

Cost Benefit Analysis
of the
Latenight Streamline Bus Service

Cost Benefit Analysis 432

Introduction:

In 2007 ASMSU had a contract with a local cab company to offer rides to MSU students on the weekends for \$1 per student as long as they used their Cat Cards. Later that year, the taxi cab company sold their business to another owner. ASMSU created a "verbal contract" with the new taxi cab company to continue this agreement with the new owner. Unfortunately, ASMSU was charged much more by the new owner and could not afford to keep up with the demand. Luckily, the Streamline Bus was being organized by local groups and ASMSU decided to try to offer the service through what would be called the Latenight Streamline. The bus route tours from the bars looping around the campus to various residential areas around Tracy, Tamarack, Durston, and Babcock covering a large percentage of Bozeman's student populated areas (Lindner). The Latenight Streamline Bus operates Thursdays through Saturdays from 8:30 pm to 3:00 am.

The Streamline Bus is funded through a government grant known as the 5311 Grant which covers all of the Streamline services including the Latenight Bus. The amount of the grant varies year to year depending on a formula determined by the Department of Transportation (Hazelbaker). The values of the 5311 Grant for each year that the Streamline has been in operation are around \$900,000 and are listed in Table 1.

Apart from the grant, the Latenight Streamline Bus Service is also funded by a \$30,000 per year contract with ASMSU which comes as a part of MSU student fees and amounts to \$1.05 per student as of the beginning of the 2011 academic year (Ross). Other years and values are listed in Table 2. The contract held with Montana State University is a Memorandum of Understanding that coincides with the Streamline Bus Service's fiscal year (Hazelbaker). Total rider count for the Latenight Service per year is shown in Table 3. It is reasonable to assume that

the fiscal year coincides with the Memorandum of Understanding that the Streamline Bus holds with Montana State University due to the fact that the majority of riders will be using the service during the fall and spring semesters. Because of this and for simplicity purposes, I will be referring to the academic year student enrollment as concurrent with the fiscal year for the Latenight Streamline Bus.

The Streamline Bus is particularly interesting because of the demographics associated with its users. The vast majority of users of the Latenight service are young adults with about half being college students, according to my survey. College students are reported to be involved in about 2,000 alcohol related fatalities each year according to a report by Ralph Hingson et al. Further, Hingson et. al reports that of the 8 million U.S. college students, more than 2 million drove under the influence of alcohol, and more than 3 million rode with a drinking driver in the previous year. Also, more than 500,000 full-time, 4-year college students were unintentionally injured under the influence of alcohol. Their study also reported that the number of 18- to 24-year-old college students who reported driving under the influence of alcohol increased from 26.5% to 31.4% during the years of their data set, 1998 to 2005.

The purpose of a cost/benefit analysis is to determine the values of the Latenight Streamline Service compared to the total costs to offer the service.

Literature Review

There have been other programs implemented in Montana to reduce drunk driving and DUI rates. For the most part these kinds of programs are offering negative incentives to people who are in the position to drive drunk. Drinking and driving is a major issue in Montana because

the state has reported to have the highest DUI rates in the nation according to the National Highway Traffic Safety Administration (NHTSA).

NHTSA further accounts that Montana reported 3,264 arrested for driving under the influence in 2007. There were 123 fatalities in crashes due to drunk driving in 2007 which translates to 11.07 drunken driving-related deaths that year for every 100,000 Montanans. Montana has over 80% rural roads with its drivers reaching speeds over 55mph. The emergency response typically takes over an hour making accidents in Montana more likely to result in a fatality.

Because of statistics such as ~~this~~, on Friday October 7, 2011, Yellowstone County implemented a “crackdown policy” termed the 24/7 Sobriety Program that is being implemented statewide following the program outlined in House Bill 106, reported in an article in the Billings Gazette by Jackie Yamanaka. The program consists of second or subsequent DUI offenders who will be required to report twice daily to perform breathalyzer tests which will cost the offenders \$2 per breathalyzer. The 24/7 program is court ordered and can be part of the conditions of bond, pre-trial release, probation or parole.

Participants are expected to blow zeros on their first try. If they blow higher, the officer waits for 20 minutes and administers another breathalyzer. If it is another positive sample, the offender will be taken to the detention facility and the court is then notified that the person is in contempt of court (Yamanaka).

The House Bill was modeled after a program implemented in South Dakota that at one time reported having highways as dangerous as those in Montana. Results in South Dakota

reported fatalities in South Dakota dropped 33% while at the same time in Montana, fatalities increased 2% between 2006 to 2007 (Yamanaka).

Proposed Methods

The costs and benefits of the Latenight Streamline can be separated into two subcategories including Individual Benefits and Costs, and Social Benefits and Costs. For individual costs I surveyed users of the Streamline Bus to determine what other costs might be associated in taking the Latenight Bus home. In measuring individual benefits, I thought that it would be interesting to use two separate methods, one being a measure of stated preferences, and the other being the individual benefit of not obtaining a DUI when drinking.

(A) Individual Costs:

Apart from the sunk costs that are a part of student tuition and fees, I included in my survey what could be the individual's costs associated with using the Latenight Streamline's service. I surveyed participants to see if waiting for the Streamline and the rigidity of the schedule was any cost to users over the choice of alternative transportation. Of my survey group, 37.5% reported that waiting was some cost to them while the other 62.5% reported that they saw no cost in waiting to use the service. Because the bus operated on an hourly schedule, the total maximum opportunity cost in terms of waiting could not be more than the value of one hour. This estimation is only applicable to little over one third of the total ridership.

Other considerations that could be seen as a cost to the individual consumer is that there might be an incentive to consume more alcohol or go out more frequently for riders of the Streamline knowing that they are not responsible for driving home. Of my survey participants, 43.3% reported that their alcohol consumption changed, where 62.5% reported that their

consumption did not change. Of the 43.3% who reported that their alcohol consumption does change, all of them stated that they drink both more alcohol and more frequently. The ultimate question remains as to whether they perceived that as a cost or as a benefit of the Latenight Streamline.

The 5311 Grant is issued to the Streamline Bus regardless of whether they are offering the Latenight Service or not. The marginal costs of operating the bus are constant at \$30,000 each year due to the Memorandum of Understanding held between the Streamline Bus and ASMSU.

(B) Individual Benefits:

I issued a survey using a dichotomous choice method to obtain the individual rider's willingness to pay for the service offered by the Latenight Streamline. I made the assumption that if a person is willing to pay more than \$10 for a ride home, they would likely choose to take a taxi since that kind of service would be able to bring the rider straight home to their doorstep versus a bus stop that would take longer to arrive home due to the bus route system. Therefore, I asked participants how much they would be willing to pay for the service if it were not free to the public, and my distribution of responses is outlined in Table 4. According to Dan Workman, Latenight Bus driver, there are between 30 to 50 people who ride the bus each night that the Latenight Service is available. Because of this, I chose for my data collection to survey 30 people as my representative population for a typical night of riders.

Because the marginal cost of taking this ride home is zero, the consumer surplus across the 30 survey participants is easy to calculate. Adding up the consumer surplus across my participants, I recorded an estimated surplus of \$106 for a group of 30 riders on any given night.

This translates to an average consumer surplus of \$3.53 per person. If these stated preferences are an accurate representation, then a total consumer surplus could be extracted for riders in each year that the Latenight Streamline has been in operation. These totals are represented in Table 5. Using this measurement the total consumer surplus does not reach the costs associated to operate the streamline bus until the third year of operation.

The second approach of valuation of ridership is calculated through the costs associated with getting a DUI. According to the Midwest Research Institute, the probability associated with getting stopped for a DUI when driving with a Blood Alcohol Content level above .10 and driving a 10-mile ride is about one in 200. This translates to a contingency of getting a DUI is about .5%, based on subjective assignments by analysts.

According to Montana DUI Laws outlined in Montana DUI Vehicle Code § 61-8-409, a DUI offender has a minimum license suspension of 6 months, mandatory alcohol education, possible vehicle confiscation, possible ignition interlock device, at least 24 hours in jail, up to 60 days, fines between \$100-\$500 and possible probation. Punishments are more severe if the driver is involved in the injury or death of others (duiarresthelp).

Because other costs associated with getting a DUI, such as lost wages due to incarceration, are difficult to measure and may differ between offenders I chose to estimate the fiscal costs associated with getting a DUI as a first time offender in Montana. Montana law states that the cost of a first offense DUI will be between \$300-\$1,000 in fines (DUI.Findlaw.com). However, this estimate does not include lawyer bills and the increases in costs of insurance.

Christopher Solomon includes a detailed estimate of all fiscal costs associated with a DUI includes towing fees, insurance premiums, legal fees, cost of bail, fines and alcohol evaluation adding up to an average of \$9,500. Depending on the state issuing the fines, it could be over \$16,000. For a conservative estimate I will start with using his average sum of \$9,500. With this net value and the previously mentioned probability, the Personal Net Value is \$47.50 for one person driving a 10-mile commute with a BAC over .10.

Using this measure of cost associated with driving home versus taking the Latenight Streamline, a new valuation can be estimated for the benefits of using the Latenight service. This Personal Net Value of the option to use the Streamline can be allocated across and is congruent with the estimation of one DUI per 200 drunk drivers.

Based on these costs and probabilities, the Latenight Streamline is offering total values of avoiding DUI's outlined in Table 6. Implications to this measure are that the people who are choosing to ride the Latenight Streamline not necessarily would have driven home. There are a percentage of people who would have chosen to walk home, use a designated driver, or had chosen to not drink as much or go out at all. Therefore, this estimate is likely overstated, but^{is} still a large number and higher than \$30,000.

(C) Social Costs

Social costs associated with these kinds of services include negative externalities associated with an increase in drunken people collecting at bus stops. I anticipated possible increases in public drunkenness or disorderly conduct rates downtown on nights when the Streamline is operating due to the fact that there are more inebriated people collecting at the bus stop waiting for a ride home. I surveyed the officers who patrol weekends downtown at the bus

stop, if they saw increases in this type of behavior, and the response was that “drinking (in general) increases public drunkenness and has nothing to do with the Streamline” (Sinness).

(D) Social Benefits

Obvious benefits of the Latenight Streamline Service include the decrease in drinking and driving home which can be valued in a similar way as before. As mentioned, the minimum time spent in jail for a DUI offense is 24 hours. Data available on Montana Prisons and Correction Facilities show that the costs of housing an inmate at a pre-release center is \$50 for females and \$40 for males. Based on these numbers, valuation for overhead saved in potential DUI cases is shown in Table 7. Other social benefits include safer streets, and a decrease in the chance of alcohol related driving fatalities.

In order to determine how this service acts as a social benefit for factors that are difficult to measure, the Latenight Streamline can be perceived as a subsidy that shifts demand away from drunk driving and reduces negative externalities associated with drinking and driving. Other potential benefits of using the Latenight Streamline include the cost savings of avoiding potential property damage associated with driving drunk and accidents as well as the statistical value of a human life and injuring others.

Valuation

Valuation of the costs and benefits associated can be summed up and totaled out for each year. Because there are immediate benefits associated with the costs of the service, the numerical value of the benefits do not need to be discounted because we are comparing, so to say, apples to apples.

Because the contract held with ASMSU is a Memorandum of Understanding that is renewed yearly, this project does not have a definite lifespan. For valuation, it is reasonable to use the present value of a perpetuity to determine the discounted net value of the Latenight Streamline's Service. Net benefits of the program can be divided by a reasonable discount rate, say the 30-year inflation rate, 30-year return on the S&P 500 or the 30-year bond rate, and the numerical value would represent the present value of the perpetuity. Other factors to consider in this kind of valuation model are that the ridership on the streamline has increased since beginning in 2008. The increases in ridership as a percentage could be calculated into the valuation model, but this then poses the issue of capacity constraints. Dan Workman reported that there have never been issues with capacity constraints before, and that no person should be turned down a ride home. He also estimated that the bus could carry about 50 riders at one given time, although there are no official capacity limits (Hazelbacker). But, this leaves the question that if ridership rates continue to increase, what is the total carrying capacity for one night of the Latenight service and how does that affect the total valuation of the service.

Conclusion

Based on the above considerations and the data values found in the tables, the Latenight Streamline is a cost-effective program that offers the potential savings of not getting a DUI as well as other potential costs associated with driving drunk. Negative externalities include small costs associated with waiting for the bus and the incentives to increase consumption appear to come as a benefit to riders. It was difficult to find any negative externalities associated with the service, and according to the surveyed population, they are insignificant. Net valuation of the benefits of the Latenight Service is positive when using a potential DUI savings method and the

net valuation of measuring consumer surplus is beyond the costs are positive in the latter years of the service due to increases in ridership.

Other Considerations and Future Research

Because the total ridership of the Latenight Streamline is measured into the thousands, a larger sample size should be taken for better accuracy of measurement. This would change the total valuation of the consumer's willingness to pay, as well as the percentages of student to non-student riders, increases in alcohol consumption and change the total valuation of the net benefits of the service.

Another important factor to study includes survey biases. Because the participants of the survey were riders of the Latenight Service, it is reasonable to assume that many of the participants were drinking, which creates a survey bias that could include either overstated values or understated values. Another factor to consider is that people who are under the influence may have a higher willingness to pay for things, including drinks, food, or a ride home.

Other considerations involve the probability of getting pulled over when driving under the influence. The estimation that I used from the Midwest Research Institute estimates that the probability of getting pulled over for a DUI is under the assumptions that the Blood Alcohol Content is over .10 and the driver is driving a length of 10 miles. This is not exactly consistent with many people who live in Bozeman. The Blood Alcohol Content limit in Montana for getting a DUI is .08 and the majority of people in Bozeman do not live outside a 10-mile radius of downtown as the Bozeman city limits has about a 2.5 mile radius. Therefore, there should be a better estimation for the probability of getting pulled over for a DUI in Bozeman.

Unfortunately, I do not have the resources to make this kind of estimation.

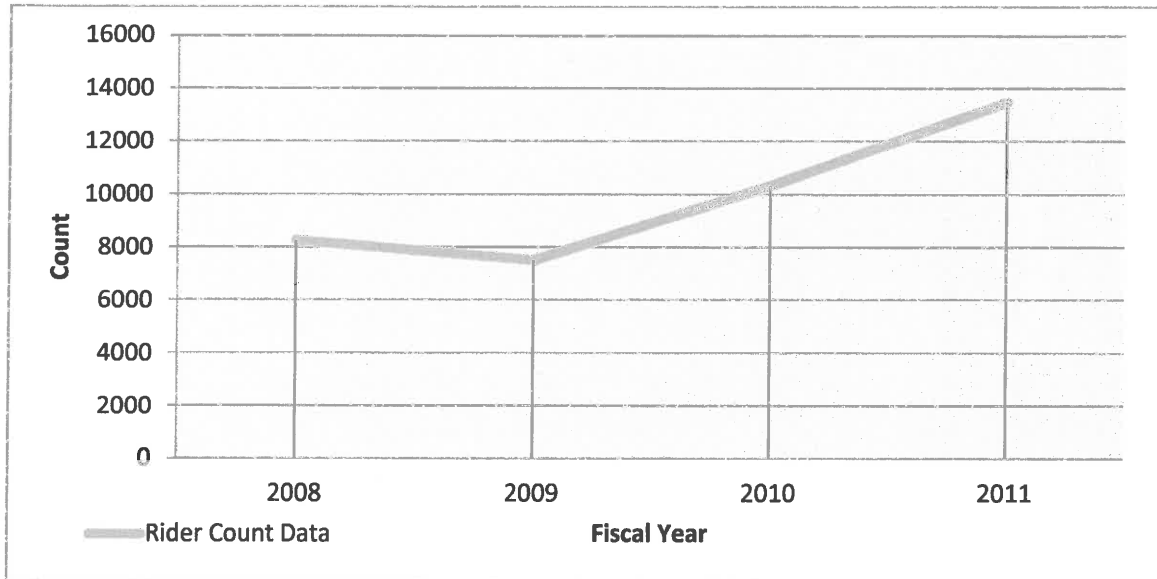
Table 1 - Numerical Values of the 3511 Grant According to Fiscal Year

Year	5311 Grant Values
2008	\$513,151
2009	\$633,708
2010	\$745,538
2011	\$877,104
2012	\$912,904

Table 2 - Numerical Costs to Students Based on Tuition and Fees and Headcount Enrollment for Academic Year

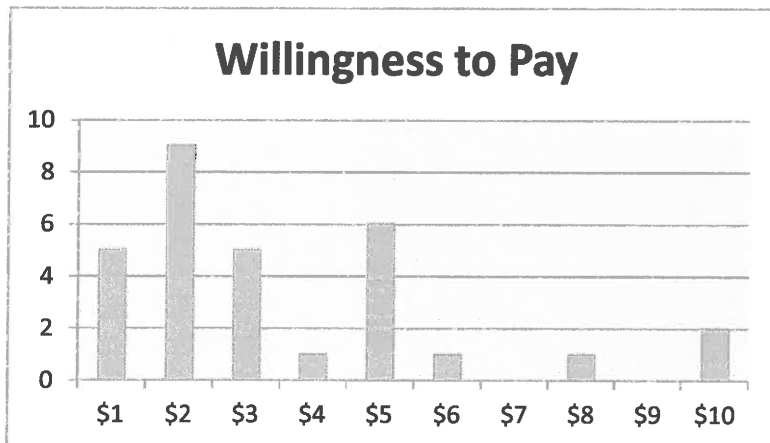
Year	Rider Count	Student Enrollment*	Cost Per Ride Per Student
2008	8232	12,369	\$1.50
2009	7484	12,764	\$1.71
2010	10292	13,559	\$1.32
2011	13452	14,153	\$1.05

Table 3 - Total Rider Count per Fiscal Year



*The fiscal years from July 1 through June 30, this coincides with the MoU and academic year.

Table 4 - Distribution of Willingness to Pay



*Montana State University Student Enrollment data was retrieved from Montana.edu

Table 5 – Consumer Surplus

Year	Rider Count	Student Enrollment	Cost Per Ride Per Student	Estimated Consumer Surplus Per Rider	Consumer Surplus
2008	8232	12,369	\$1.50	\$3.53	\$29,058.96
2009	7484	12,764	\$1.71	\$3.53	\$26,418.52
2010	10292	13,559	\$1.32	\$3.53	\$36,330.76
2011	13452	14,153	\$1.05	\$3.53	\$47,485.56

Table 6 – Individual Cost Savings on Avoiding a DUI

Year	Rider Count	NV of Using Bus	Total Value
2008	8232	\$47.50	\$391,020
2009	7484	\$47.50	\$355,490
2010	10292	\$47.50	\$488,870
2011	13452	\$47.50	\$638,970

Table 7 - Potential Cost Savings Based on Rider Count

Year	Rider Count	Estimated DUI s	Cost to Detention Center	Total Value
2008	8232	41.16	\$45.00	\$1,852
2009	7484	37.42	\$45.00	\$1,684
2010	10292	51.46	\$45.00	\$2,316
2011	13452	67.26	\$45.00	\$3,027

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