95% upper
Intercept	200,708.9189	2,925.1867	68.614	2.70E-07	192,587.2986	208,830.5393
Population Growth % Change	950,885.1351	310,651.4625	3.061	.0376	88,378.4027	1,813,391.8676

Conclusion

Using the various selected quantitative models, Tulsa Transit may expect to see a 32% fixed route ridership increase over the next 5 years (FY09 – FY13).

University of Tulsa Transit Ridership Forecast

Team A

5-Year Prediction (FY09-FY13)

Multiple F	0.869660148				
R Square	0.756308772				
Adjusted	0.705539767				
Standard	1463.549753				
Observati	30				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regressio	5	159545832.9	31909166.57	14.89705699	1.08556E-06
Residual	24	51407469.14	2141977.881		
Total	29	210953302			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	-311095.468	57530.87599	-5.407452305	1.48673E-05	-429833.3694
Price	3240.658964	1153.336852	2.809811338	0.009705337	860.2887101
population	450.8940857	75.00733802	6.011332993	3.31369E-06	296.0865498
personal	-1.678680764	0.308709325	-5.437739096	1.37792E-05	-2.315825491
weather	71.26070619	33.37967315	2.134853325	0.043185946	2.368447271
operation	24.24631045	16.53568382	1.466302253	0.155547083	-9.881663378

2009	Forecast	2010	Forecast	2011	Forecast	2012	Forecast	2013	Forecast
Quarter 1	56312.84	Quarter 1	55629.56	Quarter 1	55758.24	Quarter 1	55793.69	Quarter 1	55395.07
Quarter 2	57739.40	Quarter 2	56957.23	Quarter 2	56873.59	Quarter 2	56680.51	Quarter 2	55564.00
Quarter 3	57339.66	Quarter 3	56630.20	Quarter 3	56605.15	Quarter 3	56460.68	Quarter 3	56809.79
Quarter 4	56260.58	Quarter 4	55807.08	Quarter 4	56017.82	Quarter 4	56597.35	Quarter 4	57217.93

FY09- 227,653 FY10- 225,024 FY11- 225,255 FY12- 225,533 FY13- 224,987

University of Tulsa Transit Ridership Forecast

Team B

5-Year Prediction (FY09-FY13)

$$Y = 200,798.92 + 950,885.14x$$

Ridership Forecast using Pop % Chng Model:

	1		2
Year	Demand Forecast		
2008			214,402
2009			216,140
2010			217,879
2011			219,618
2012			221,357

$$Y = -256,809.92 + 1,0439x$$

Ridership Forecast using Labor Force Model:

	1		2
Year	Demand Forecast		
2008			214,807
2009			216,662
2010			218,517
2011			220,371
2012			222,226

$$Y = 51,176.78 + 72.177x$$

Ridership Forecast using Time Series Model

		6	7
Year	Demand Forecast		
2008			212,360
2009			213,515
2010			214,669
2011			215,824
2012			216,979

University of Tulsa Transit Ridership Forecast

Team Members

Tulsa Transit wishes to thank Professor Wen-Chyuan Chiang and all of the University of Tulsa students who worked on this project. The team members whose work is summarized in this presentation are:

Team A

Brian Wurst
Mansour al-Sahlaw
Rob Laird
Joe Salem
Andy Aguilar

Team B

Ken Luttrell
Jesse Meyer
Jarod Tracy
John Warren
Julie Westfall