THESIS

UNDERSTANDING PUBLIC PERCEPTIONS OF DIFFERENT OPTIONS TO FUND THE HIGHWAY SYSTEM

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ABSTRACT

UNDERSTANDING PUBLIC PERCEPTIONS OF DIFFERENT OPTIONS TO FUND THE HIGHWAY SYSTEM

The purpose of this research was to generate an understanding of the public perceptions of different revenue generation systems that are already in use or that have the potential to be used in the future, and to educate the public on the different revenue generation systems. In addition, this study tested a number of hypotheses that were focused on finding relationships (correlations) between the choice of funding option to support the highway system in the United States and the demographic information.

A survey method was used to explore this topic. The survey instrument was sent to 15,945 people representing five states: Colorado, North Dakota, South Dakota, Utah, and Wyoming (Mountain-Plains Consortium states) via mail. Only 1,190 surveys were received, 27 were eliminated due to various issues, and 1,163 were posted as completed surveys resulting in a response rate of 7.30 %. Data analysis of the results consisted of performing descriptive and inferential statistics and running chi-square tests for correlation analysis.

The results of this survey indicate that the public in the states of Colorado, North Dakota, South Dakota, Utah, and Wyoming selected "increasing the federal gas tax that is collected at the time of purchase" as their first choice of funding option. The support for the use of highway tolling to fund the highway system was somewhat moderate among the population across the five states. The collection of additional sales tax on all goods to fund the highway system was

unpopular funding mechanism among the population in the five states. Similarly, the support for the use of mileage-based user fees was disliked among the population in the five states.

This research is significant, as few studies have been done on understanding the public perceptions of different options to fund the highway systems. Furthermore the findings of this survey could be used by the law-makers in the five states under study to make better decisions with respect to the alternative options of funding the highway system in their state based on the general public's perceptions in the state. Future research could be aimed to study the impact of the utilized option on each state with regard to its social, economic, and behavioral issues that could result from its implementation.

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CHAPTER ONE

INTRODUCTION

1.1 Background

According to the Federal Highway Administration (FHWA), the highway system in the United States consists of 160,000 miles of roads spread over the 50 states. The highway system accounts for only 4% of the nation's roads but handles more than 40% of all highway traffic, 75% of heavy truck traffic, and 90% of all tourist traffic. **Figure 1.1** is an illustration of the National Highway System (NHS) in the United States (Federal Highway Administration, 2012)

Figure 1.1: National Highway System in the United States (Federal Highway Administration, 2012).

For almost a century, fuel tax revenue collected at the time of purchase of gasoline by consumers has been the main funding source for the highway system in the United States with respect to maintenance and construction. This method has been thought to be the most appropriate due to its fairness in collecting money based on gallons of fuel sold. One of its advantages was that fuel tax collected was somewhat proportional to mileage traveled, making it a desirable form of road user charge (Forkenbrock & Hanley, 2006). However, despite the fact that road users are driving more miles, tax revenue from the sale of gasoline has not kept pace because vehicles have become more fuel efficient and yet the assessed fuel tax per gallon stayed the same as described below. At the same time, the cost of maintaining the nation's infrastructure has increased. This increase is the result of increasing fuel costs and the costs of construction materials and labor. Furthermore, the nation's highway system is carrying more vehicles causing more wear and tear and therefore, needing additional repair.

Fuel Tax revenue consists of two elements; the federal excise tax and the state gas taxes. According to Tax Foundation, the federal excise tax which is currently at 18.4 cents per gallon for gasoline and 24.4 cents for diesel fuel has not changed since 1994 (McBride, 2014). Furthermore, the state gas taxes range between 8 cents per gallon and 51.9 cents per gallon as in Alaska and Connecticut, respectively (The Council of State Governments, 2014).

The Highway Trust Fund (HTF) was established by the Highway Revenue Act in 1956 which is financed by the federal excise tax for the purpose of providing the resources needed for the construction and maintenance of the National System of Interstate and Defense Highways in addition to providing funding for the Federal-Aid Highway Program. The taxes collected are designated to the HTF and are periodically extended by Congress through various Acts such as Intermodal Surface Transportation Efficiency Act (ISTEA), Transportation Equity Act for the

21st Century (TEA-21), and Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and most recently Moving Ahead for Progress in the 21st Century Act (MAP-21) which was signed into law in July of 2012 (Ozbek, Prakash, & Youssef, 2010, & "Moving Ahead for", 2012). This law authorizes the spending of over $105 billion to fund the surface transportation programs across the country for the fiscal years 2013 & 2014 ("Moving Ahead for", 2012). However, the law is a temporary fix to a more serious issue with respect to highway system's maintenance and construction that the nation faces as outlined below.

According to Transportation for Tomorrow, in 2007, the level of funding for highways in the U.S. was approximately $68 billion per year. This level of funding would not be sufficient to maintain the highway assets to keep them operational with the expectation of increasing demand in travel even if the money were to be spent in the most efficient way. Thus, the physical condition of the highways is likely to significantly deteriorate in the near future. It was projected that investments in the highway system would be in the range of $130 billion to $240 billion annually through 2020 ("National Surface Transportation", 2007).

The lower end, $130 billion, is the estimated cost to maintain the highways performance at their current condition with the assumptions of reducing energy consumption and travel demand. Conversely, the higher end, $240 billion, is the estimated cost to aggressively expand the highways by separating passenger from freight traffic via establishing dedicated truck-only lanes or improving the connectivity among rural areas. A middle range would accomplish a combination of maintaining the current condition of the highways and moderate expansion. Thus, not increasing the current funding level will have negative impacts on the American public

in terms of travel delay, vehicle operating costs, commerce, and future economic growth ("National Surface Transportation", 2007).

1.2 Problem Statement and the Need

Due to the decline in fuel tax revenues, the Federal government and state governments in the U.S. have started to look for alternative methods of generating new revenue streams to build, repair, and maintain the roads across the U.S. A team leader in the Federal Highway Administration Office of Transportation Policy Studies, James March, stated "*This is a propitious time to explore a new approach to assessing road user charges- - one that will accommodate vehicles with any of the possible propulsion technologies and also facilitate implementation of a variety of public policies related to more equitable and efficient charges for highway use.*" (Forkenbrock & Hanley, 2006).

Given this, the topic of alternatives to fuel tax revenues is getting significant attention among researchers, different government agencies, as well as other entities. These systems are being discussed at different venues as possible long-term solutions to address the increasing needs of the highway program and funding shortfall. There are newspaper and journal articles about different alternative revenue generation systems, discussing the advantages, disadvantages and applicability (Ozbek, Prakash, & Youssef, 2010). However, there is limited research on understanding the public's perspective on the issue of highways funding and the different methods of creating new revenue streams to support highways. Therefore, there is a need to further study the issue of alternative funding options in regards to public opinions and perceptions in comparison to the current fuel tax system.

Since most of the research is focused on the issue of finding alternative revenue streams, public attitude towards changing the current funding mechanism should not be overlooked.

1.3 Research Objectives

The main objective of this research study is to generate an understanding of the public perception of different revenue generation systems that are already in use or that have the potential to be used in the future. A secondary objective that is hoped to be achieved is to educate the public on the different revenue generation systems while trying to reach the main objective presented above.

1.4 Research Hypotheses

While addressing the main objective discussed earlier, this study also tested a number of hypotheses that are focused on finding relationships (correlations) between the choice of funding options to support the highway system in the United States and demographic information. **Table 1.1** provides the summary of funding options and demographic information.

Table 1.1
Summary of the Choice of Funding Options and Demographic Information

Funding Options	Demographic Information
Increasing the federal gas tax that is collected at the time of purchase	Living environment
Increasing the state gas tax that is collected at the time of purchase	Access to public transportation
Collection of additional taxes and fees on other driving-related items	Use of public transportation
Collection of additional sales tax on all goods	Average miles driven per week
Use of highway tolling	Miles per gallon (MPG)
Use of High Occupancy Toll (HOT) Lanes	Age
Use of Cordon Pricing	Gender
Use of Mileage-Based User Fees	Annual household income
	Level of education

The null hypotheses are denoted by H_{01} through H_{09}, whereas the alternative hypotheses are denoted by H_{A1} through H_{A9}. Below are the research hypotheses:

H_{01}: There is no association between the choice of funding option and the living

environment.

H_{A1}: There is an association between the choice of funding option and the living environment.

H_{02}: There is no association between the choice of funding option and having access to public transportation.

H_{A2}: There is an association between the choice of funding option and having access to public transportation.

H_{03}: There is no association between the choice of funding option and the use of public transportation.

H_{A3}: There is an association between the choice of funding option and the use of public transportation.

H_{04}: There is no association between the choice of funding option and the average miles driven per week.

H_{A4}: There is an association between the choice of funding option and the average miles driven per week.

H_{05}: There is no association between the choice of funding option and the vehicle's miles per gallon.

H_{A5}: There is an association between the choice of funding option and the vehicle's miles per gallon.

H_{06}: There is no association between the choice of funding option and age.

H_{A6}: There is an association between the choice of funding option and age.

H_{07}: There is no association between the choice of funding option and gender.

H_{A7}: There is an association between the choice of funding option and gender.

H_{08}: There is no association between the choice of funding option and the annual household income.

H_{A8}: There is an association between the choice of funding option and the annual household income.

H_{09}: There is no association between the choice of funding option and the highest level of education completed.

H_{A9}: There is an association between the choice of funding option and the highest level of education completed.

1.5 Research Method

In order to meet the research objectives, this research collected data through surveys that were administered via mail. In these surveys, a brief and easy to understand explanation of each of the different revenue generation systems such as increasing the federal gas tax that is collected at the time of purchase, increasing the state gas tax that is collected at the time of purchase, collection of additional taxes and fees on other driving-related items, collection of additional sales tax on all goods, the use of highway tolling, the use of High Occupancy Toll (HOT) Lanes, the use of cordon pricing, and the use of Mileage-Based User Fees was also provided to reach the secondary objective of this research of educating the public on the different revenue generation systems.

1.6 Scope

The survey was administered only in the states covered by the Mountain-Plains Consortium (Colorado, North Dakota, South Dakota, Utah, and Wyoming). A good representation of the population in all areas, within each state, with different demographics was attempted to be

attained. The overall survey framework developed in this research could be used to administer similar surveys in other states as well.

1.7 Anticipated Benefits

Given that the current funding mechanism for highway system mainly relies on the collection of fuel taxes which is prone to become less and less reliable as evidenced by the repeated shortfalls in HTF, it is time to evaluate the alternative revenue generation systems needed to construct and maintain the large network of U.S. highways. Due to the importance of the issue of highways funding in the U.S., some of the anticipated benefits of this research include:

1. Educating the general public about the issue of highway funding.
2. Raising awareness about the significance of maintaining the highway system in the U.S. by explaining why there is a gap between the current and the proposed adequate highway funding.
3. Enabling the policy-makers make better informed decisions on which revenue generation system to implement considering the input from the public.

CHAPTER TWO

LITERATURE REVIEW

2.1 History of Highway Funding in the United States

2.1.1 The Highway Trust Fund (HTF)

The highway and transportation system in the United States has been funded through the Highway Revenue Act of 1956 which collects excise tax primarily on motor fuel when sold to the final consumers at gas stations around the nation. The Highway Trust Fund (HTF) consists of 60% gas tax, 30% diesel tax, and the remaining 10% of the fund comes from other sources such as sales tax on tires, trailers, and trucks weighing more than 55,000 pounds (CBO, 2012). 85% of the funds collected for the HTF are redistributed back to the states to be used for highway repair and maintenance, and the other 15% are used to fund a variety of mass transit projects (CBO, 2012).

Excessive funds for the HTF are allowed to be accumulated for future needs; therefore, the HTF spending is not limited to only the funds collected in a given year. Such accumulation of unused funds had led to a $31 billion surplus in the HTF by the end of 2000. Since then, the cost to maintain the nation's infrastructure has exceeded the revenue being collected and as a result, the reserves in the HTF have been decreasing. By 2008, the HTF was spent and this led to the transfer of $35 billion from the general fund, which was approved by law-makers, to keep the HTF solvent (CBO, 2012).

There have been many revisions of the Highway Revenue Act since its inception in 1956. In addition, most highway funding bills last for about three to five years allowing future congresses to modify them, as needed, to accommodate future transportation needs. The Safe,

Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy of Users (SAFETEA-LU) of 2005 authorized the HTF to spend $244.1 billion over a five-year period starting from 2005. The majority of the funds were to be spent primarily on the construction and maintenance of the highway system and bridges. SAFETEA-LU also authorized spending some of their money on other projects to include safety metropolitan planning, and trails for pedestrians and bicycles. SAFETEA-LU was set to be reevaluated in September of 2009, when it expired, and the congress would then be asked for a new highway funding bill to maintain the nation's infrastructure system (FHA, 2005). Having said that, the lawmakers were unable to come to an agreement and instead of the SAFETEA-LU expiring and drastically reducing highway funding; lawmakers extended the bill several times, at its level, until June 30th of 2012 (FHA, 2012).

2.1.2 The Highway Funding Bill MAP-21 of 2012

In the summer of 2012, Congress approved a new two-year highway funding bill known as MAP-21. This bill authorized the spending of $105 billion on surface transportation over the periods of 2013 and 2014 ("Transportation Bill Signed", 2012). In addition, MAP-21 replaced the SAFETEA-LU. The purpose of the MAP-21 is to extend the HTF and tax collection through 2016 which is two more years beyond its spending authorization period ("Transportation Bill Signed", 2012). The bill guarantees 95% of the funds collected by the HTF through gas tax would be returned to the states. Other aspects of MAP-21 are as follow ("Transportation Bill Signed", 2012);

- Transfers of almost $19 billion from the general fund to the HTF over a two-year period, 2013 & 2014.
- Eliminates about 60 programs in an attempt to streamline funding to states.
- Establishes a National Freight Policy and National Freight Network.

- Extends the Highway Research Program.
- Expands innovative financing mechanisms.
- Develops states ability to toll existing roads while maintaining free lanes.
- Doubles the Highway Safety Improvement Program.
- Increases funding for modernization of transit programs.
- Streamlines the environmental process without compromising environmental protections.

While the new transportation bill, MAP-21, authorizes the HTF to continue collecting revenue and dispersing it to the states, it does not address the underlying issues of the gap between highway funding and the cost to maintain our nation's infrastructure. Aware of the funding shortfall, law-makers added provision to MAP-21 providing approximately $19 billion from the general fund to subsidize the HTF for the following two years (Ehl, 2012).

2.1.3 Funding Shortfall and Future Highway Funding Needs

The gap in funding is primarily attributed to an antiquated method of collecting revenue based on gallons of gasoline sold. Despite the fact that people in the U.S. are driving more miles, revenue from the sale of gasoline has decreased because vehicles have become more fuel efficient. At the same time, the cost of maintaining the nation's infrastructure has increased. This increase is the result of increasing fuel costs and the costs of construction materials and labor. Furthermore, the nation's highway system is carrying more vehicles causing more wear and tear and therefore, needing additional repair (Wachs, 2003).

The Congressional Budget Office estimates a gap in funding of $147 billion if the current tax and spending policies continue to 2022 (CBO, 2012). The estimate of the gap is the difference between the estimated cost of maintenance, which is $589 billion, and the estimated receipt of $442 billion over a ten-year period from 2012 to 2022 (CBO, 2012). For instance, the

state of Virginia, in its annual revenue report, estimated that state and federal motor fuel taxes peaked in 2007 at $72.4 billion and has sunk since then to $68.6 billion (Cawley, 2012). In 2013, the American Society of Civil Engineers rated the U.S. roads and its transit system with a grade D (ASCE, 2014). Furthermore, the engineering society also reported that the nation would need to spend about $170 billion more per year than its current spending to improve and maintain the transportation network at an acceptable level (ASCE, 2014).

The HTF was bailed out by the general fund in 2008 and 2009 for a combined total of $35 billion. Realizing the revenue collected from the national gas tax would not be able to cover the expense to maintain the highway system; law-makers set aside funds from the general fund to cover this gap (Tate, 2012).

2.1.3.1 Increasing Construction Costs

Over a one-year period, 2007 to 2008, construction material prices increased greatly. For example, the price of asphalt increased by 70%, concrete by 36%, and steel by 105%. In addition, diesel fuel which is used to operate heavy construction equipment increased by 63% over the same period (Biehler, 2009). As a result of the these higher costs, states' purchasing power have decreased for construction materials and limited their ability to complete the necessary maintenance of existing roads and building new roads to ease congestion caused by the higher demand for such services. On the bright side, due to the recession of 2010 and 2011, these prices have decreased because many stimulus projects are coming below their initial estimates (Biehler, 2009).

It is estimated that for every $1 spent on road maintenance, $7 would be saved to reconstruct it once it has fallen into poor condition. Not only it is more expensive in the long-run to let the nation's highway system deteriorate, it has additional cost to the public. It is estimated

that on average, rough roads cost $335 per driver annually because of excess wear and tear on the vehicle. However, the estimate tremendously increases up to $746 per driver in urban areas with high concentration of rough roads (Beihler, 2009).

2.1.3.2 Decrease in Revenue Collected

With the advance in technology, the automobile industry has begun to manufacture more fuel efficient vehicles. As a result, fuel tax revenues have been negatively impacted and will continue to decrease in the coming years (Porter, et al., 2005). In 2011, a joint proposal by the National Highway Traffic Safety Administration and the Environmental Protection Agency that was aimed to tighten corporate average fuel economy (CAFÉ) standards for light-duty vehicles manufactured from 2017 through 2025 to include cars, minivans, pickup trucks, sport utility, and crossover utility vehicles. The proposed standards are expected to replace the current standards of manufacturing cars with fuel economy of 34.1 miles per gallon for 2016 and beyond, to 49.6 miles per gallon for the new proposed period. In addition to reducing fuel consumption, the new proposal would also require the gradual reductions in greenhouse gas emissions from such vehicles. This significant reduction in fuel consumption by the new standards would result in huge drop in gasoline tax receipts. The Congressional Budget Office estimated the drop in revenue from gasoline tax for the proposed period to be $57 billion (Nelson, 2012).

2.1.4 Impacts on States

Decreased revenues from gasoline taxes coupled with the uncertainty caused by the Congress extending the SAFETEA-LU bill have had a large effect on the states' ability to maintain their current highway system and meet the increasing demands of additional drivers. Due to the fact that road projects take long time to complete, sometimes several years, they require long-term commitment and funding from the government. As the SAFETEA-LU bill

continued to be extended, many local politicians were questioning the long-term plan for the highway infrastructure and were nervous with respect to selling bonds or seeking financing to take on large scale construction projects in their home state ("Wary governments shake", 2014).

While states' law-makers are unenthusiastic to increase their states' gas tax on their residents, they have attempted to overcome this issue in several ways such as selling bonds, tapping into other funds, considering public-private partnerships, and other tolling options. For example, the Minnesota Transportation Finance Advisory Committee reported that to build the infrastructure needed to reduce congestion and to encourage economic growth and development would cost a minimum of $21 billion in additional revenue over the periods from 2013 to 2032 (Kerr, 2012). This additional revenue would come from various ways such as increasing of the state gas tax, selling state bonds, and the use of public-private partnership (Kerr, 2012).

Another example is that the democrats in Pennsylvania have proposed a one-time fee through tolling on all the state's borders for all drivers except the state's residents. They estimated that charging $5 per truck and $1 per passenger vehicle would generate between $235 and $300 million annually ("Rendell to Lawmakers", 2010). Proposals like those are generally acceptable for states' law-makers in an effort to avoid taxing their own residents and gain their support for re-election purposes. Nonetheless, such proposals are likely to have an adverse effect on the interstate commerce laws, as products and travelers are supposed to be allowed to move freely between state borders (Eyer, 2010).

Arizona Department of Transportation (ADOT) estimates about $26.2 billion will be collected over the next 25 years from the gas tax sold in the state. However, the expectations for the transportation needs and costs were estimated to be $88.9 billion leaving $62.7 billion gap during the same period (Lobeck, 2012). Thus, ADOT is modifying its long-term budget by

decreasing the highway expansion from 76% to 27% and increasing highway preservation and modernization from 24% to 63% (Lobeck, 2012). Essentially, ADOT was left with no option to combat this gap but to maintain its highway system while drastically reducing its spending on constructing new highways. This will create a congestion problem in the state due to the expected increase in its population by 52%. According to Arizona Department of Administration, the state's population is expected to increase from 7.37 million in 2012 to 11.2 million in 2036 ("2006 - 2055 population projections", 2012).

Similarly, Wyoming Department of Transportation (WDOT) has a deficit of $135 million per year for highway maintenance which does not include any major projects that need to be completed. With respect to fixing the funding gap, law-makers in the state do not believe that increasing the gas tax will solve the issue, instead, they are considering using tolls or lottery money to fund the highway needs ("Lawmakers must act", 2012).

Meeting the increasing infrastructure needs while facing shrinking gas tax revenues are not the issues for Arizona, Pennsylvania, and Wyoming alone. As a matter of fact, most states across the nation are facing similar problems in regard to highway system deterioration and decreasing funds to maintain it.

2.2 Highway Funding Options

For the last century, traditional gas tax has been used by the majority of the countries around the world as a mean to generate revenue to pay for maintenance, construction, and operation of road infrastructure (Kalauskas et al, 2010). Nonetheless, due to the fact that the cost to maintain the roads has increased, other countries have looked to other funding mechanism over the last 40 years.

In the United States, there are several options that can be implemented by the federal and/or state governments to change and/or supplement the traditional method of generating revenue to support the highway system. The remainder of this literature review will address some of the options that were included in the survey developed in this research.

2.2.1 Increasing the Federal Gas Tax on Fuel

Financing of highways in the United States primarily depends on fuel tax revenues. For many years, this method was thought to be appropriate because of its fairness in collecting money based on gallons of fuel sold (Forkenbrock & Hanley, 2006). However, as technology advances, the automobile industry has begun to manufacture more fuel efficient vehicles. As a result, fuel tax revenues have been negatively impacted and will continue to decrease in the coming years (Porter, et al., 2005). The Congressional Budget Office estimates that the decrease in gasoline being consumed will cause a 21% decrease in fuel tax revenue by 2040 as more fuel efficient vehicles replace the older ones (CBO, 2012).

Many people claim that the downfall of the nation's fuel tax is the fact that it was never indexed to inflation and allowed to rise as the cost to maintain and construct roads increased. As the prices of road construction supplies, fuel for equipment, and labor have increased over the last several years, the gas tax has stayed flat. Pennsylvania Governor, Ed Rendell, claims that an additional $567 million per year in revenue for the state would have been raised if the state's gas tax, license fee, and registration fee were indexed to inflation when they were last increased (Schmitz, 2010). A study conducted by Wachs (2003) gave some reasons as to why fuel tax should increase. Some of the reasons include; fuel taxes are lower than in the past, fuel taxes are lower in the U.S. than in other countries, drivers' tolerance to fuel tax increase, rise in the cost of

transportation projects, growing congestion, low collection costs, fraud proof process, and that fuel tax increases are much fairer to the poor than the alternatives.

2.2.2 Increasing the State Gas Tax on Fuel

All 50 states and the District of Columbia have initiated a gas tax of their own to subsidize the amount of money being returned to them by the federal government. Similar to the federal gas tax, states collects their tax at the time of sale at gas stations throughout their state. In 2012, gas taxes across the states range from as low as $0.075 per gallon in Georgia to as high as $0.375 per gallon in Washington State (Copeland & Overberg, 2012). Furthermore, as of April 1st, 2014, the state taxes range between 12.4 cents per gallon and 52.89 cents per gallon as in Alaska and California, respectively (NDOR, 2014). Mountain Plains Consortium (MPC) states (Colorado, North Dakota, South Dakota, Utah, and Wyoming) gas tax and year they were last increased are shown in **Table 2.1** (ITEP, 2014).

Table 2.1
Summary of Mountain Plains Consortium States Gas Tax

State	Gas Tax per Gallon	Year of Last Increase
Colorado	$0.22	1991
North Dakota	$0.23	2005
South Dakota	$0.22	1999
Utah	$0.245	1998
Wyoming	$0.24	2013

Increasing taxes during an economic downturn or recession in not popular; however, several states have considered raising their state's gas tax to meet the needs of their state's infrastructure. In February of 2008, Minnesota enacted 8.5 cents per gallon increase in its state gas tax that would be phased over a 4-year period ("Report Identifies $50 Billion", 2009). Despite the increase, the Minnesota Department of Transportation has projected a $50 billion

funding gap over the next 20 years and therefore, this increase would not be sufficient to meet the state's 20 year transportation plan ("Report Identifies $50 Billion", 2009).

A poll of 413 Utah residents in 2009 revealed that only 29% of the participants supported increasing the state's gas tax to pay for its infrastructure while 70% opposed the increase (Hancock, 2009). A major benefit of increasing state gas tax is the ease of implementation because the system already exists. However, if a state decided to raise its gas tax substantially higher than its neighboring state, then its revenue would have a potential decrease as travelers and residents who cross state lines regularly would likely choose to purchase the gas in the state with lower gas tax.

2.2.3 Increasing Taxes and Fees on Other Driving Related Items

There are many costs associated with owning and operating a vehicle on the highway system across the United States. Vehicle ownership costs include purchase of a new vehicle, regular maintenance, major repairs, and fuel costs. In addition, state and federal governments have additional costs including sales tax on new cars, additional tax on vehicle parts such as tires, drivers license fees, plates and registration fees, and fees for violations such as speeding and parking tickets and other driving related offenses. Many of these are designed to raise revenue while traffic violations are designed to influence poor driving behavior. As highway funding has decreased, many states have looked at these additional forms of revenue as a way to fill in the funding gap. However, as some law-makers see these options as potential revenue generating sources, others consider them regressive taxes that have greater effect on lower income population in the U.S.

The state of New York passed a law that increase the license plate fees by $25 per year, the law was quickly repealed after officials called the additional charge an unfair burden on

drivers (New York looks, 2009). Washington Governor, Chris Gregoire, proposed a fee on oil refined in the state which can raise $3.6 billion to be used for the state highway funding shortfall. The proposal was not approved and instead, an agreement was passed raising only $90 million through a variety of driving related fees. For instance, license plates which were free are now going to cost $10 each year and owners of electrical vehicles are required to pay a fee of $100 annually (Nelson, 2012).

Colorado passed the Funding Advancement for Surface Transportation and Economic Recovery Act (FASTER Act) in 2009. The act is supposed to generate about $200 million annually by increasing registration fees by approximately $40 per year for most vehicles. The funds from the FASTER Act were earmarked to repair 125 bridges throughout the state at a cost of $700 million by 2017 (Hoover, 2012). However, the Mountain States Legal Foundation brought a lawsuit in the Denver District Court claiming that FASTER Act violates the Taxpayer Bill of Rights (TABOR) because such increase was implemented without tax-payers approval (Hoover, 2012).

Those who oppose increasing driving related expenses such as driver's license fees claim that these expenses are regressive tax that is a high burden on low income people. This type of regressive tax is a flat fee to all citizens despite their level of income causing low-income tax-payers to pay a higher percent of their income to such fees. Increasing driving related expenses will cause those who drive less to pay proportionately higher rate per mile than those who drive more. Drivers who commute a lot can absorb these fees as a relatively small increase in their price per mile while those who commute less pay more per mile for the same right to use the roads. Therefore, increasing driving related expenses does not encourage people to seek alternative transportation once the fees have been paid.

2.2.4 Increase Sales Tax on All Goods

Since the federal government's tax revenue depends mainly on individual income taxes, payroll taxes, and corporate income taxes, therefore the state sales taxes are left up to the individual state's discretion (CBO, 2011). However, with national shortage in highway funding, many law-makers have proposed sales tax increases to supplement the current gas tax. Just a month after the passage of the New MAP-21 bill, voters in 10 counties around Atlanta voted down a plan to increase sales tax by 1% for 10 years to fund transportation investments in these counties. Advocates of the new tax were hoping that the general public would step-in and find a way to finance their infrastructure needs. The plan would have raised $7.2 billion, and was rejected by 63% of the vote (Holeywell, 2012).

To the contrary, the Virginia General Assembly passed a transportation funding bill proposed by Gov. Robert McDonnell to replace the 17.5 cents-per-gallon gas tax with wholesale tax of 3.5 percent on motor fuel. The bill will raise approximately $3.5 billion annually to support the transportation needs in the state (Kunkle & Vozzella, 2013).

2.2.5 Highway Tolling

Highway tolling is when every lane in a highway is tolled. This means that everyone who wishes to use the road pays a fee. This type of tolling can have variable rates for different size vehicles, and for various time of the day usage. Highway tolling has been used to supplement the revenue collected through state and federal gas tax.

According to Tim Lomax, an expert in congestion at Texas Transportation Institute at Texas A&M, tolls are not needed when there is an excess of free interstate capacity. However, once the state's population increases to a point that causing congestion on the state existing interstate, then tolling becomes a viable option for decreasing congestion (Copeland, 2009). He

also claims that tolls that are in place, even if they are temporarily, are hard to get rid of (Copeland, 2009). Representative James Oberstar of Minnesota, chairman of the House Transportation and Infrastructure Committee, said "*I am open to all ideas except tolling for existing highways. We've paid for those highways once. We're not going to pay for them again*" (Green, 2010).

Many states are considering tolling as an option to raise additional revenue to fund their infrastructure needs. However, it is not a simple process because the Federal government has to approve the conversion of an existing road into toll road. The nation's highway system was originally built with tax-payers' money and many feel that tolling is just another way of taxation. The Federal Highway Administration (FHWA) has rejected Pennsylvania's proposal to toll the 311 miles of Interstate-80 that ran through the state. The FHWA claimed that the state transportation budget has other revenues available that can be used to maintain the road ("Pennsylvania Again Seeks", 2009). Furthermore, opponents of tolling the Interstate-80 claimed that such proposal would raise $130 million annually which is much more than the current $80 million that is needed as maintenance costs (Schmitz, 2009).

Florida DOT considered tolling as a funding option to cover the $125 million cost to construct a flyover connecting Interstate-95 to Butler Boulevard (Hannan, 2012). Drivers would still be allowed to use the highway system for free, but would have to pay a toll to use the connector which would ease congestion as well. In addition, the tolls would be fully automated through the state's existing SunPass collection system and therefore, no toll booths (Hannan, 2012).

Tolling can help ease congestion by encouraging drivers to drive off-peak hours. As a result of tolling for six months the 520 bridge in Seattle, traffic has decreased and has been

moving during the peak times. The revenue collected is used to pay off the financing cost of constructing the bridge ("Six months into", 2012).

Prior to constructing a tolled highway, certain criteria must be considered and evaluated with respect to the project. The National Environmental Protection Act (NEPA) has requirements for all proposed tolled highway projects. Such projects include the effect on human environment, habitat of endangered species, historic properties, and low income populations (Phelan & Phelan, 2008).

2.2.6 High Occupancy Toll (HOT) Lanes

The main difference between High Occupancy Toll (HOT) lanes and highway tolling is that HOT lanes only charge a toll for the use of specific lane, allowing those drivers who are unwilling to pay the toll to travel on the highway for free. HOT lanes generally charge variable rates depending on the demand of the other free lanes and offer discounts or free tolls for those carpooling. High Occupancy Vehicles (HOV) lanes were generally located in metropolitan cities with congestion problems during rush hours. Many cities have attempted to utilize them as a way to encourage carpooling, and use mass transit. They were only available to busses, ambulances, and those carpooling. However, as states' funding began to decline, local highway departments looked into converting HOV lanes to HOT lanes ("I-85 Express Lanes", 2014).

HOT lanes in Minnesota on Interstate-35 use variable rate scheme to keep the traffic flowing at a minimum rate of 50 miles per hour. Prices of the road usage vary from $0.25 per trip during off peak travel times to as high as $8 per trip during peak hours ("Minnesota Opens Hot", 2009). In Miami, drivers who use Interstate-95 notice the difference in speed between two HOT lanes that charges various rates. The traffic speed can increase from 36 miles per hour to

56 miles per hour depending on the rate and the lane being used ("Florida Express Lanes", 2009).

2.2.7 Cordon Pricing

The basic premise of cordon (area) pricing is to charge drivers a fee for entering a specific area, commonly a city center. Across the world, the cordon pricing scheme have been successful (AASHTO, 2014). In Norway, three cities have implemented the cordon pricing model to include Bergen (1986), Trondheim (1991), and Oslo (1990). The rate that was applied varies depending on the time of the day. The primary purpose of the cordon pricing was to maintain the existing infrastructure, and to finance future transportation needs (Morisugi, & Ravinder, 2004). In Stockholm, Sweden, a cordon pricing system was introduced in August of 2007 after allowing citizens to try it for two years (Congestion Pricing: Examples", 2014).

Similarly, London and Durham both started implementing cordon pricing system in 2003 and 2002, respectively (Ieromonachou, Petros, Potter, & Warren, 2005). In an effort to reduce pollution, congestion, and finance the infrastructure needs, the city of Milan, Italy introduced the cordon pricing system in 2008 (Rotaris, Danielis, Marcucci, & Massiani, 2010). In 2007, Valletta, Malta also introduced the system of cordon pricing to limit congestion and optimize the use of the parking lots outside the mid-town area (Attard, & Ison, 2010). According to a report by the Federal Highway Administration, cordon (area) pricing system has been successful in raising revenue and reducing congestion (Doan, 2010).

2.2.8 Mileage-Based User Fees

Mileage-Based User Fees concept is also referred to as Vehicle Miles Traveled (VMT). The main idea of VMT is that roads users are charged per mile driven throughout the time they use the roads. Therefore, they are being charged on a continuous basis with the use of Global

Positioning System (GPS). Furthermore, the charges are assessed based on the actual miles and not based on the amount of fuel consumed. VMT system may also charge different rates for various types of roads, locations, periods, and vehicles (Ozbek, Youssef, & Prakash, 2010).

The Road User Fee Task Force (RUFTF) of Oregon has developed a pilot system that is based on vehicle miles traveled using a global positioning system (GPS) technology and an odometer-based equipment to find an alternative to a fuel tax revenue system. It was found that using odometer-based technology via radio frequency (RF) was more feasible to implement than the GPS system (Porter, et al., 2005) and more able to replenish the revenue stream than the traditional fuel tax collection system (Kim, et al., 2005). When Oregon ran the pilot program, participants' major objection was the in-vehicle boxes used to track miles driven. James Whitty of Oregon Department of Transportation said "*They didn't like the government boxes. They didn't like the GPS mandate*" (Copeland & Overberg, 2012). Washington and Nevada are planning similar projects. Furthermore, Minnesota is planning to use smart phones application to collect information through GPS and 500 volunteers from rural counties are testing such a system (Copeland & Overberg, 2012).

Other countries around the world have such system in place. For instance, Holland enacted a vehicle miles traveled system through the use of the GPS in every vehicle across the country in an attempt to reduce carbon emissions and congestion. The system charges various rates during peak travel times, to trucks, commercial vehicles, and larger cars that release higher than average carbon ("Holland Enacts Plan", 2009). This new system is expected to reduce fatal accidents by 7% through the reduction in congestion and decrease carbon emissions by 10%. In addition, the tax rate was set to be $0.07 per mile driven and is expected to raise all adequate funds needed to support the highway system funding needs (Max, 2009).

Despite the success of VMT system in other countries, there has been some opposition to the system in the United States. Minnesota State Representative, Raymond John "Chip" Cravaack, proposed a spending bill that would prevent the secretary of transportation from exploring VMT as a form of raising revenue for the nation's highway system. This bill was approved by the house (Kasperowics, 2012). While Cravasck acknowledges the need for a better way to fund the highway trust fund, he feels that the VMT system is not the appropriate way. His objection to the VMT system is due to many reasons including that the system will hurt drivers who live in rural areas, its high cost of implementation, its impact on privacy rights, and its subjectivity for potential privacy abuse (Kasperowics, 2012). Proponents to the VMT system such as Jake Kononov of the Colorado DOT estimated that there was 49 billion vehicle miles traveled in Colorado alone in 2007. He claimed that a 1 cent per mile driven tax would have raised $490 million (Leib, 2008).

2.3 Understanding Public Opinion on Highway Funding

Transportation costs have a huge impact on the tax-payers in the US and their household budget. As the cost of maintaining the highway system increases, the average family's in the U.S. transportation costs will likely increase as well. Since transportation costs are a large portion of the family's budget, it is imperative to have their input when selecting a new mechanism for funding the highway system.

Law-makers have attempted to gain information regarding to what the public in their states would prefer as a highway funding option. For example, Missouri Department of Transportation has started a blue ribbon citizens' committee that has traveled around the state asking the public on how they would like the shortfall in highway funding to be supplemented. The project has been successful in getting the public's feedback on the issue (Whitfield, 2012).

Similar surveys solicited public opinions regarding the options of funding the highway system in the United States. For example, HNTB Corporation's America THINKS conducted a survey in 2013 by asking participants to select a funding option that they would prefer to support the highway system in the U.S. Such options include tolling, the increase of public transportation fares, sales tax, gas tax, vehicles registration fees, property tax, income tax, others, and no increase in any of the options. It was found that the majority of people in America, 36%, prefer charging tolls on roads and bridges whereas, 21% prefer no increase in any fees.

Furthermore, 27% of people support the increase in public transportation fares, 24% support sales tax increase, 20% support gas tax increase, 19% support the increase in vehicle registration fees, 10% support property tax increase, 8% support income tax increase, and only 1% support other options (THINK, 2013).

Another survey asked participants if they would support a 10-cents federal gas tax increase. It found that almost 75% of people in America strongly oppose and somewhat oppose the option of national gas tax increase (Agrawal & Nixon, 2013).

Another survey found that 41% of people strongly and somewhat support the charge of mileage tax based on the vehicle's level of pollution with variable rates, average 1 cent per mile, and 49% support a $0.5 increase in sales tax to fund the highway system in the U.S. (Agrawal, Nixon, & Murthy, 2012).

A national study released by the Mineta Transportation Institute at San Jose State University found that 19% more people would support increasing the nation's gas tax if the funds went to dedicated transportation projects that reduce global warming as compared to raising the tax without showing where the additional revenue would be spent ("Linking Gas Tax", 2010). Yet another study released by the Mineta Transportation Institute at San Jose State

University found that 16% more people would support raising the gas tax if it is done over a period of several years as opposed to all at once ("Linking Gas Tax", 2010).

When it comes to public perception with respect to the issue of highway funding, the opinion might change over time. A survey was conducted in Oslo to evaluate the popularity of tolls. The study initially revealed that tolls are not overwhelmingly accepted by the public. However, the gap is narrowing between those who are against and those who are in favor of the tolls after the realization of the benefits became more apparent (Odeck, & Brathen, 1997).

According to NCHRP Synthesis of Highway Practice 377: Compilation of Public Opinion Data on Tolls and Road Pricing with respect to public opinion on different pricing schemes, Cordon Tolling, Express Toll Lanes, Hot Lanes, and Traditional Toll Roads, it was found that 73% of participants support the use of Hot Lanes. The next popular option with 71% of participants support was the use of Traditional Toll Roads. However, 53% of the participants opposed the use of Cordon Pricing (Zmud, & Arce, 2008). Another survey that was conducted in Massachusetts revealed that 57% of the participants were in support of fees/fares tolls to fund the road system. In addition, the majority of people, 62%, support the option of closing the income loopholes /sales tax to fund the roads and highway system in the state. This was followed by 61% of the participants support the increase of gas tax to fund the road system in Massachusetts (Koczela & Parr, 2013).

CHAPTER THREE

METHODOLOGY

This chapter addresses the research methods and procedures used in conducting this study. Due to the decline in fuel tax revenues, the government in the U.S. has started to look for alternative methods of generating new revenue streams to build, repair, and maintain the roads across the U.S. (Forkenbrock & Hanley, 2006). Yet, public's attitude towards the issue of highway funding has not received much attention from researchers. Therefore, the purpose of this research is to generate an understanding of the public perceptions of different revenue generation systems that are already in use or that have the potential to be used in the future, and to educate the public on the different revenue generation systems while trying to accomplish the first objective.

3.1 Research Design

This study explored the attitudes of the general public with respect to the alternatives to fuel tax revenues to support the highway system in the United States by using a survey instrument through the use of both inferential and descriptive statistics. "*Surveys provide an efficient and timely method to collect data from large populations, especially since surveys are used to measure attitudes or opinions about a phenomenon in a natural setting that may not otherwise be measurable"* (Wiersma, 2000, P.157). According to Fink (2003), *"a survey is a system for collecting information from or about people to describe, compare, or explain their knowledge, attitudes and behavior" (P.98).* The information obtained from this study is valuable due to the fact that there are only few similar studies conducted on such issue. A survey conducted by HNTB Corporation's America THINKS asked for the public's opinion regarding

the use of tolling as a mean of generating revenue to maintain the roads, bridges, and to save travel time (America THINKS 2013 Tolling Survey, 2013). In addition, the survey provided other funding options to include increase public transportation fees, sales tax, gas tax, vehicle's registration fees, property tax, income tax, other options not listed, no increase in any of the options mentioned, and asked participants to select their top funding option (America THINK 2013 Tolling Survey, 2013). Another survey by Mineta Transportation Institute asked the public if they would back a gas tax increase only if the money is used for the maintenance of streets, roads, and highways (Agrawal & Nixon, 2013).

3.2 Survey Development

The developed survey consisted of brief and easy to understand questions about the different revenue generation systems such as increasing the federal gas tax that is collected at the time of purchase, increasing the state gas tax that is collected at the time of purchase, collection of additional taxes and fees on other driving-related items, collection of additional sales tax on all goods, the use of highway tolling, the use of High Occupancy Toll (HOT) Lanes, the use of cordon pricing, and the use of Mileage-Based User Fees. In addition, a summary explaining each system was included in the information sheet that accompanied the survey to reach the secondary objective of this research of educating the public on the different revenue generation systems. Overall purpose of the survey questions was aimed at identifying the perception of the road users in the Mountain Plains Consortium (MPC) states which include Colorado, North Dakota, South Dakota, Utah, and Wyoming on each of these revenue generation systems. The survey was divided into three different sections. Section I of the survey contained 20 general questions that asked for the public's opinion regarding the highway system and the alternative

ways of generating revenues to support it. A few representative examples of the statements asking the degree with which the respondent agrees are listed below;

1. The quality of the highway system is important to me?
2. Vehicles that cause more wear and tear on the highways should pay more to fund the highway system?
3. The private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return?
4. I support the collection of additional sales tax on all goods to fund the highway system?
5. I support the use of Mileage-Based User Fees to fund the highway system?

Section II of the survey, which was the main focus of this study, asked about the respondent's choice of the funding system. This section was comprised of eight different funding options to include;

1. Increasing the federal gas tax that is collected at the time of purchase
2. Increasing the state gas tax that is collected at the time of purchase
3. Collection of additional taxes and fees on other driving-related items
4. Collection of additional sales tax on all goods
5. Use of highway tolling
6. Use of High Occupancy Toll (HOT) Lanes
7. Use of Cordon Pricing
8. Use of Mileage-Based User Fees

The final part of the survey, Section III, consisted of demographic questions such as living environment, access to public transportation, use of public transportation, average miles

driven per week, vehicle's miles per gallon, age, gender, annual household income, and the highest level of education attained.

Before finalizing and administering the full scale survey, a pilot survey was developed to administer in a smaller scale to be able to receive feedback about the content and format of the survey from the respondents and thus to improve it. After the pilot survey was developed, some faculty, staff, students, and others were asked to take the survey. A total of 11 surveys were received along with verbal and written feedbacks to improve the survey as discussed in Section 3.6- The Survey Instrument. After this pilot study was concluded, the final format of the questionnaire and the information sheet were established.

As a result of the collaboration between the researcher and the University Testing Center at Colorado State University, a template for the survey was created in an effort to transfer the data from paper to electronic format to ease the process of collecting and tabulating the results. To test the accuracy of the template, all 11 surveys were scanned and the results were posted electronically in text format. These results were then checked manually to verify the accuracy of the process. Few mistakes were detected and corrections were made to the template and the same surveys were run again. After checking the results, a match between the paper and the electronic format was accomplished.

3.3 Sample Size

The study sample size,$\boldsymbol{n}$, was determined by using the following formula (Devore & Peck, 2005, p.377);

$$\boldsymbol{n} = \boldsymbol{\pi}\,(1-\boldsymbol{\pi})\left(\frac{Z}{B}\right)^{\mathbf{2}}$$

Where n represents the estimated sample size, $\boldsymbol{\pi}$ represents the true proportion of the population, Z represents the value associated with the confidence intervals, and B represents the bound on the error of estimation.

Since $\boldsymbol{\pi}$ was unknown, a conservative value of 0.5 was used to estimate the sample size. This would yield the largest sample size than any other $\boldsymbol{\pi}$ value. In addition, the confidence interval that was chosen for this study was 95% with Z value of 1.96. Finally a 5% error of estimation was deemed to be acceptable for this study resulting in a B value of 0.05 (Devore & Peck, 2005, P. 378). Using these numbers and the formula above, a sample size of 385 respondents per each state within the scope of this study was determined.

3.4 Sampling Technique

Simple random sampling is the most common sampling technique yet, it is the most difficult to achieve. This is due to the process of selecting the participants in the sample so that any individual, from the population, has an equal probability of being chosen. In doing so, any bias in the population will not be an issue since it will be equally distributed among the participants. The idea of simple random sampling is selecting individuals who will be representative of the population under study (Creswell, 2008). On the other hand, convenience sampling is the process of selecting individuals who are willing and available to participate in the study. In such sampling, the researcher will not be able to claim that the sample is a representative of the population. However, such sample can be very helpful in providing useful information with respect to the questionnaire and hypotheses (Creswell, 2008).

For the pilot survey, the convenience sampling approach was adopted; whereas, the simple random sampling approach was implemented for the final large scale survey.

3.5 Population and Sample Frame

The study population was defined as people who reside and have mailing addresses in the selected five states (Colorado, North Dakota, South Dakota, Utah, and Wyoming).

For the purpose of this study, a random sample of 16,500 representing five states (3,300 per state), was purchased from Marketing Systems Groups. The sample included residential addresses, traditional and Only Way to Get Mail (OWGM) P.O. Boxes, and Drop Points. However, the sample excluded seasonal, educational, throwbacks, and vacant addresses. The decision to include and exclude certain address types was made to eliminate any bias in the sample and to increase the response rate.

Drop Points are when mail for multiple residences is sent to one address and distributed internally to other dwellings. Seasonals are addresses for people who may actually live fulltime outside of the target geography. Educationals are temporary student addresses at universities and boarding schools. Throwbacks are when any mail addressed to a particular street address is instead delivered to an associated P.O. Box.

The reason for selecting 16,500 addresses, sample size (3,300 per state), was to get a response rate of at least 11.67% per state which corresponded with the minimum sample size, calculated earlier, of 385 per state.

All 16,500 addresses were run through the National Change of Address (NCOA) for verification. As a result, 555 addresses were eliminated from the sample. The remaining 15,945 addresses consisted of 3,163 addresses from Colorado, 3,204 from North Dakota, 3,182 from South Dakota, 3,202 from Utah, and 3,194 from Wyoming.

3.6 The Survey Instrument

The pilot survey was created (Appendix A) and was designed to measure people's attitude toward some alternatives to fuel tax revenue to support the highway system in the United States. Thus, the attitude scale measured how the respondents strongly agreed or disagreed with the alternatives and which option was the most favorable, if the choice was made. The questions in the instrument were originated from the themes that emerged throughout the process of reviewing relevant literature.

For the pilot study, the survey consisted of a two-page information sheet (also in Appendix A) containing general information regarding alternative methods of generating revenues to educate the public prior to answering the questionnaire, and a three-page survey which was divided into three sections. The survey included 30 questions in all sections, 22 items in section I, one item in section II, and 7 items in section III.

Section I, titled "General Questions", was designed to collect data about the public's attitude toward the highway system and the different alternatives to fuel tax revenue.

Section II, titled "Choice of Funding System", contained eight different methods / policies regarding the issue of alternatives to fuel tax revenue. In this section, participants were asked to choose the option that they would support for implementation. As noted earlier, the section was the main focus of this study.

Section III, titled "Demographics", was designed to gather demographic information about the participant in this survey study.

According to Wiersma, such format has an advantage of maximizing consistency throughout all responses and providing a straightforward analysis and data presentation (Wiersma, 2000).

Initially, a 3-point Likert rating scale was selected for section I of the survey. The scale breakdowns were "agree", "disagree", and "neither agree nor disagree". During the pilot study process, a copy of the introduction and the questionnaire were provided to all participants (faculty members from different universities and departments) asking for feedback.

Consequently, one participant of the pilot study indicated that the 3-point rating scale was inappropriate for analysis reasons. Quote; "Five is better – more variance for analysis." Few other participants of the pilot study recommended the use of the 5-point rating scale as well. Thus, the 5-point Likert rating scale was adopted for this survey to include strongly agree, agree, neutral, disagree, and strongly disagree. Creswell suggested that the use of the popular Likert scale, strongly agree to strongly disagree, assumes equal size intervals among all categories (Creswell, 2008). Furthermore, Blaikie also indicated that it is very common to treat Likert scale as a rating scale under the assumption that all categories have equal intervals among them (Blaikie, 2003).

One of the feedback questions asked participants in the pilot study as to whether the information sheet was clear and easy to understand. One participant commented "No, the information sheet is too long and has too much detail. Need to be reduced to a one page." As a result, the information sheet was modified and consolidated into one sheet. Many respondents of the pilot study suggested that the survey should be shorter in length, less than 3 pages. Furthermore, some recommended the addition of more categories in the demographic section of the survey such as level of education. Others endorsed the expansion of some categories within each question in the demographic section such as more breakdowns of the household income category.

After reviewing all comments and suggestions during the pilot study process, the final survey cover letter, information sheet, and questionnaire were modified and updated to their final format (Appendix B). All questions in the survey, both the pilot study and the final format, were closed-ended type of questions. In closed-ended survey questions, the researcher provides options for the respondent to choose from (Creswell, 2008). Closed-ended questions are more appropriate for participants because knowing the parameters of response options give them comfort especially for sensitive type of questions. Moreover, they provide numeric values that are useful during the statistical analysis and enable the researcher to compare results (Creswell, 2008).

The final cover letter and the information sheet portion of the survey were one page each, in length. However, the final survey compromised of one page, double-sided, that included three sections with the total of 31 items. A breakdown of survey items is provided in **Table 3.1**.

Table 3.1
Summary of the Number of Questions in the Pilot and Final Surveys

Section	Pilot	Final Version
Section I	22	20
Section II	1	1
Section III	7	10

3.7 Data Collection Format

Five types of data collection techniques are commonly used in survey research studies to include mailed questionnaires, electronic questionnaires, one-on-one interviews, focus group interviews, and telephone interviews. Coherently, all formats have advantages and disadvantageous. For instance, telephone interview surveys lack the observation of nonverbal

communication on the participants' part. Conversely, one-on-one interviews allow for such observation (Creswell, 2008).

For the purpose of this study, the mailed questionnaire was the form of data collection chosen option. The main disadvantage of mailed questionnaire is the low response rate (Gliner & Morgan, 2000, p.339). Nonetheless, some research studies indicated that incentives with minimal financial value can alleviate the issue of the low response rate (Dillman, 2007). Offering incentives to participants to avoid low response rate was initially considered but quickly eliminated because the agency funding this study prohibits such practice in its sponsored research projects. Therefore, it was decided to send the survey to a large number of households so that even if a low response rate as low as 12% was received, the minimum sample size of 385 would be achieved to be able to make inferences for the population.

The cover letter, information sheet, and the survey questionnaire were sent to the randomly selected sample of 15,945 participants divided into five different states (Colorado, North Dakota, South Dakota, Utah, and Wyoming). In addition, a business reply envelope with pre-paid postage was also sent with every survey.

3.8 Survey Administration Process

The main focus during the administration process was delivering the survey to the participants as quickly and accurately as possible. Furthermore, receiving the responses in a timely manner was another emphasis during the administration process. Thus, it was imperative to pay close and careful attention to the preparation of all documents related to the survey. This was achieved through detailed planning and persistence of the administration process. The survey cover letter, information sheet, and questionnaire were revised several times by different stakeholders to include the graduate student and the professor (Advisor).

Some modifications were done to the information sheet, after the pilot study process, such as changing its length to one page. Others were performed on the survey questionnaire to include changing the rating scale from 3 to 5-point rating based on Likert scale, editing some of the language in the questions to make them more understandable, and formatting the instrument, by adding or deleting categories, to fit in one double-sided page. All such changes resulted from the pilot study process.

After finalizing the documentations associated with the survey including the cover letter, information sheet, and questionnaire, two activities started concurrently and one activity started later during the administration process. The first activity focused on obtaining the approval from the Institutional Review Board (IRB). During the waiting period, prior to approval, the second activity started which was purchasing the mailing addresses, for all participants in the survey, from Marketing Systems Group. The third activity was the preparation of all completed and final documents for bulk mailing.

Once the final approval granted by IRB on the 30th of May, 2013, the purchased addresses were sent to Central Receiving / Mail Facilities at Colorado State University (CSU) to be verified against the NCOA database on the 12th of June, 2013. Meanwhile, the envelopes including the return pre-paid postage ones, and the printed complete set of documentations were delivered to Central Receiving on the 13th of June, 2013. On the same day, folding, stuffing, and labeling / addressing were started using an automated system at the Mail Facilities. The entire operation was completed in less than two days. On Monday, the 17th of June, Mail Facilities at CSU sent the survey to all the participants in the five states.

Participants' confidentiality was not an issue since the survey documentations did not ask for their personal information such as names and addresses. Therefore, there was no way to link the returned surveys to the participants who completed them.

After mailing the questionnaire, two tasks began simultaneously. The first task was managing the incoming mail. The task involved sorting the mail by state, and date that they were received. The second task was inputting these data into a spreadsheet using Microsoft Excel. The process focused on removing blank surveys and sorting the completed ones in the order they were received.

Completed surveys were received until the 23rd of September, 2013 on which date the survey was closed. This date was selected arbitrarily and was based on the mail volume that was delivered to the department over the three-month period. The spreadsheet was then updated to its final form. This included the total number of surveys received for each state. It was found that out of the 15,945 questionnaire sent to participants in five different states; only 1,190 surveys were received, 27 were eliminated, and 1,163 surveys were posted as completed in the spreadsheet. This yielded to a response rate of approximately 7.30 percent. **Figure 3.1** is a plot of the number of responses vs. the date they were received for the five states to include Colorado, North Dakota, South Dakota, Utah, and Wyoming. Although the surveys were sent on June 17th, 2013, the peak of the responses was between the periods of June 26th and July 9th, 2013. For instance, on the first day of July, a total of 260 responses were received from all five states. The highest number of 88 responses was received from Wyoming followed by 55 from South Dakota, 51 from North Dakota, 33 from Utah, and 26 from Colorado. These surveys were marked as completed; however, five surveys were eliminated from South Dakota, two from Wyoming and were marked as incompleted surveys.

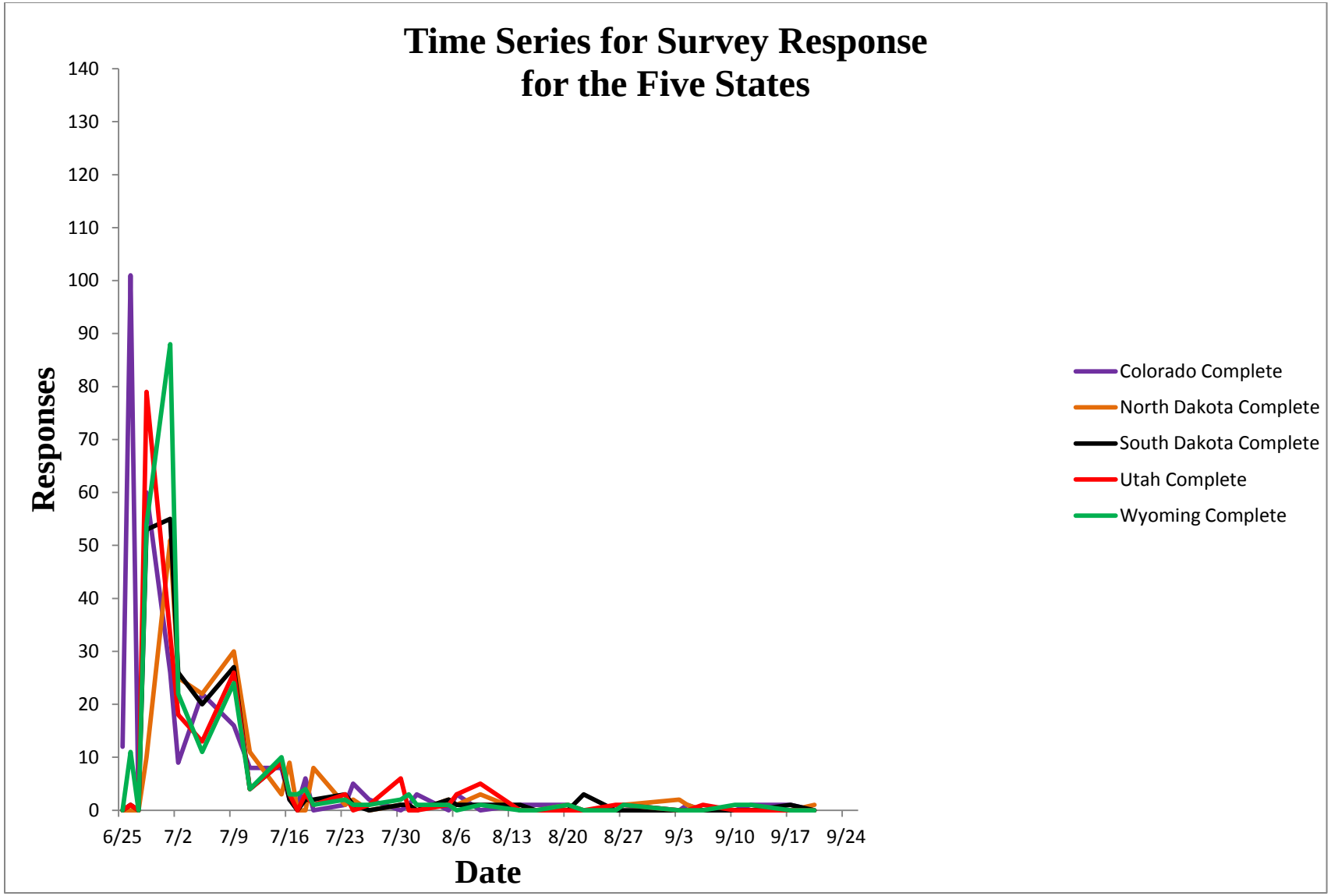


Figure 3.1: Time series for survey responses from CO, ND, SD, UT, and WY.

3.9 Data Management Process

Data management consisted of data entry and data screening. Data entry is the process of transferring data from paper to electronic format. Data screening involves the identification of missing or duplicate data and taking actions to correct them.

The process of scanning the survey results electronically saved time and money during data entry process. By using an electronic mean, data entry errors were minimized. All text files, with final scores, were received from the University Testing Center on the 25th of September, 2013. After then, the files were converted into excel format for cleaning and tallying purposes.

Questions 1 through 20 of the survey, section I, were assigned numerical values replacing Likert scale of strongly agree to strongly disagree as follow:

Strongly agree = 1

Agree = 2

Neutral = 3

Disagree = 4

Strongly disagree = 5

Question 21, section II which was the main focus of this study, included eight categories. Each category was given a numeric value. For example, if a participant chose the third option, then the number "3" was assigned to that selection and so forth. Nothing was assigned to the remaining options.

Questions 22 through 31, section III, were given similar numeric values as question 21, described above. The only difference was that when choosing a category in questions 1 through 20 and questions 22 through 31, a numeric value would be assigned to that category and the

remaining categories would have “BLANK” assigned to them. For instance, question 29 contained the gender (female, male). If a participant selected “male”, then the numeric value associated with this option would be “2” and “BLANK” would be assigned to “female” meaning the option was not selected. **Table 3.2** represents a snapshot of the process.

Table 3.2
Snap-Shot of the Data Results, Q29 Prior to Formatting

24a	**24b**
BLANK	2
BLANK	2
BLANK	BLANK
1	BLANK
BLANK	2
BLANK	2
1	BLANK
BLANK	2
BLANK	2
1	BLANK
1	BLANK
BLANK	2
BLANK	2
BLANK	2

Once the conversion process of the text files into excel files was completed, a column with “Final Answer” was added next to each question to display the numeric value for the selected answer. The value was achieved by summing the row for each survey answer. Referring back to question 29, if the participants selected “2”, then a “BLANK” would be displayed for option “1”, since it was not selected. Summing the row, the total value would be “2” because excel treats “BLANK” as a numeric value of zero “0”. Furthermore, questions with no answers would automatically display “BLANK” and summing the row across would yield to

zero “0”. This allowed for an easy transition to data screening process. **Table 3.3** illustrates a snapshot of the process.

The data screening process was straightforward because errors were easy to spot because an “error” would be displayed in that cell. To correct such an issue, the original paper survey would be pulled and manually verified against the electronic version and corrections would be made. These errors occurred during the automated scanning process of the results of the surveys were mainly due to inappropriate filling of the bubbles or skipping the scan by the machine.

Table 3.3
Snap-Shot of the Data Results, Q29 after Formatting

24a	24b	Final Answer
BLANK	2	2
BLANK	2	2
BLANK	BLANK	0
1	BLANK	1
BLANK	2	2
BLANK	2	2
1	BLANK	1
BLANK	2	2
BLANK	2	2
1	BLANK	1
1	BLANK	1
BLANK	2	2
BLANK	2	2
BLANK	2	2

CHAPTER FOUR

RESULTS

4.1 Data Analysis

This chapter presents the results and analysis of the survey as well as the results of the testing of the research hypotheses presented in the introduction in Chapter 1.

The R Project for Statistical Computing (Ri386 3.0.2) was used to analyze most of the resulting data from the main study for the inferential statistics portion of the research study. In addition, Microsoft Excel 2010 was also used in general computations and graphics for the descriptive statistics section of the study. The R Project was very instrumental program in determining the chi-square tests that were run on question 21 in relation to demographic questions which were 22 through 31. Likewise, all p-values associated with the chi-square tests that were less than or equal to 0.1 were further tested for correlations using the R Project as well. The use of such program to run these test was accomplished with the support from the Department of Statistics at Colorado State University (CSU).

Data analysis of the results consisted of descriptive and inferential statistics. The latter was conducted on selected questions in section I and the top three selected options for the question in section II; and the descriptive statistics was applied to all questions in section III except for question 22. The question was eliminated because 100 percent of the respondents were from the state under study, total of five states. A summary of the survey sections including the title and the number of questions are presented in **Table 4.1.**

Table 4.1
Survey Sections Summary

Section	Title	Number of Questions
I	General Questions	20
II	Choice of Funding System	1
II	Demographics	10

Inferential statistics was also employed to sections II and III as part of testing the research hypotheses except for question 22 in section III. Testing the research hypotheses included finding a correlation between question 21 in section II, choice of funding system, and each of the demographic data in section III, questions 23 through 31.

According to Creswell, correlational designs are used in quantitative research studies to measure the degree of association between variables, two or more, by mean of using statistical methods of correlational analysis, (Creswell, 2008). This was achieved by applying Chi-square [X^2] statistic to the survey results. According to Devore & Peck (2005), "*The goodness-of-fit statistic, denoted by X^2, is a quantitative measure of the extent to which the observed counts differ from those expected when H_0 is true*" (p.518). When the difference between the observed count and the expected count, the value of X^2, is large, then the null hypothesis (H_0) can be rejected. Similarly, when the value of X^2 is small, H_0 is true and thus cannot be rejected (Devore & Peck, 2005). To draw a conclusion on whether to accept or reject a null hypothesis, a P-value was compared to the significance level for the test. Devore & Peck define the P-value as: "*The P-value (also sometimes called the **observed significance level**) is a measure of inconsistency between the hypothesized value for a population characteristic and the observed sample. It is the probability, assuming that H_0 is true, of obtaining a test statistic value at least as inconsistent with H_0 as what actually resulted*" (Devore & Peck, 2005, p.419).

Ott & Longnecker suggest that "*if the level of significance is a small value, then the sample data fail to support H_0 and our decision is to reject H_0*" (Ott & Longnecker, 2001, p.224). The question was what P-Value should be used in this analysis? Many statisticians believe that an appropriate P-value is less than or equal to 0.05 ($P \leq 0.05$). However, this value is not a standard one. The matter-of-fact, Ott & Longnecker warn from falling into this trap and suggest that selecting the appropriate P-value means that rejection of a null hypothesis can be achieved based on the level of risk of error (Ott & Longnecker, 2001). Thus, with the advice of the post-doctorate student from the Department of Statistics at CSU, it was determined that P-value of less than or equal to 0.10 ($P \leq 0.10$) was the best fit for the purpose of this research study. In addition, since the sample sizes in some of the categories for questions 23 through 31 were small, it was decided to use a permutation test. The reason is that the permutation test makes weaker assumptions about the distribution under the null hypothesis (Angulo Ibanez, 2012).

4.2 Results of the Survey

As a result of mailing out 15,945 questionnaires to five different states to include Colorado, North Dakota, South Dakota, Utah, and Wyoming, only 1,190 surveys were received. However, a total of 27 surveys were eliminated due to different reasons such as blank surveys, incomplete surveys, or mailing the wrong surveys back. For instance, one of the surveys that were received was a medical one. Thus, a total of 1,163 completed surveys were included in this analysis. The overall response rate was 7.29% which is much lower than anticipated. As mentioned in chapter 3, the desired number of completed surveys was 385 per state which yielded to a response rate of 11.67% per state. Nonetheless, the response rates for Colorado, North Dakota, South Dakota, Utah, and Wyoming were 9.26%, 5.81%, 6.76%, 6.68%, and

7.98% respectively. On the same token, the number of surveys that were eliminated was 2 from Colorado, 2 from North Dakota, 7 from South Dakota, 6 from Wyoming; and one was eliminated from Utah. Finally, 10 miscellaneous, missing state information, surveys were also disregarded. **Table 4.2** is a summary, per state, for sent surveys, received surveys, removed surveys, completed surveys, and the response rate.

Table 4.2
Summary of Surveys Tally

State	Sent Surveys	Received Surveys	Removed Surveys	Completed Surveys	Response Rate
Colorado	3,163	295	2	293	9.26%
North Dakota	3,204	188	2	186	5.81%
South Dakota	3,182	222	7	215	6.76%
Utah	3,202	214	0	214	6.68%
Wyoming	3,194	261	6	255	7.98%
Totals	**15,945**	**1,180**	**17**	**1,163**	**7.29%**

It is important to re-list the hypotheses used for this research study prior to presenting the detailed analyses for each of the five states mentioned earlier. Total of 9 hypotheses, for each state, that were used in this research study are as follow:

H_{01}: There is no association between the choice of funding option and the living environment.

H_{A1}: There is an association between the choice of funding option and the living environment.

H_{02}: There is no association between the choice of funding option and having access to public transportation.

H_{A2}: There is an association between the choice of funding option and having access to public transportation.

H_{03}: There is no association between the choice of funding option and the use of public transportation.

H_{A3}: There is an association between the choice of funding option and the use of public transportation.

H_{04}: There is no association between the choice of funding option and the average miles driven per week.

H_{A4}: There is an association between the choice of funding option and the average miles driven per week.

H_{05}: There is no association between the choice of funding option and the vehicle's miles per gallon.

H_{A5}: There is an association between the choice of funding option and the vehicle's miles per gallon.

H_{06}: There is no association between the choice of funding option and age.

H_{A6}: There is an association between the choice of funding option and age.

H_{07}: There is no association between the choice of funding option and gender.

H_{A7}: There is an association between the choice of funding option and gender.

H_{08}: There is no association between the choice of funding option and the annual household income.

H_{A8}: There is an association between the choice of funding option and the annual household income.

H_{09}: There is no association between the choice of funding option and the highest level of education completed.

H_{A9}: There is an association between the choice of funding option and the highest

level of education completed.

4.2.1 The State of Colorado

As a result of soliciting 3,163 surveys that were sent across Colorado, 295 were received, 2 were eliminated, and 293 were marked as completed. This yielded to a response rate of 9.26% which was lower than the desired response rate of, at least, approximately 12%, about 385 respondents (to have an error of estimation of 5% in inferential statistics as was discussed in Chapter 3).

It is important to note that, the reporting of the results, for analysis purposes, was based on the actual number of respondents for each question. In other words, since not every participant responded to every question the respondents who left the question blank were removed from the total participants for that specific question. **Table 4.3** contains a summary of the total number of respondents, for question 1 through question 31, to the survey.

Table 4.3
Summary of Total and Actual Respondents to Question 1 through Question 31

Questions	Actual Number Responded
Q1	292
Q2	291
Q3	276
Q4	280
Q5	289
Q6	293
Q7	292
Q8	291
Q9	292
Q10	293
Q11	292
Q12	292
Q13	293
Q14	293
Q15	288
Q16	292
Q17	290
Q18	292
Q19	291
Q20	292
Q21	259
Q22	293
Q23	288
Q24	290
Q25	288
Q26	289
Q27	289
Q28	288
Q29	284
Q30	266
Q31	283

4.2.1.1 Demographics

The demographic information for the State of Colorado is shown in nine pie-charts representing questions 23 through 31. The pie-charts illustrate the percentages of each category in each question. **Figures 4.1 through 4.9** show the demographic results for the nine questions

to include living environment, access to public transportation, use of public transportation, average miles driven per week, vehicle's miles per gallon, age, gender, annual household income, and highest level of education attained.

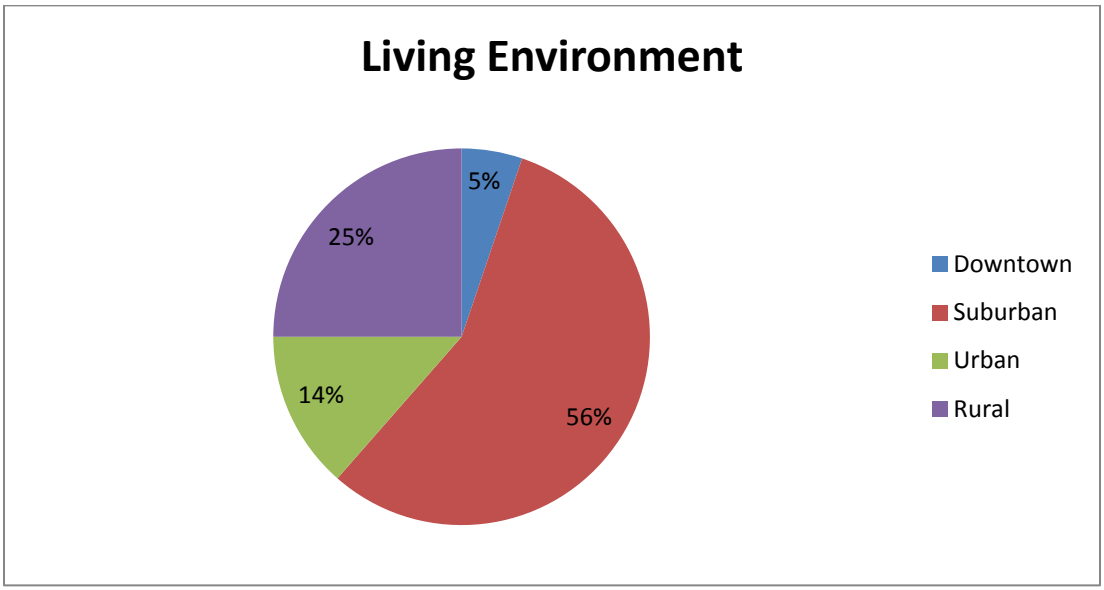


Figure 4.1: Living environment.

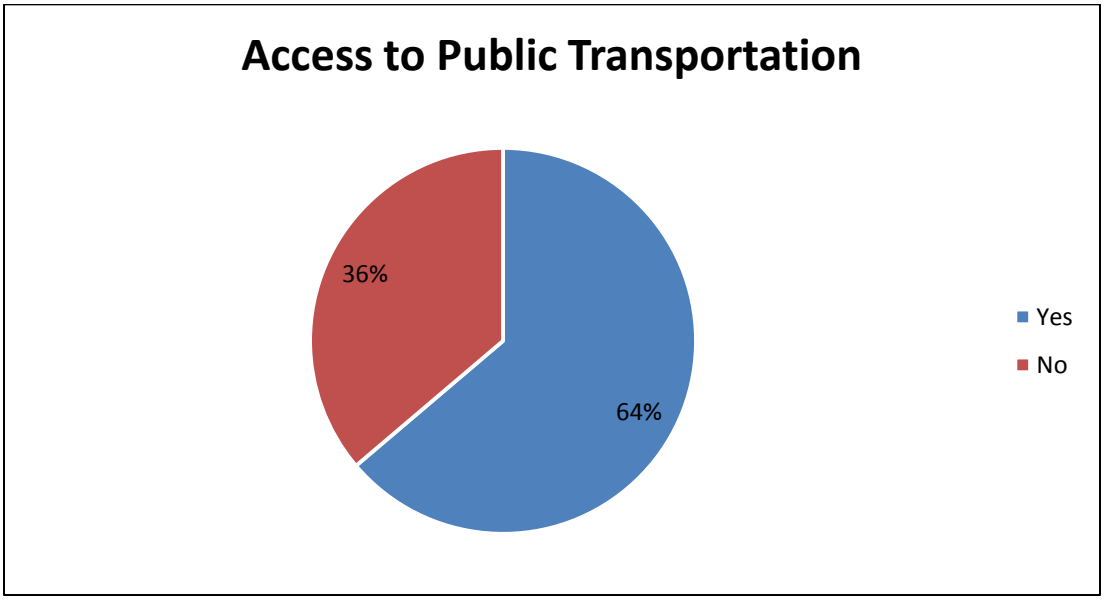


Figure 4.2: Access to public transportation.

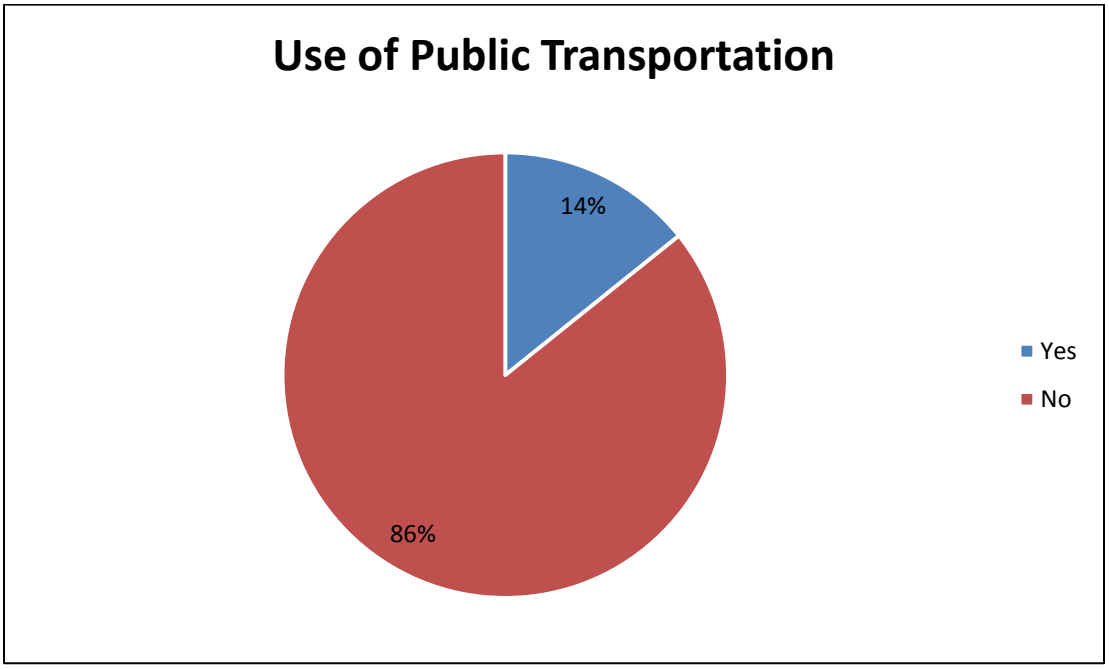


Figure 4.3: Use of public transportation.

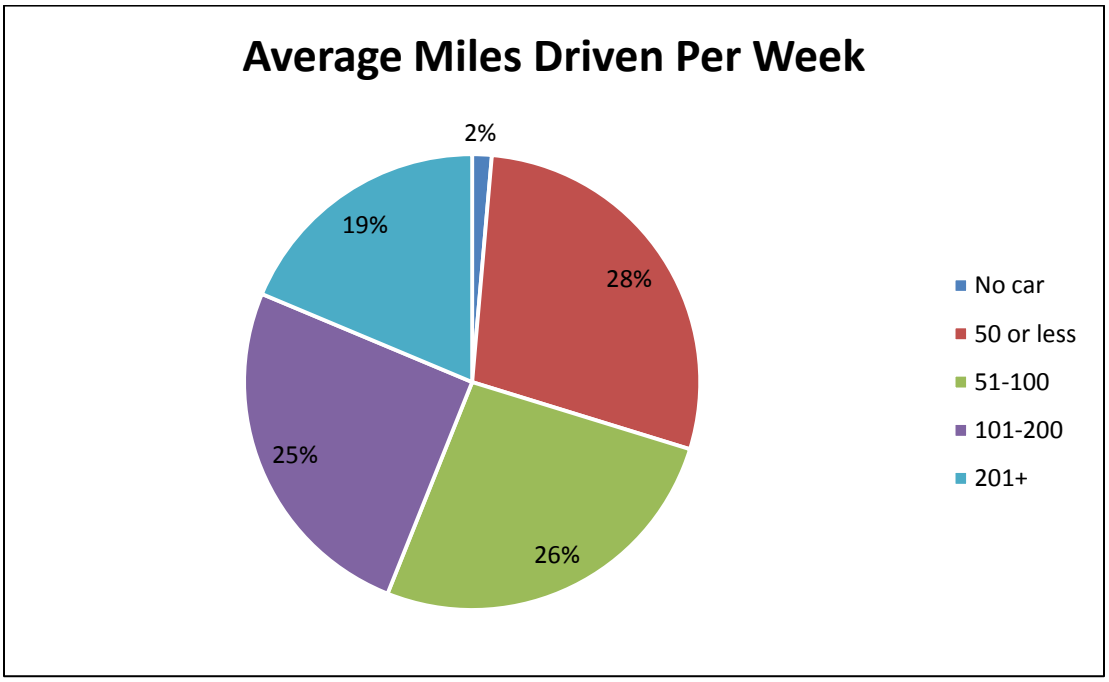


Figure 4.4: Average miles driven per week.

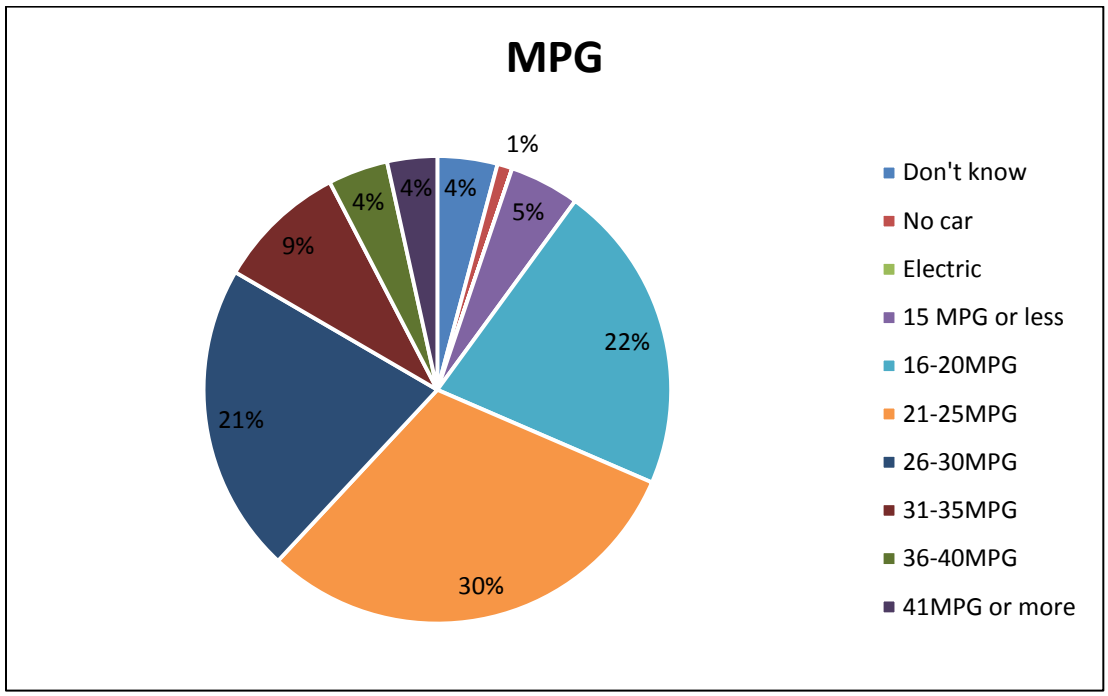


Figure 4.5: Vehicle's miles per gallon.

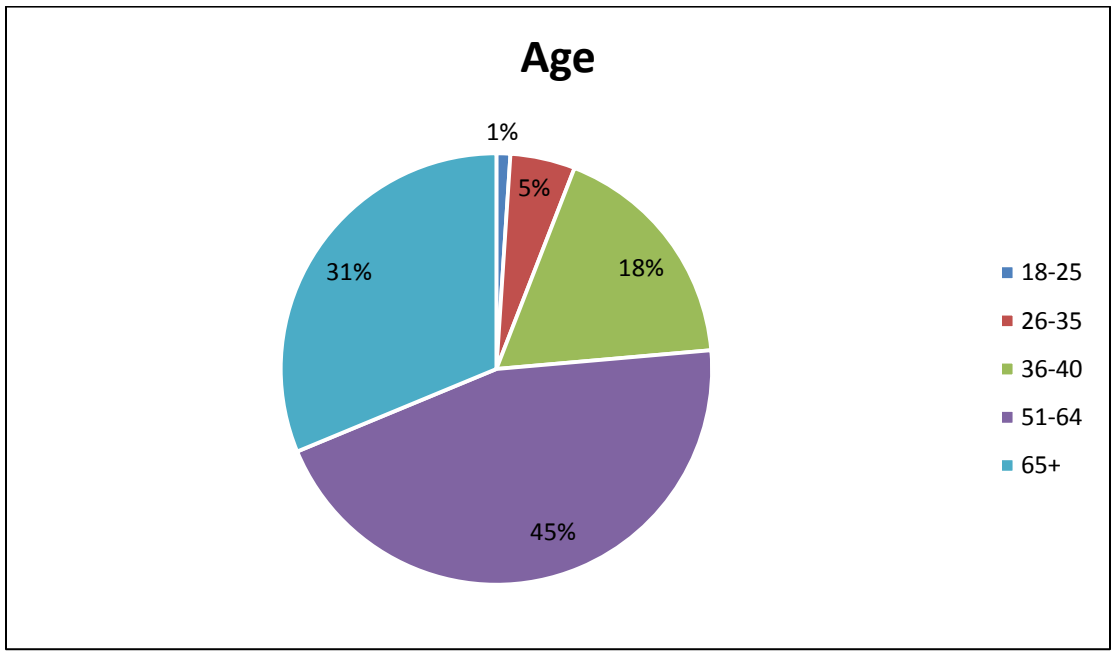


Figure 4.6: Age.

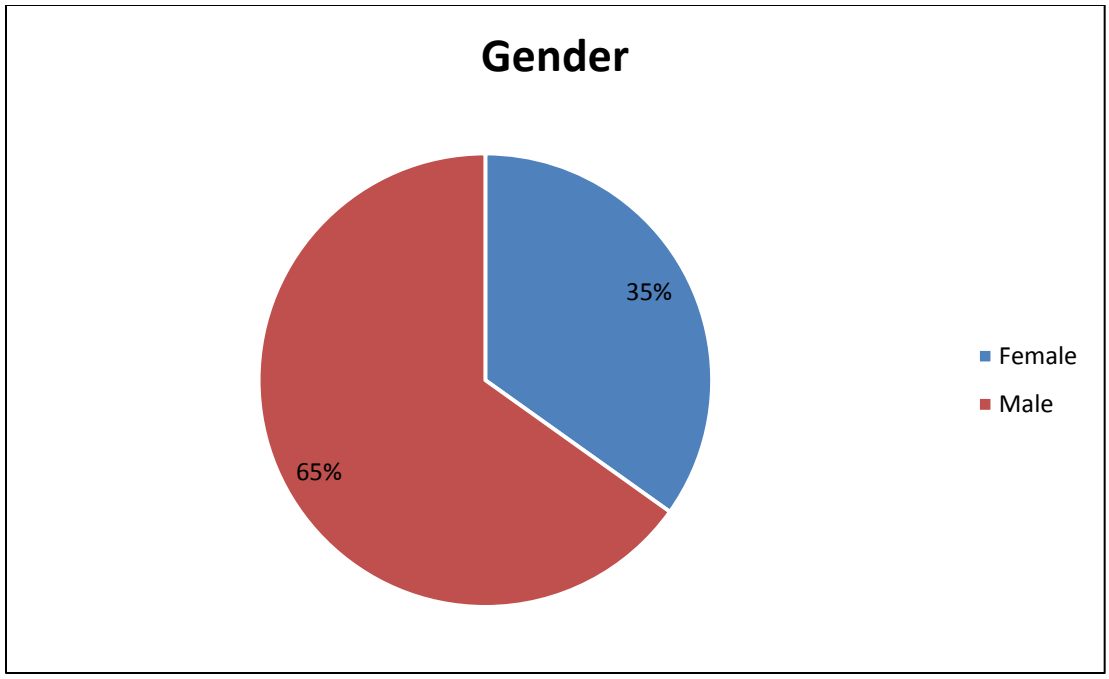


Figure 4.7: Gender.

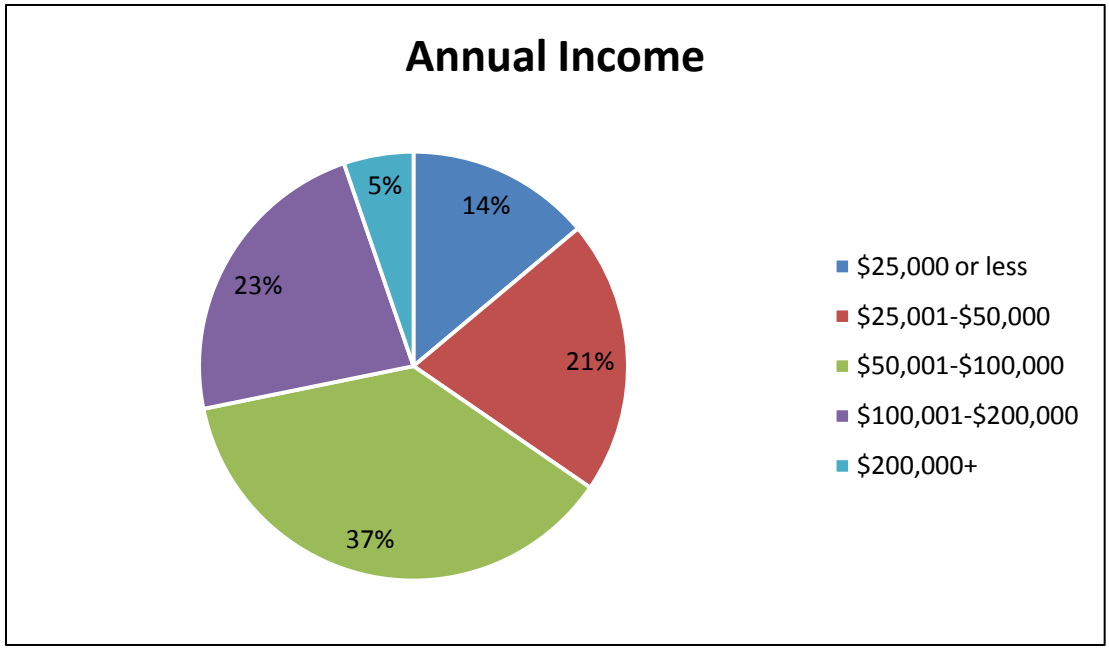


Figure 4.8: Annual household income.

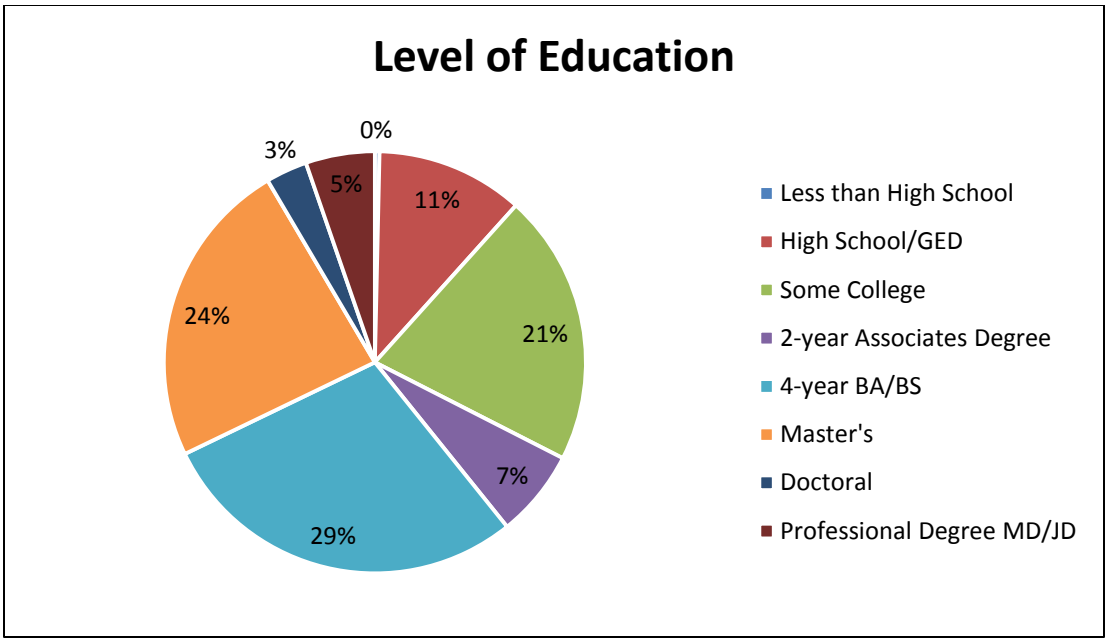


Figure 4.9: Highest level of education attained.

It was found that about 45% of all respondents were between the age of 51 and 64 years old (both females and males), and 65% were male, see **Figures 4.6 & 4.7** respectively. Interestingly, 64% of total participants have access to public transportation but only 14% are actually using some form of public transportation, see **Figures 4.2 & 4.3** correspondingly. Furthermore, 65% of all respondents in Colorado have an annual household income greater than $50,000, and 61% have at least a four-year college degree, see **Figures 4.8 & 4.9** respectively.

4.2.1.2 General Questions Related to Highways and Funding

Questions 1 through 20, in section I of the survey, used the 5-point Likert rating scale, strongly agree to strongly disagree. Nonetheless, for the purpose of analysis, strongly agree and agree categories were combined into a single category. It was found with 95% confidence that between 52% and 64% of the population in Colorado agreed that the highway system is in poor condition. That is, 58% of the population, +/- 6% error of estimation, agreed that the highway system is in poor condition. Furthermore, it was also found with 95% confidence that between

85% and 93% of the population concurred that the quality of the highway system is important to them. That is, 89% of the population, +/- 4% error of estimation, agreed that the quality of the highway system is important to them. **Table 4.4** is a summary of the population opinion with respect to the poor condition of the highway system and its importance to them.

Table 4.4
Summary of the Condition and the Importance of Highway Quality

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	58.00	+/- 6.00	Between 52 and 64
The Quality of the Highway System is important to me	89.00	+/- 4.00	Between 85 and 93

It is worth noting that, it was found with 95% confidence that only between 14% and 22% of the population in Colorado supported the use of mileage-based user fees to fund the highway system. That is, 18% of the population, +/- 4% error of estimation, supported the use of mileage-based user fees to fund the highway system. Furthermore, it was also found with 95% confidence that between 7% and 15% of the population felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. That is, only 11% of the population, +/- 4% error of estimation, felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. **Table 4.5** represents the above findings.

Table 4.5
Summary of the Mileage-Based User Fees and Its Tracking System

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I support the use of Mileage-Based User Fees to fund the highway system	18.00	+/- 4.00	Between 14 and 22
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe	11.00	+/- 4.00	Between 7 and 15

In addition, a complete table and pie-charts of the results for questions 1 through 20 are included in (Appendix D).

4.2.1.3 Choice of Funding System

For the top three preferences of funding option of the highway system in Colorado, it was found with 95% confidence that between 18% and 28% of the population chose increasing the federal gas tax at the time of purchase as their first preference. That is, 23% of the population, +/- 5% error of estimation, picked that option as their first choice. Similarly, it was found with 95% confidence that between 16% and 26% of the population selected increasing the state gas tax at the time of purchase as their second option. That is, 21% of the population, +/- 5% error of estimation, chose that option as their second one. The third preference was a tie among three options with 95% confidence that between 10% and 18% of the population picked these options as their third preference. That is, 14% of the population, for each option, and +/- 4% error of estimation, selected these options as their third preference. The tie that occurred among the three options includes collecting of additional sales tax on all goods, the use of highway tolling, and

the use of Highway Occupancy Toll (HOT) Lanes. **Table 4.6** is a summary of the top three choices of funding highway system in Colorado.

Table 4.6
Summary of the Top Funding Options in Colorado

Option	Option's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
[1] Increasing the Federal Gas Tax	23.00	+/- 5.00	Between 18 and 28
[2] Increasing the State Gas Tax	21.00	+/- 5.00	Between 16 and 26
[3] Collection of Additional Sales Tax on All Goods	14.00	+/- 4.00	Between 10 and 18
[3] Use of Highway Tolling	14.00	+/- 4.00	Between 10 and 18
[3] Use of Highway Occupancy Toll (HOT) Lanes	14.00	+/- 4.00	Between 10 and 18

4.2.1.4 Correlation Analysis

For the correlation analysis, the Chi-square test was performed to investigate if there was a correlation between any of the demographic questions, section III of the survey, and the choice of funding option, section II, based on the selected P-value of less than or equal to 0.10 (P-value ≤ 0.10). The R Project for Statistical Computing (Ri 386 3.0.2) software was used for the Chi-square test. The Chi-square test for question 25 with the Chi-square value of 11.40 and its associated P-value of 0.12, which is greater than 0.10, revealed that there was no correlation between the choice of funding option and the use of public transportation. In other words, since the P-value is not less than 0.10, the null hypothesis, H_{03}, could not be rejected, and therefore, there is no association. Similarly, it was found that there were no correlations between the choice of funding option and the miles driven per week, the vehicle's miles per gallon, age,

gender, annual household income, and the highest level of education attained based on the P-values of 0.52, 0.32, 0.60, 0.31, 0.49, and 0.30, respectively. (i.e., H_{04}, H_{05}, H_{06}, H_{07}, H_{08}, and H_{09}, could not be rejected, and therefore, there are no associations). One the other hand, there were correlations between the choice of funding option, the living environment, and having access to public transportation with Chi-square test values of 33.10, and 13.80, and their corresponding P-values of 0.07, and 0.05, respectively. In other words, since the P-values are less than 0.10, the null hypotheses, H_{01} and H_{02}, were rejected, and therefore, there are associations. **Table 4.7** represents the Chi-square test results and the associated P-value for each of the demographic question, questions 23 through 31.

Table 4.7
Summary of Chi-square Tests and their Associated P-values

Questions	Chi-Sq	P-Value	Correlation
Q23	33.10	0.07	Yes
Q24	13.80	0.05	Yes
Q25	11.40	0.12	No
Q26	27.00	0.52	No
Q27	60.30	0.32	No
Q28	25.60	0.60	No
Q29	8.28	0.31	No
Q30	27.50	0.49	No
Q31	53.70	0.30	No

For the correlational relationship that existed between the choice of funding option and the living environment, question 23, it was found that approximately 46% of people who live in downtown and 26.5% who live in urban areas of Colorado support the option of increasing the federal gas tax that is collected at the time of purchase. Furthermore, about 28% of people living in suburban Colorado support the option of increasing the state gas tax that is collected at the time of purchase and almost 23% of people living in rural Colorado support the option of the use

of highway tolling. Interestingly, people who live in downtown, suburban, and rural areas of Colorado do not support the use of cordon pricing option, whereas, only about 3% of people who live in urban area of Colorado support the use of cordon pricing. **Table 4.8** summarizes the proportion between the choice of funding option and the living environment.

Table 4.8

Percentages of Choice of Funding Option and the Living Environment

					Proportions			
Policy	**Downtown**	**Suburban**	**Urban**	**Rural**	**Downtown**	**Suburban**	**Urban**	**Rural**
1.Increasing the federal gas tax that is collected at the time of purchase	6	34	9	9	46.15%	22.97%	26.47%	14.75%
2.Increasing the state gas tax that is collected at the time of purchase	1	41	4	9	7.69%	27.70%	11.76%	14.75%
3.Collection of additional taxes and fees on other driving-related items	1	8	1	4	7.69%	5.41%	2.94%	6.56%
4.Collection of additional sales tax on all goods	1	22	5	9	7.69%	14.86%	14.71%	14.75%
5.Use of highway tolling	1	15	7	14	7.69%	10.14%	20.59%	22.95%
6.Use of High Occupancy Toll (HOT) Lanes	1	22	3	8	7.69%	14.86%	8.82%	13.11%
7.Use of Cordon Pricing	0	0	1	0	0.00%	0.00%	2.94%	0.00%
8.Use of Mileage-Based User Fees	2	6	4	8	15.38%	4.05%	11.76%	13.11%
Totals	**13**	**148**	**34**	**61**	**100%**	**100%**	**100%**	**100%**

Finally, it was found that, for the correlational relationship between the choice of funding option and having access to public transportation, question 24, approximately 26.5% of people who have access to public transportation chose the funding option of increasing the federal gas tax that is collected at the time of purchase. Moreover, about 24% of people having access to public transportation support increasing the state gas tax that is collected at the time of purchase. On the other hand, around 22.7% of people who don't have access to public transportation were in agreement in supporting the use of highway tolling. No one who has access to public transportation support the cordon pricing and only 1.1% of people not having access to public transportation support it. **Table 4.9** represents the proportion of people who do or don't have access to public transportation and their choice of funding option.

Table 4.9
Percentages of Choice of Funding Option and Access to Public Transportation

			Proportions	
Policy	**Yes**	**No**	**Yes**	**No**
1.Increasing the federal gas tax that is collected at the time of purchase	45	15	26.47%	17.05%
2.Increasing the state gas tax that is collected at the time of purchase	41	14	24.12%	15.91%
3.Collection of additional taxes and fees on other driving-related items	10	4	5.88%	4.55%
4.Collection of additional sales tax on all goods	24	13	14.12%	14.77%
5.Use of highway tolling	17	20	10.00%	22.73%
6.Use of High Occupancy Toll (HOT) Lanes	22	12	12.94%	13.64%
7.Use of Cordon Pricing	0	1	0.00%	1.14%
8.Use of Mileage-Based User Fees	11	9	6.47%	10.23%
Totals	**170**	**88**	**100%**	**100%**

4.2.2 The State of North Dakota

The results of soliciting 3,204 surveys that were sent across North Dakota, 188 were received, 2 were eliminated, and 186 were marked as completed. This yielded to a response rate of 5.8% which was lower than the desired response rate of, at least, approximately 12%, about 385 respondents (to have an error of estimation of 5% in inferential statistics as was discussed in Chapter 3).

It is important to note that, the reporting of the results, for analysis purposes, was based on the actual number of respondents for each question. In other words, since not every participant responded to every question the respondents who left the question blank were removed from the total participants for that specific question. **Table 4.10** contains a summary of the total number of respondents, for question 1 through question 31, to the survey.

Table 4.10
Summary of Total and Actual Respondents to Question 1 through Question 31

Questions	Actual Number Responded
Q1	183
Q2	186
Q3	175
Q4	182
Q5	186
Q6	186
Q7	186
Q8	185
Q9	184
Q10	186
Q11	186
Q12	185
Q13	186
Q14	186
Q15	185
Q16	186
Q17	186
Q18	185
Q19	184
Q20	186
Q21	164
Q22	186
Q23	182
Q24	185
Q25	183
Q26	185
Q27	182
Q28	184
Q29	184
Q30	167
Q31	182

4.2.2.1 Demographics

The demographic information for the state of North Dakota is shown in nine pie-charts representing questions 23 through 31. The pie-charts illustrate the percentages of each category

in each question. **Figures 4.10** through **4.18** show the demographic results for the nine questions to include living environment, access to public transportation, use of public transportation, average miles driven per week, vehicle's miles per gallon, age, gender, annual household income, and highest level of education attained.

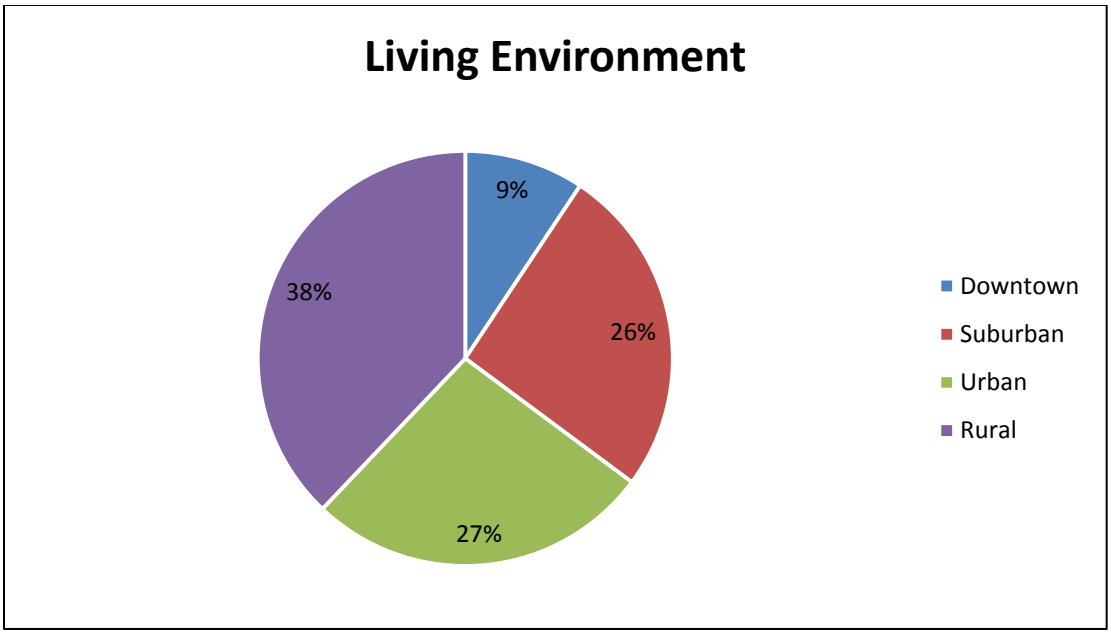


Figure 4.10: Living environment.

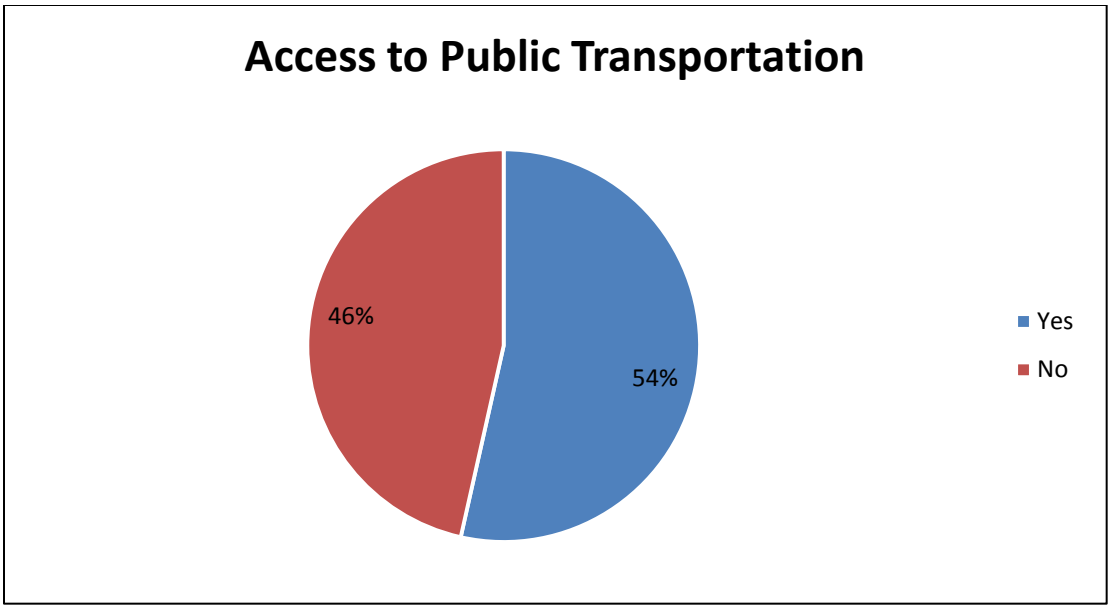


Figure 4.11: Access to public transportation.

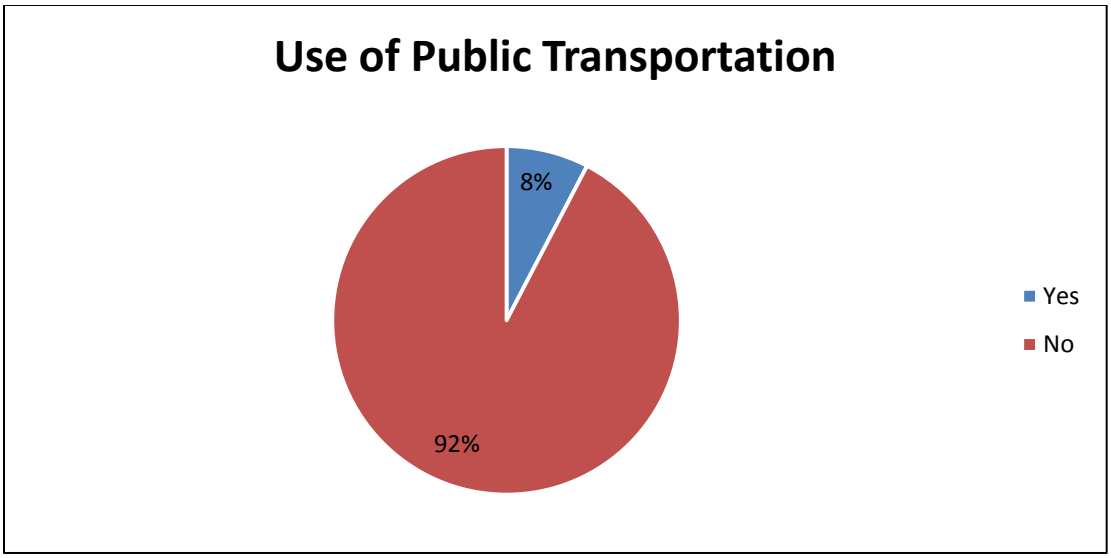


Figure 4.12: Use of public transportation.

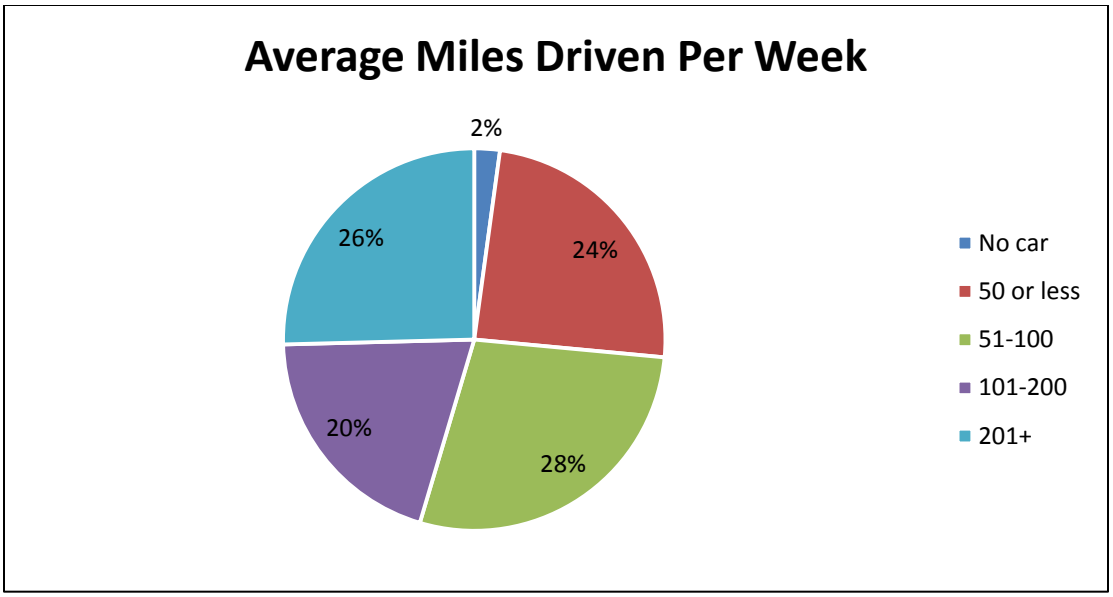


Figure 4.13: Average miles driven per week.

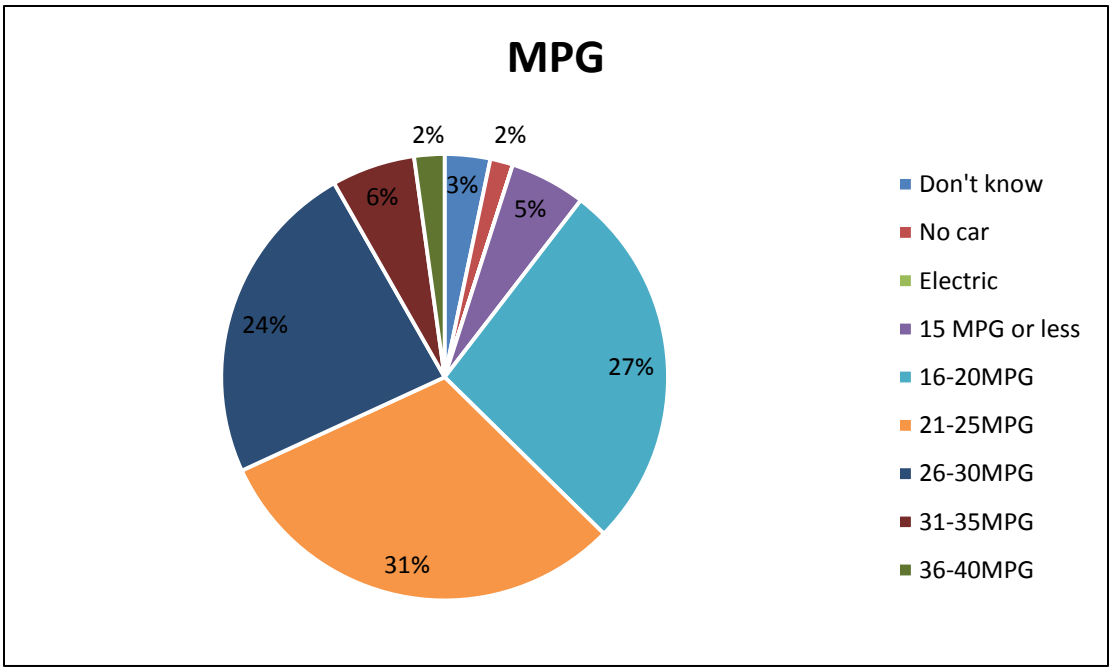


Figure 4.14: Vehicle's miles per gallon.

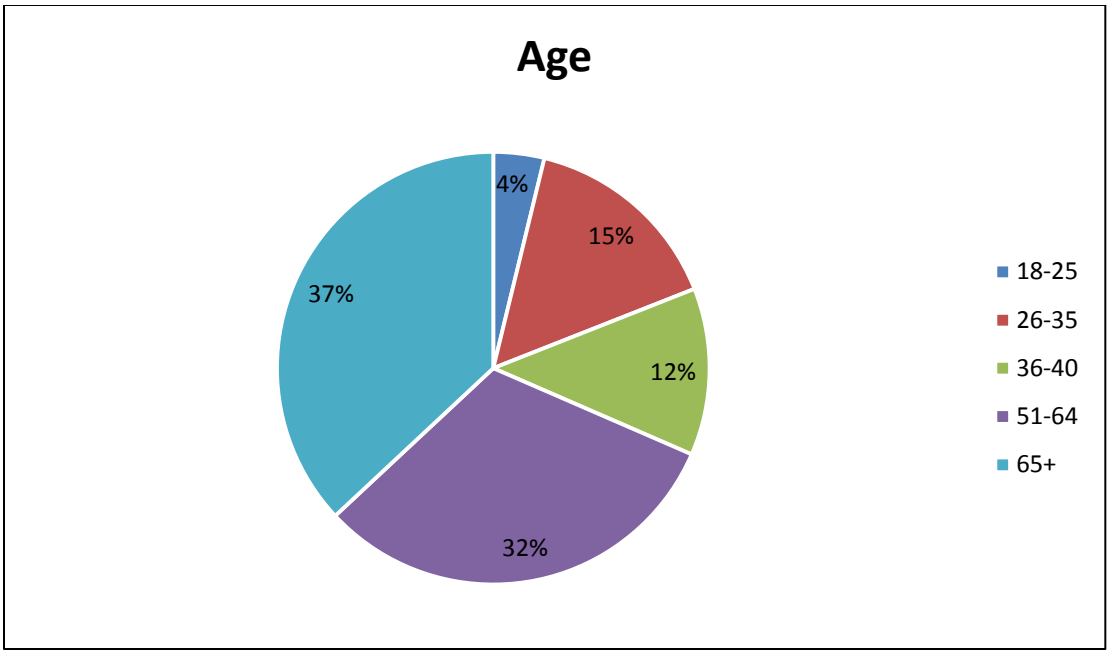


Figure 4.15: Age.

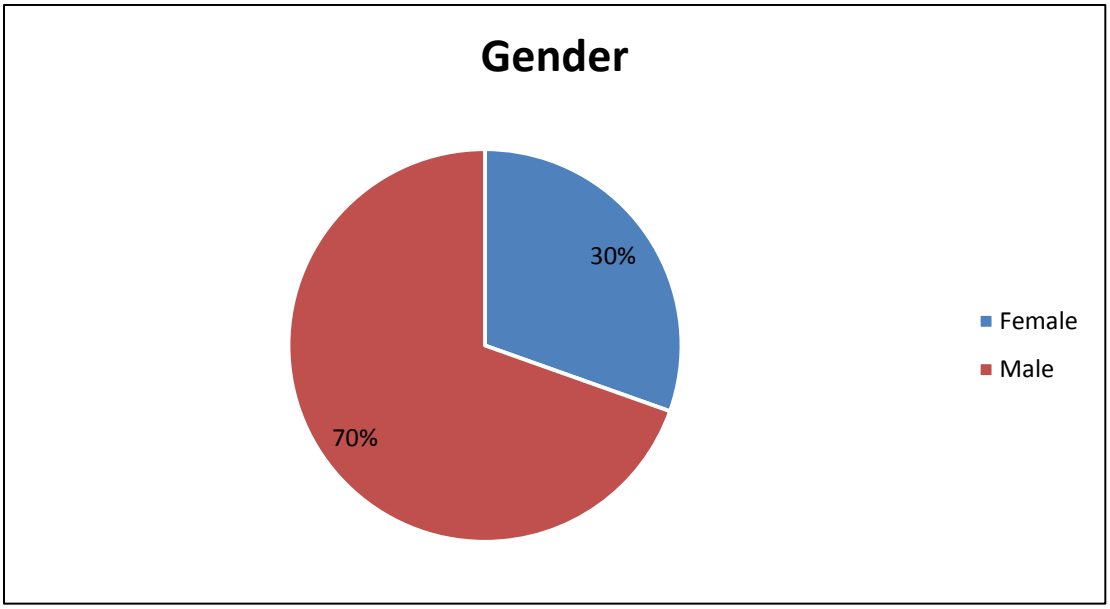


Figure 4.16: Gender.

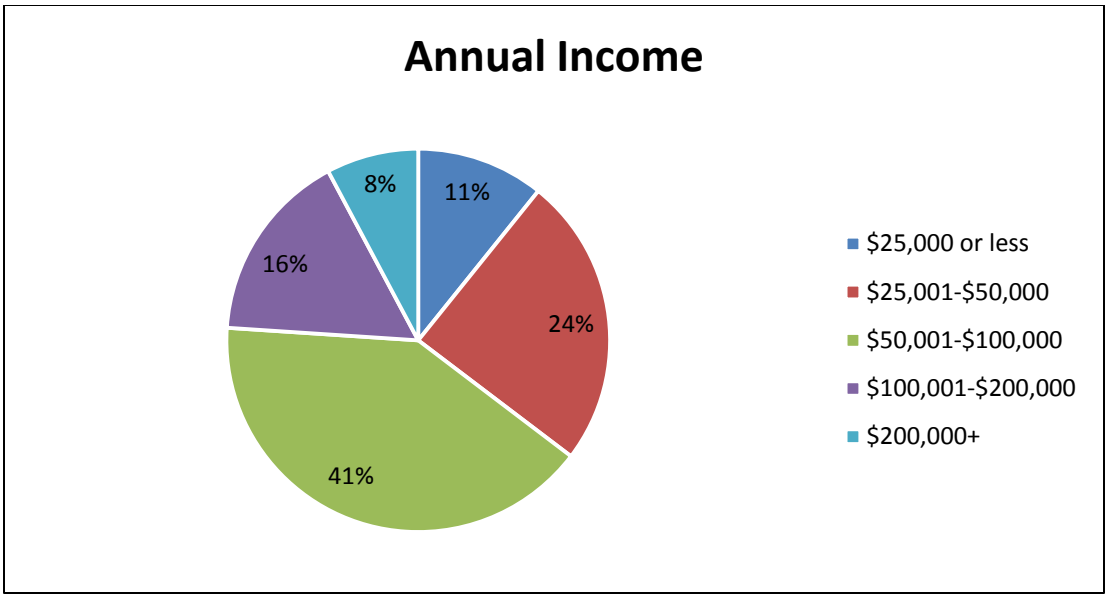


Figure 4.17: Annual household income.

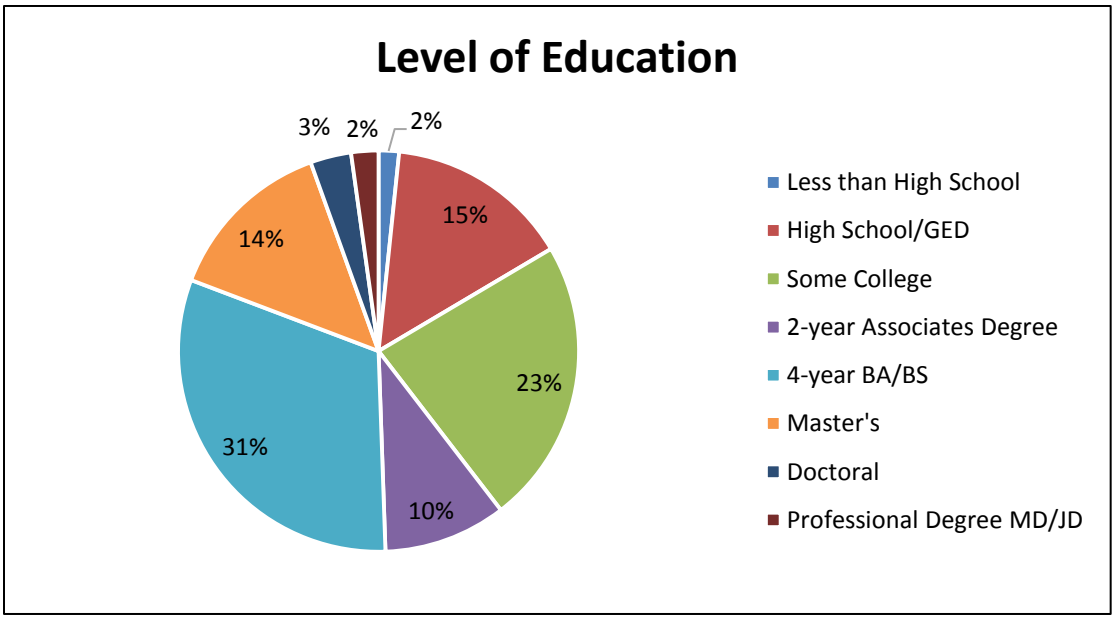


Figure 4.18: Highest level of education attained.

It was found that about 38% of all respondents live in rural areas of North Dakota, and 70% were male; see **Figures 4.10** & **4.16** respectively. Interestingly, 54% of total participants

have access to public transportation but only 8% are actually using some form of public transportation, see **Figures 4.11** & **4.12** correspondingly. Also, 46% of all respondents drive more than 101 miles per week and 52% drive less than or equal to 100 miles, see **Figure 4.13**. Furthermore, 65% of all respondents in North Dakota have an annual household income greater than $50,000, and 63% have at least a four-year college degree, see **Figures 4.17** & **4.18** respectively.

4.2.2.2 General Questions Related to Highways and Funding

Questions 1 through 20, in section I of the survey, used the 5-point Likert rating scale, strongly agree to strongly disagree. Nonetheless, for the purpose of this research study analysis, strongly agree and agree categories were combined into a single category since it was assumed equal intervals between the response categories. It was found with 95% confidence that between 42% and 56% of the population in North Dakota agreed that highway system is in poor condition. That is, 49% of the entire population in North Dakota, +/- 7% error of estimation, agreed that the highway system is in poor condition.

Furthermore, it was also found with 95% confidence that between 88% and 96% of the population were in agreement that the quality of the highway system is important to them. That is, 92% of the population, +/- 4% error of estimation, agreed that the quality of the highway system is important to them. **Table 4.11** is a summary of the population opinion with respect to the poor condition of the highway system and its importance to them.

Table 4.11
Summary of the Condition and the Importance of Highway Quality

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	49.00	+/- 7.0	Between 42 and 56
The Quality of the Highway System is important to me	92.00	+/- 4.0	Between 88 and 96

It is worth noting that, it was found with 95% confidence that approximately between 13% and 23% of the population in North Dakota supported the use of mileage-based user fees to fund the highway system. That is, 18% of the population, +/- 5% error of estimation, supported the use of mileage-based user fees to fund the highway system. Furthermore, it was also found with 95% confidence that between 6% and 16% of the population felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. That is, only about 11%, +/- 5% error of estimation, felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. **Table 4.12** represents the above findings.

Table 4.12
Summary of the Mileage-Based User Fees and its Tracking System

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I support the use of Mileage-Based User Fees to fund the highway system	18.00	+/- 5.00	Between 13 and 23
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe	11.00	+/- 5.00	Between 6 and 16

In addition, a complete table and pie-charts of the results for questions 1 through 20 are included in (Appendix E).

4.2.2.3 Choice of Funding System

For the top three preferences of funding option of the highway system in North Dakota, it was found with 95% confidence that approximately between 25% and 39% of the population chose increasing the federal gas tax at the time of purchase as their first preference. That is, 32% of the population, +/- 7% error of estimation, picked that option as their first choice. Similarly, it was found with 95% confidence that between 17% and 31% of the population selected increasing the state gas tax at the time of purchase as their second option. That is, about 24% of the population, +/- 7% error of estimation, chose that option as their second one. For the third preference, with 95% confidence that between 9% and 19% of the population picked the additional sales taxes on all goods as their choice of option. That is, nearly 14% of

the population, +/- 5% error of estimation, selected that option as their third preference. **Table 4.13** is a summary of the top three choices of funding highway system in North Dakota.

Table 4.13
Summary of the Top Funding Options in North Dakota

Option	Option's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
[1] Increasing the Federal Gas Tax	32.00	+/- 7.00	Between 25 and 39
[2] Increasing the State Gas Tax	24.00	+/- 7.00	Between 17 and 31
[3] Collection of Additional Sales Tax on All Goods	14.00	+/- 5.00	Between 9 and 19

4.2.2.4 Correlation Analysis

For the correlation analysis, the Chi-square test was performed to investigate if there was a correlation between any of the demographic questions, section III of the survey, and the choice of funding option, section II, based on the selected P-value of less than or equal to 0.10 (P-value ≤ 0.10). The R Project for Statistical Computing (Ri 386 3.0.2) software was used for the Chi-square test. It was found that there were no correlations between the choice of funding option and living environment, access to public transportation, use of public transportation, average miles driven per week, vehicle's miles per gallon, age, gender, annual household income, and highest level of education attained based on the P-values of 0.20, 0.32, 0.34, 0.58, 0.46, 0.38, 0.18, 0.97, and 0.89, respectively. (i.e. H_{01} through H_{09} could not be rejected, and therefore, there is no association). **Table 4.14** represents the Chi-square test results and the associated P-value for each of the demographic question, questions 23 through 31.

Table 4.14
Summary of Chi-square Tests and their Associated P-values

Questions	Chi-Sq	P-Value	Correlation
Q23	26.00	0.20	No
Q24	8.10	0.32	No
Q25	7.87	0.34	No
Q26	25.90	0.58	No
Q27	49.10	0.46	No
Q28	29.70	0.38	No
Q29	10.10	0.18	No
Q30	15.80	0.97	No
Q31	37.30	0.89	No

4.2.3 The State of South Dakota

As a result of soliciting 3,182 surveys that were sent across South Dakota, 222 were received, 7 were eliminated, and 215 were marked as completed. This yielded to a response rate of 6.76% which was lower than the desired response rate of, at least, approximately 12%, about 385 respondents (to have an error of estimation of 5% in inferential statistics as was discussed in Chapter 3).

It is important to note that, the reporting of the results, for analysis purposes, was based on the actual number of respondents for each question. In other words, since not every participant responded to every question the respondents who left the question blank were removed from the total participants for that specific question. **Table 4.15** contains a summary of the total number of respondents, for question 1 through question 31, to the survey.

Table 4.15
Summary of Total and Actual Respondents to Question 1 through Question 31

Questions	Actual Number Responded
Q1	215
Q2	215
Q3	206
Q4	213
Q5	214
Q6	211
Q7	215
Q8	215
Q9	215
Q10	214
Q11	214
Q12	214
Q13	213
Q14	213
Q15	214
Q16	214
Q17	213
Q18	213
Q19	211
Q20	214
Q21	207
Q22	215
Q23	212
Q24	214
Q25	209
Q26	213
Q27	212
Q28	212
Q29	210
Q30	201
Q31	209

4.2.3.1 Demographics

The demographic information for the State of South Dakota is shown in nine pie-charts representing questions 23 through 31. The pie-charts illustrate the percentages of each category in each question. **Figures 4.19 through 4.27** show the demographic results for the nine

questions to include living environment, access to public transportation, use of public transportation, average miles driven per week, vehicle's miles per gallon, age, gender, annual household income, and highest level of education attained.

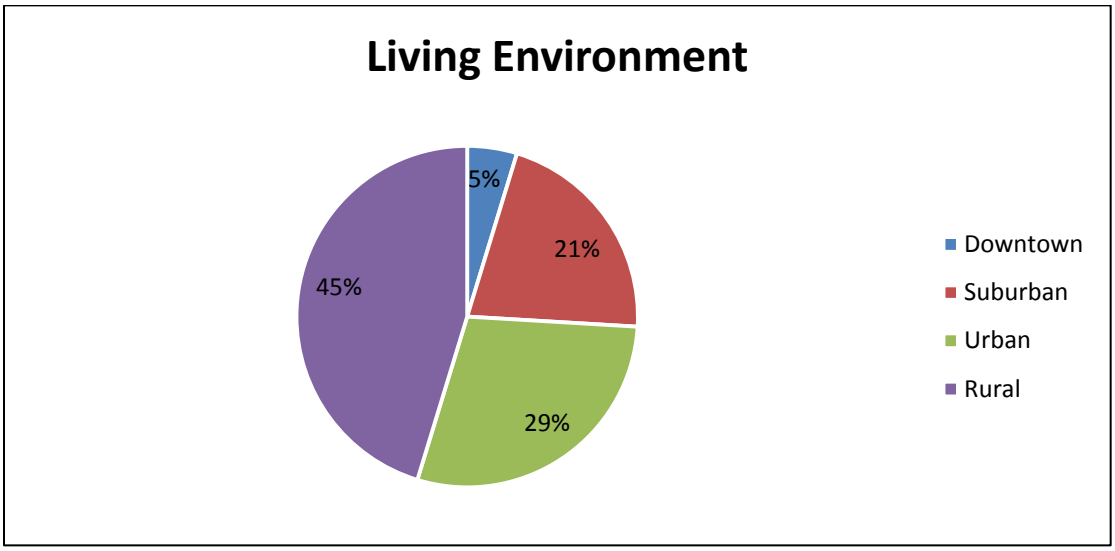


Figure 4.19: Living environment.

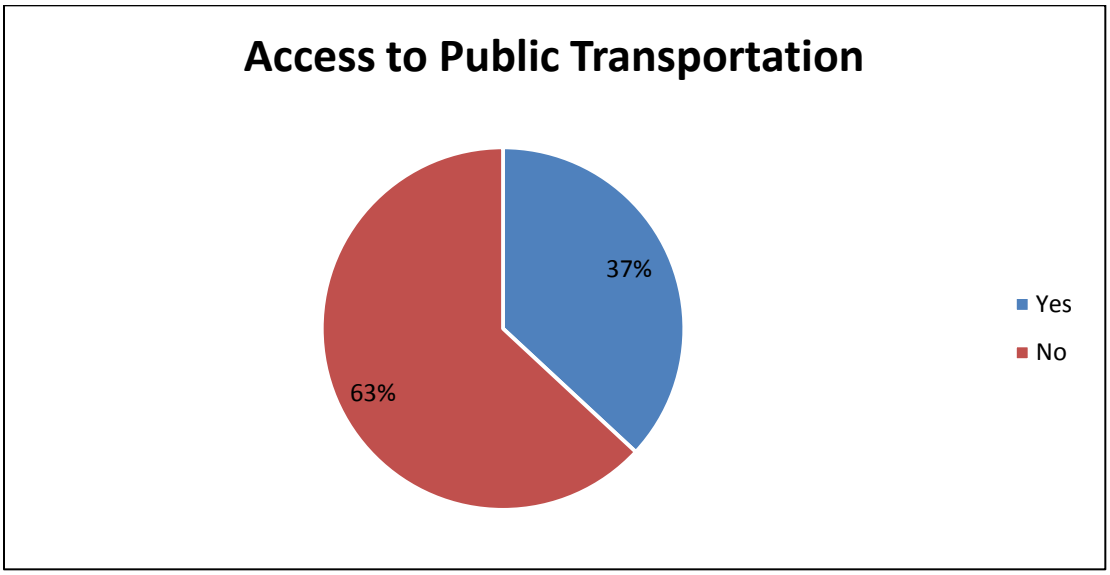


Figure 4.20: Access to public transportation.

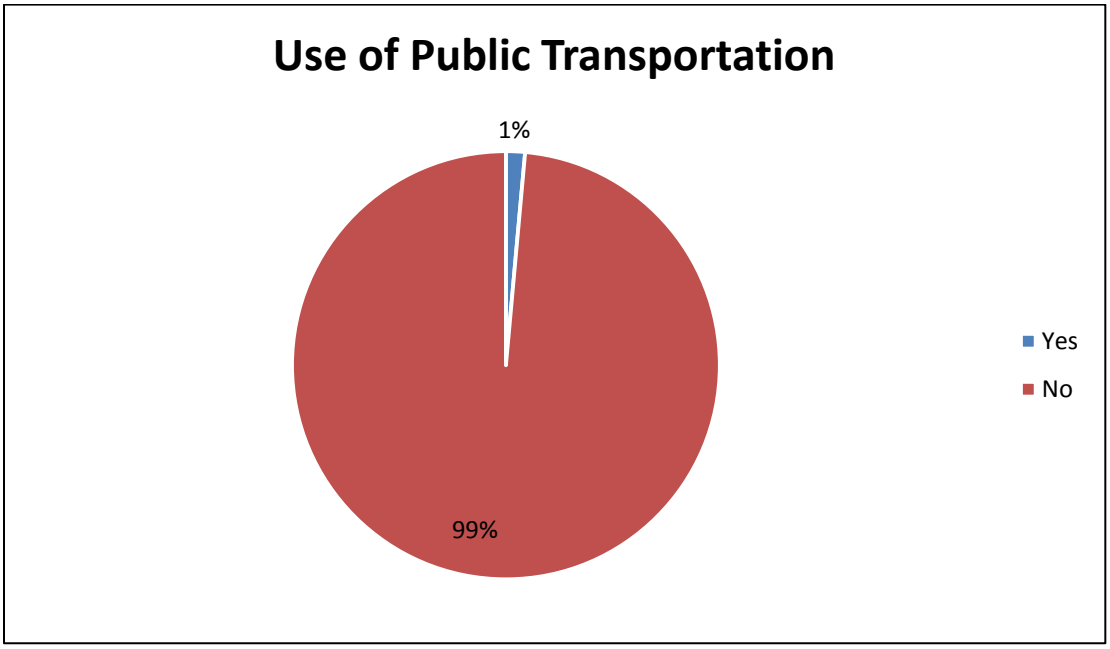


Figure 4.21: Use of public transportation.

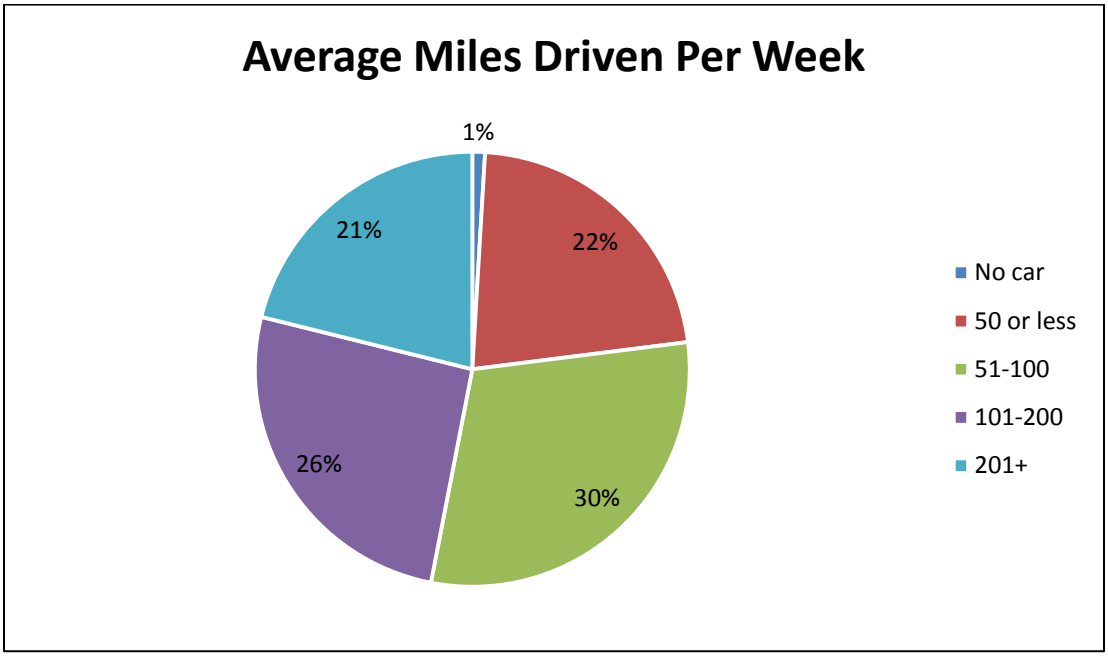


Figure 4.22: Average miles driven per week.

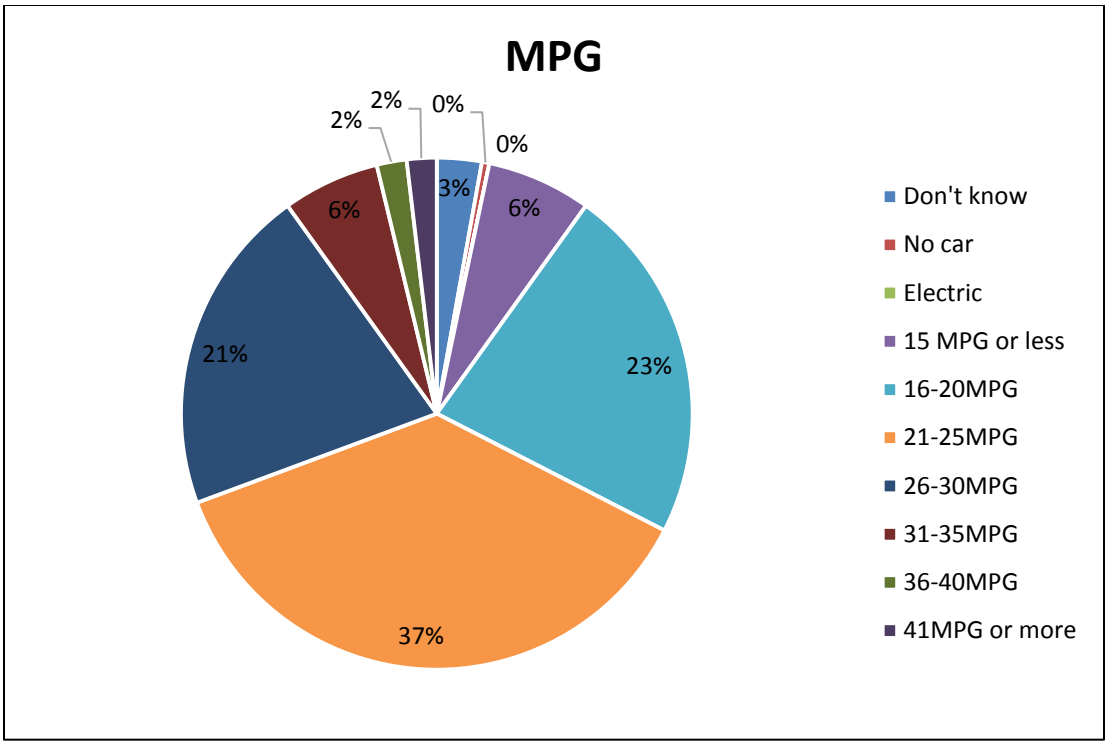


Figure 4.23: Vehicle's miles per gallon.

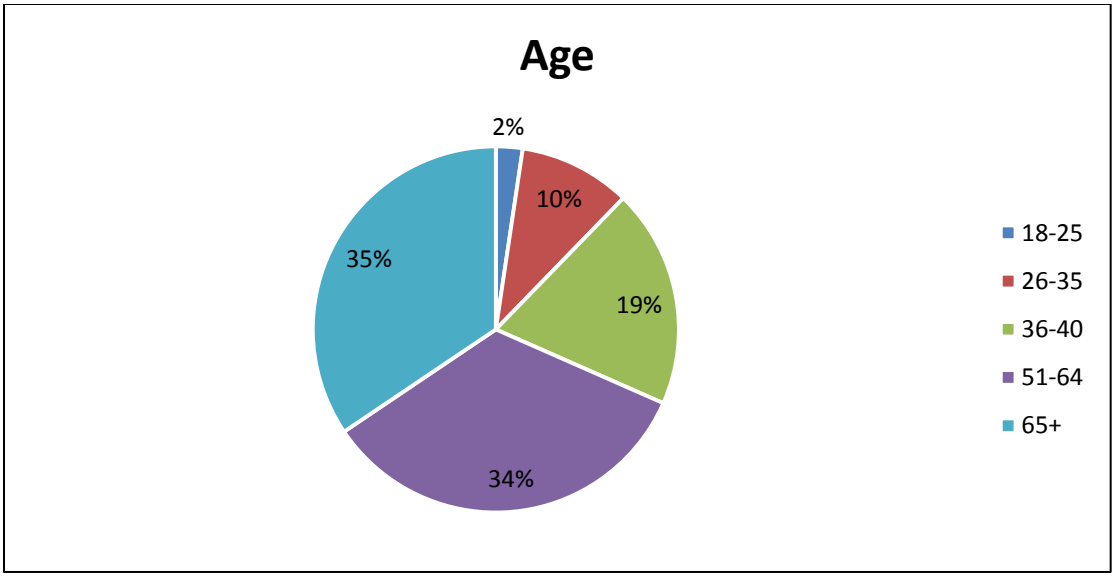


Figure 4.24: Age.

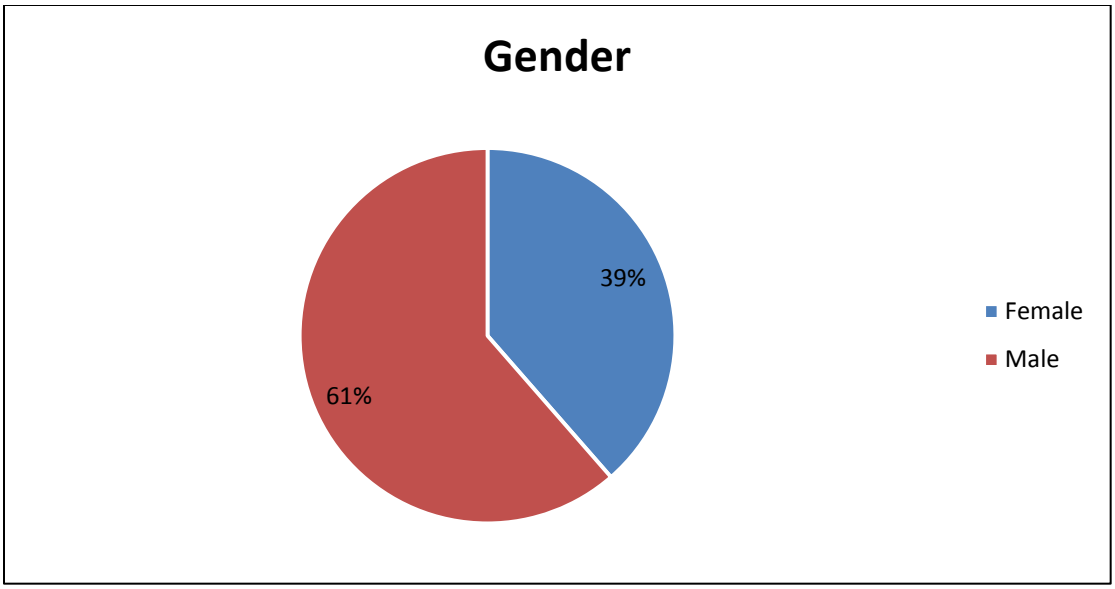


Figure 4.25: Gender.

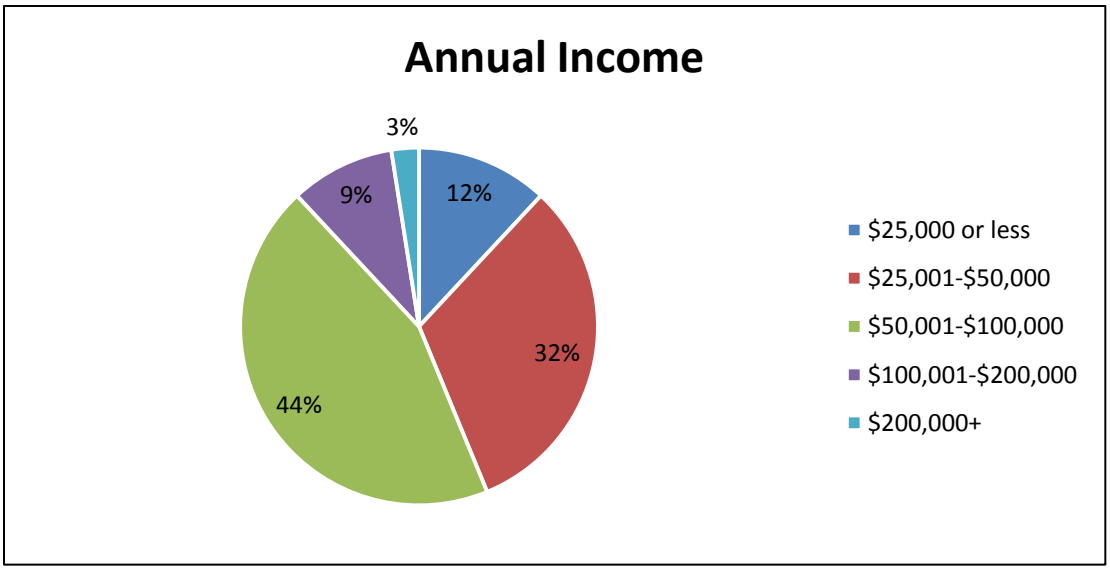


Figure 4.26: Annual household income.

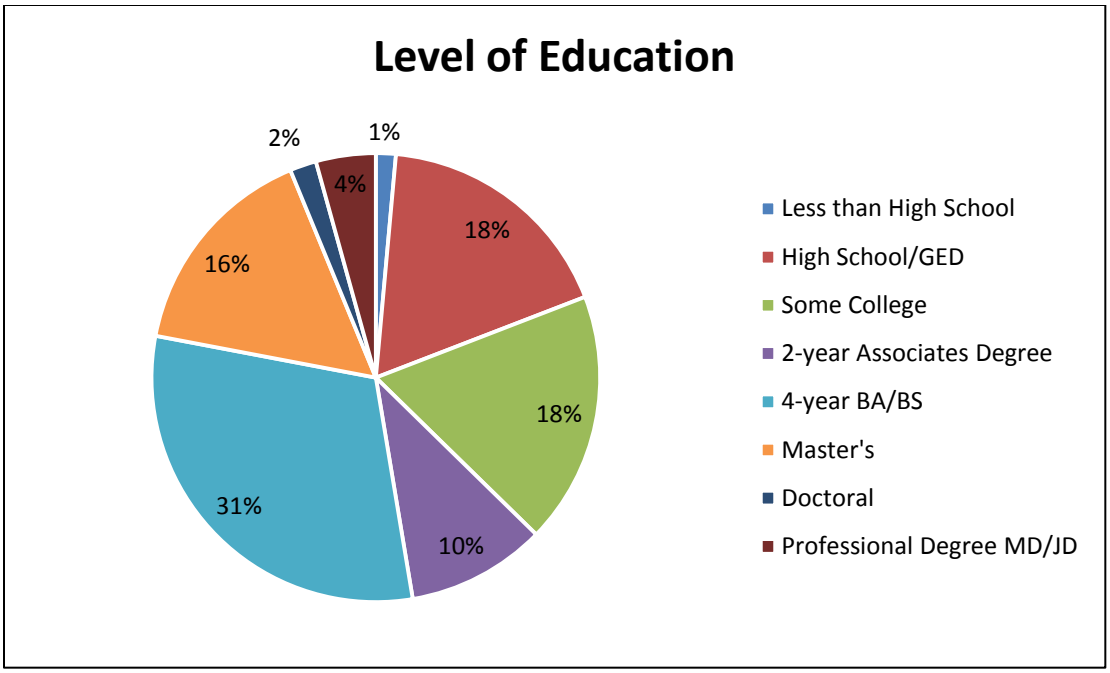


Figure 4.27: Highest level of education attained.

It was found that about 45% of all respondents live in rural areas of South Dakota, and 61% were male; see **Figures 4.19** & **4.25** respectively. Interestingly, 37% of total participants have access to public transportation but only 1.0% is actually using some form of public transportation, see **Figures 4.20** & **4.21** correspondingly. Also, 47% of all respondents drive more than 101 miles per week and 52% drive less than or equal to 100 miles, see **Figure 4.22**. Furthermore, 56% of all respondents in South Dakota have an annual household income greater than $50,000, and 53% have at least a four-year college degree, see **Figures 4.26** & **4.27** respectively. Finally, 81% of the respondents stated that their vehicles drive more than 21 miles per gallon, see **Figure 4.23**.

4.2.3.2 General Questions Related to Highways and Funding

Questions 1 through 20, in section I of the survey, used the 5-point Likert rating scale, strongly agree to strongly disagree. Nonetheless, for the purpose of this research study analysis,

strongly agree and agree categories were combined into a single category since it was assumed equal intervals between the response categories.

It was found with 95% confidence that between 39% and 53% of the population in South Dakota agreed that highway system is in poor condition. That is, 46% of the entire population in South Dakota, +/- 7% error of estimation, agreed that the highway system is in poor condition. Furthermore, it was also found with 95% confidence that between 87% and 95% of the population were in agreement that the quality of the highway system is important to them. That is, 91% of the population, +/- 4% error of estimation, agreed that the quality of the highway system is important to them. **Table 4.16** is a summary of the population opinion with respect to the poor condition of the highway system and its importance to them.

Table 4.16
Summary of the Condition and the Importance of Highway Quality

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	46.00	+/- 7.0	Between 39 and 53
The Quality of the Highway System is important to me	91.00	+/- 4.0	Between 87 and 95

It is worth noting that, it was found with 95% confidence that approximately between 17% and 29% of the population in South Dakota supported the use of mileage-based user fees to fund the highway system. That is, 23% of the population, +/- 6% error of estimation, supported the use of mileage-based user fees to fund the highway system.

Furthermore, it was also found with 95% confidence that between 9% and 19% of the population felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. That is, only about 14%, +/- 5% error of estimation, felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. **Table 4.17** represents the above findings.

Table 4.17
Summary of the Mileage-Based User Fees and its Tracking System

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I support the use of Mileage-Based User Fees to fund the highway system	23.00	+/- 6.00	Between 17 and 29
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe	14.00	+/- 5.00	Between 9 and 19

In addition, a complete table and pie-charts of the results for questions 1 through 20 are included in (Appendix F).

4.2.3.3 Choice of Funding System

For the top three preferences of funding option of the highway system in South Dakota, it was found with 95% confidence that approximately between 26% and 38% of the population chose increasing the federal gas tax at the time of purchase as their first preference. That is, 32% of the population, +/- 6% error of estimation, picked that option as their first choice. Similarly, it was found with 95% confidence that between 14% and 24% of the population

selected increasing the state gas tax at the time of purchase as their second option. That is, about 19% of the population, +/- 5% error of estimation, chose that option as their second one. For the third preference, with 95% confidence that between 10% and 20% of the population picked the additional sales taxes on all goods as their choice. That is, nearly 15% of the population, +/- 5% error of estimation, selected that option as their third preference. **Table 4.18** is a summary of the top three choices of funding highway system in South Dakota.

Table 4.18
Summary of the Top Funding Options in South Dakota

Option	Option's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
[1] Increasing the Federal Gas Tax	32.00	+/- 6.00	Between 26 and 38
[2] Increasing the State Gas Tax	19.00	+/- 5.00	Between 14 and 24
[3] Collection of Additional Sales Tax on All Goods	15.00	+/- 5.00	Between 10 and 20

4.2.3.4 Correlation Analysis

For the correlation analysis, the Chi-square test was performed to investigate if there was a correlation between any of the demographic questions, section III of the survey, and the choice of funding option, section II, based on the selected P-value of less than or equal to 0.10 (P-value ≤ 0.10). The R Project for Statistical Computing (Ri 386 3.0.2) software was used for the Chi-square test. The Chi-square test for question 23 with the Chi-square value of 15.80 and its associated P-value of 0.77, which is greater than 0.10, revealed that there was no correlation between the choice of funding option and the living environment. Thus, since the P-value is not less than 0.10, the null hypothesis, H_{01}, could not be rejected, and therefore, there is no

association. Similarly, it was found that there were no correlations between the choice of funding option and the access to public transportation, the miles driven per week, the vehicle's miles per gallon, gender, annual household income, and the highest level of education attained based on the P-values of 0.15, 0.80, 0.63, 0.35, 0.78, and 0.60, respectively. (i.e. H_{02}, H_{04}, H_{05}, H_{07}, H_{08}, and H_{09}, could not be rejected, and therefore, there are no associations). On the other hand, there were correlations between the choice of funding option, the use of public transportation, and age with Chi-square test values of 16.30, and 47.90, and their corresponding P-values of 0.09, and 0.01, respectively. In other words, since the P-values are less than 0.10, the null hypotheses, H_{03} and H_{06}, were rejected, and therefore, there are associations. **Table 4.19** represents the Chi-square test results and the associated P-value for each of the demographic question, questions 23 through 31.

Table 4.19
Summary of Chi-square Tests and their Associated P-values

Questions	Chi-Sq	P-Value	Correlation
Q23	15.80	0.77	No
Q24	10.80	0.15	No
Q25	16.30	0.09	Yes
Q26	21.40	0.80	No
Q27	52.00	0.63	No
Q28	47.90	0.01	Yes
Q29	7.78	0.35	No
Q30	21.90	0.78	No
Q31	45.90	0.60	No

For the correlational relationship that existed between the choice of funding option and the access to public transportation, question 25, it was found that 100% of people who have access to public transportation in South Dakota support the option of Collecting additional sales tax on all goods.

Furthermore, about 33% of people who don't have access to public transportation in South Dakota support the option of increasing the federal gas tax that is collected at the time of purchase and almost 20% of people who don't have access to public transportation in South Dakota support the option of increasing the state gas tax that is collected at the time of purchase. Interestingly, approximately 2% of people who don't have access to public transportation in South Dakota support the use of cordon pricing. **Table 4.20** summarizes the proportion between the choice of funding option and the access to public transportation.

Table 4.20

Percentages of Choice of Funding Option and the Access to Public Transportation

			Proportions	
Policy	**Yes**	**No**	**Yes**	**No**
Increasing the federal gas tax that is collected at the time of purchase	0	65	0.00%	32.50%
Increasing the state gas tax that is collected at the time of purchase	0	39	0.00%	19.50%
Collection of additional taxes and fees on other driving-related items	0	16	0.00%	8.00%
Collection of additional sales tax on all goods	3	29	100.00%	14.50%
Use of highway tolling	0	16	0.00%	8.00%
Use of High Occupancy Toll (HOT) Lanes	0	11	0.00%	5.50%
Use of Cordon Pricing	0	4	0.00%	2.00%
Use of Mileage-Based User Fees	0	20	0.00%	10.00%
Totals	**3**	**200**	**100%**	**100%**

Finally, it was found that, for the correlational relationship between the choice of funding option and age, question 28, approximately 42% of people who are between the ages of 51 and 64 years old chose the funding option of increasing the federal gas tax that is collected at the time of purchase. Moreover, about 36% of people who are older than 65 years support increasing the federal gas tax as well. On the other hand, 60% of people who are between the ages of 18 and 25 years old were in agreement in supporting the use of highway tolling. No one with the age range of 18 to 25, 26 to 35 and older than 65 years supported the cordon pricing. Finally, nearly 30% of people who are between the ages of 36 and 50 support the collection of additional sales tax on all goods. **Table 4.21** represents the proportion of the age of people and their choice of funding option.

Table 4.21

Percentages of Choice of Funding Option and Age

						Proportions				
policy	**18-25**	**26-35**	**36-50**	**51-64**	**65 or older**	**18-25**	**26-35**	**36-50**	**51-64**	**65 or older**
Increasing the federal gas tax that is collected at the time of purchase	0	1	12	29	25	0.00%	5.00%	29.27%	41.43 %	36.23%
Increasing the state gas tax that is collected at the time of purchase	0	5	7	14	13	0.00%	25.00%	17.07%	20.00 %	18.84%
Collection of additional taxes and fees on other driving-related items	1	3	3	6	3	20.00%	15.00%	7.32%	8.57%	4.35%
Collection of additional sales tax on all goods	0	4	12	5	10	0.00%	20.00%	29.27%	7.14%	14.49%
Use of highway tolling	3	2	2	5	5	60.00%	10.00%	4.88%	7.14%	7.25%
Use of High Occupancy Toll (HOT) Lanes	1	2	1	4	4	20.00%	10.00%	2.44%	5.71%	5.80%
Use of Cordon Pricing	0	0	1	2	0	0.00%	0.00%	2.44%	2.86%	0.00%
Use of Mileage-Based User Fees	0	3	3	5	9	0.00%	15.00%	7.32%	7.14%	13.04%
Totals	**5**	**20**	**41**	**70**	**69**	**100%**	**100%**	**100%**	**100%**	**100%**

4.2.4 The State of Utah

As a result of soliciting 3,202 surveys that were sent across Utah, 214 were received, none were eliminated, and the 214 surveys were marked as completed. This yielded to a response rate of 6.68% which was lower than the desired response rate of, at least, approximately 12%, about 385 respondents (to have an error of estimation of 5% in inferential statistics as was discussed in Chapter 3).

It is important to note that, the reporting of the results, for analysis purposes, was based on the actual number of respondents for each question. In other words, since not every participant responded to every question the respondents who left the question blank were removed from the total participants for that specific question. **Table 4.22** contains a summary of the total number of respondents, for question 1 through question 31, to the survey.

Table 4.22
Summary of Total and Actual Respondents to Question 1 through Question 31

Questions	Actual Number Responded
Q1	214
Q2	212
Q3	202
Q4	203
Q5	212
Q6	213
Q7	214
Q8	212
Q9	213
Q10	213
Q11	213
Q12	212
Q13	214
Q14	212
Q15	212
Q16	213
Q17	213
Q18	213
Q19	208
Q20	211
Q21	199
Q22	214
Q23	212
Q24	210
Q25	210
Q26	214
Q27	213
Q28	213
Q29	212
Q30	204
Q31	212

4.2.4.1 Demographics

The demographic information for the State of Utah is shown in nine pie-charts representing questions 23 through 31. The pie-charts illustrate the percentages of each category in each question. **Figures 4.28 through 4.36** show the demographic results for the nine

questions to include living environment, access to public transportation, use of public transportation, average miles driven per week, vehicle's miles per gallon, age, gender, annual household income, and highest level of education attained.

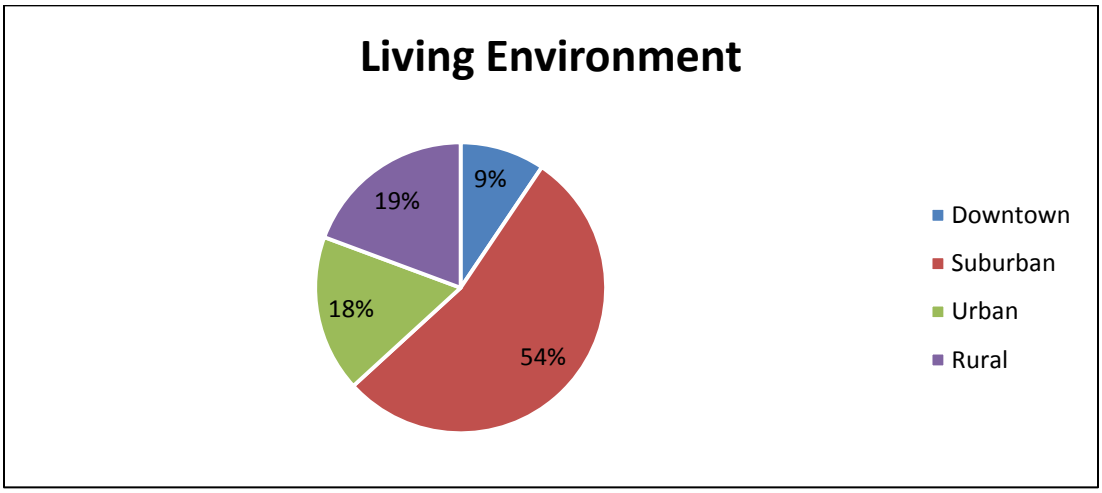


Figure 4.28: Living environment.

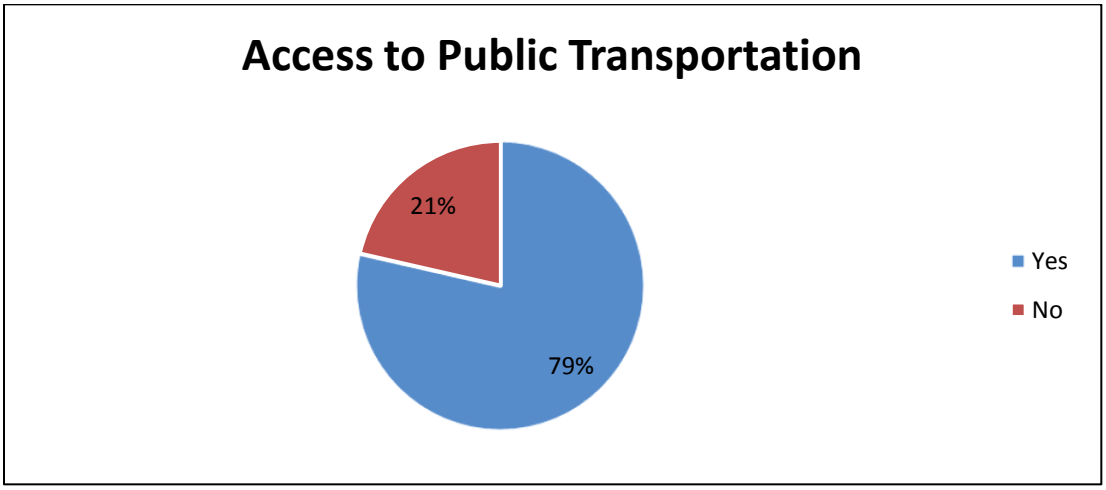


Figure 4.29: Access to public transportation.

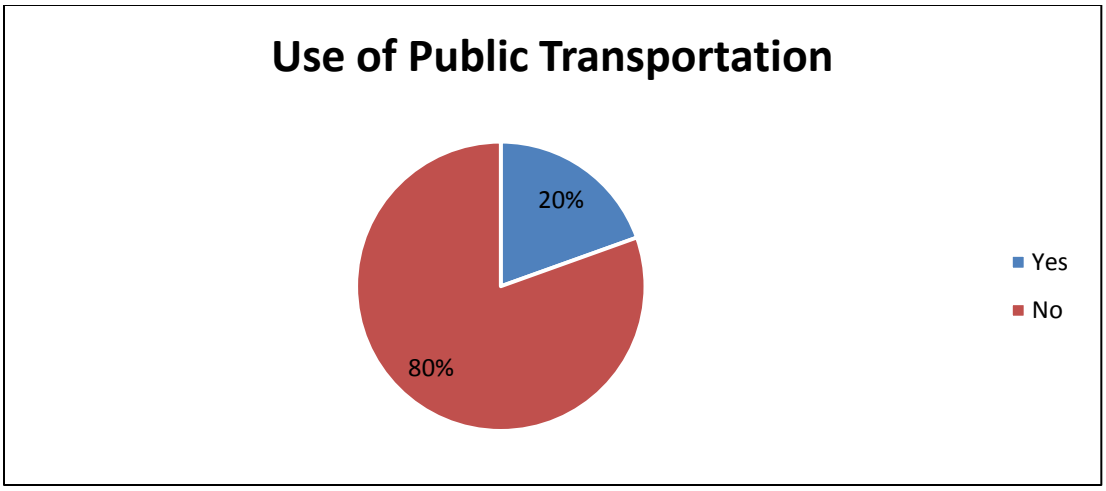


Figure 4.30: Use of public transportation.

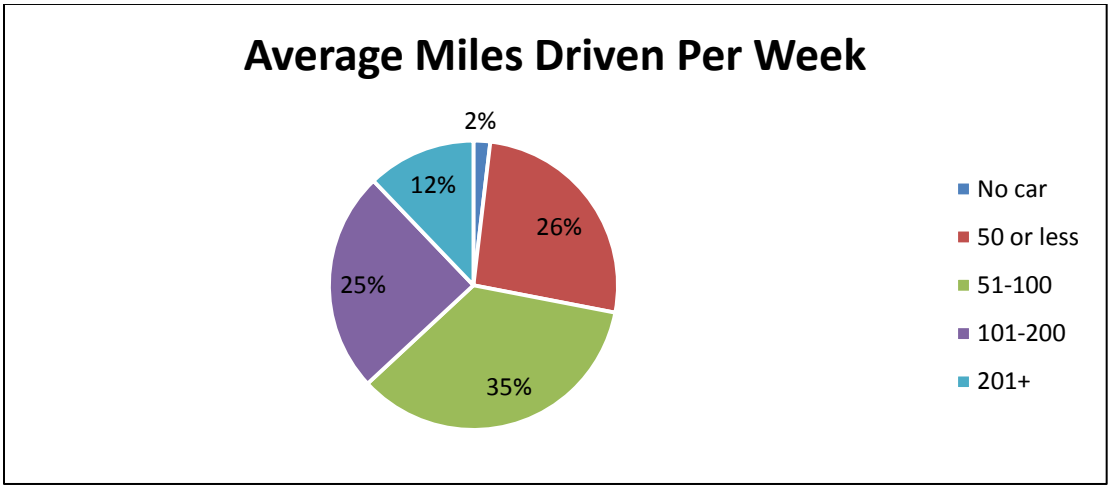


Figure 4.31: Average miles driven per week.

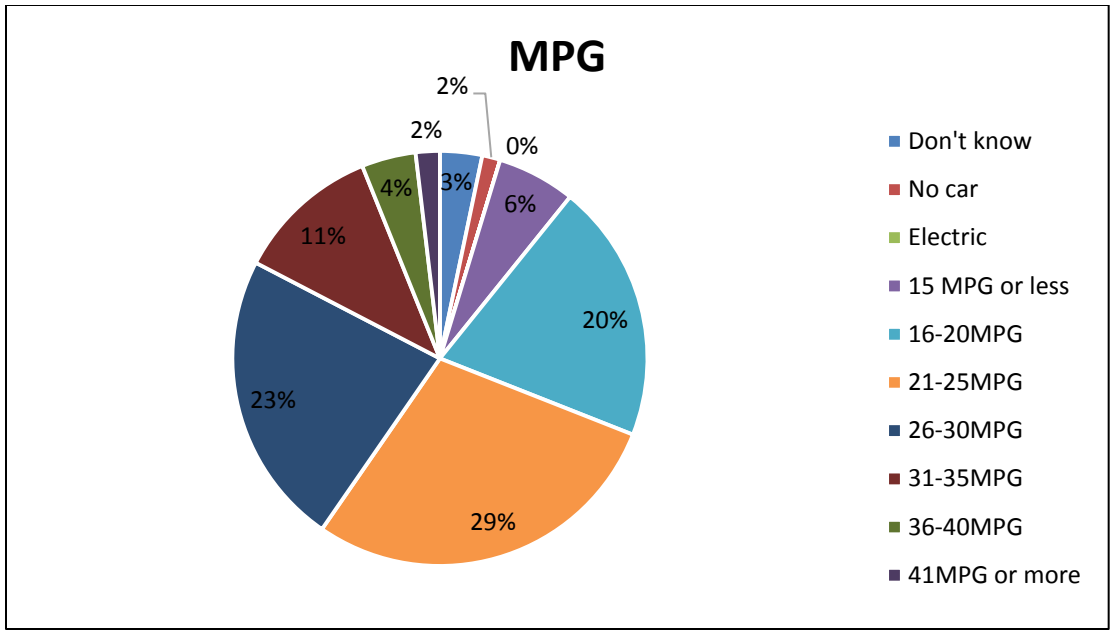


Figure 4.32: Vehicle's miles per gallon.

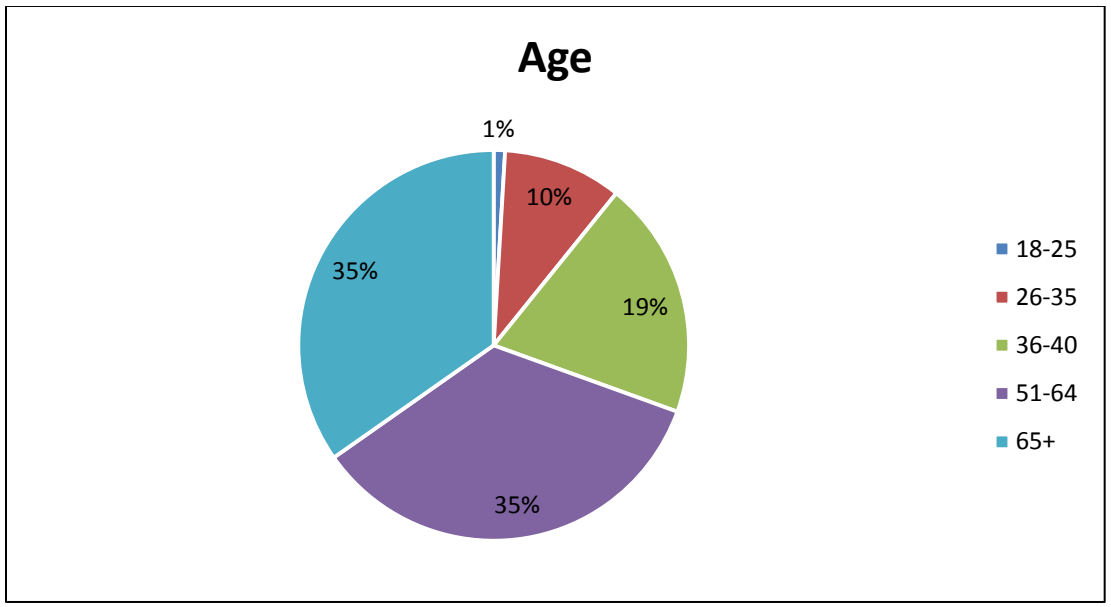


Figure 4.33: Age.

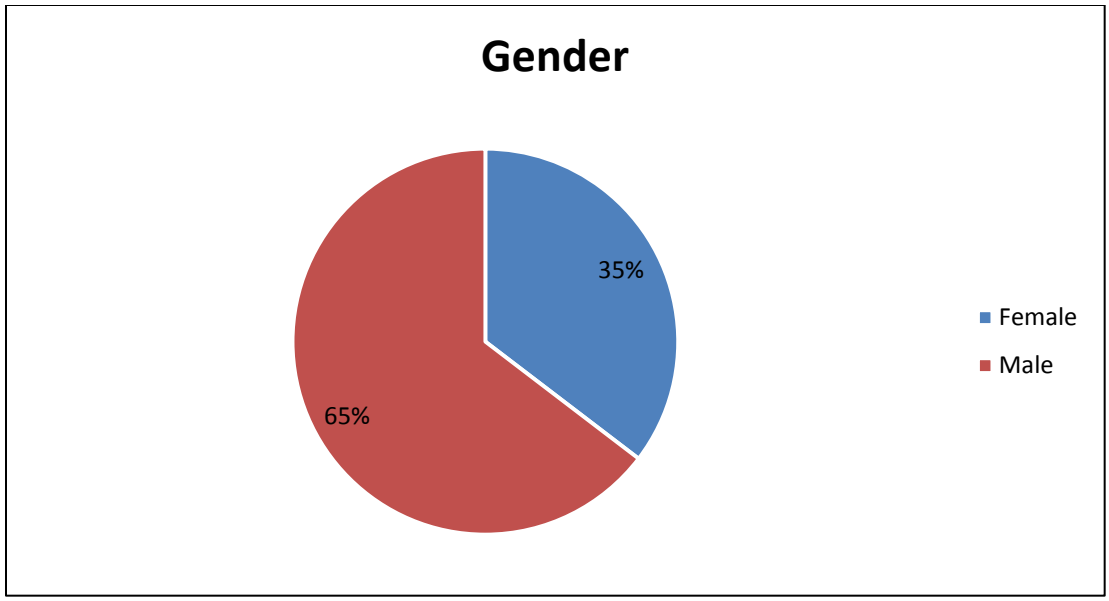


Figure 4.34: Gender.

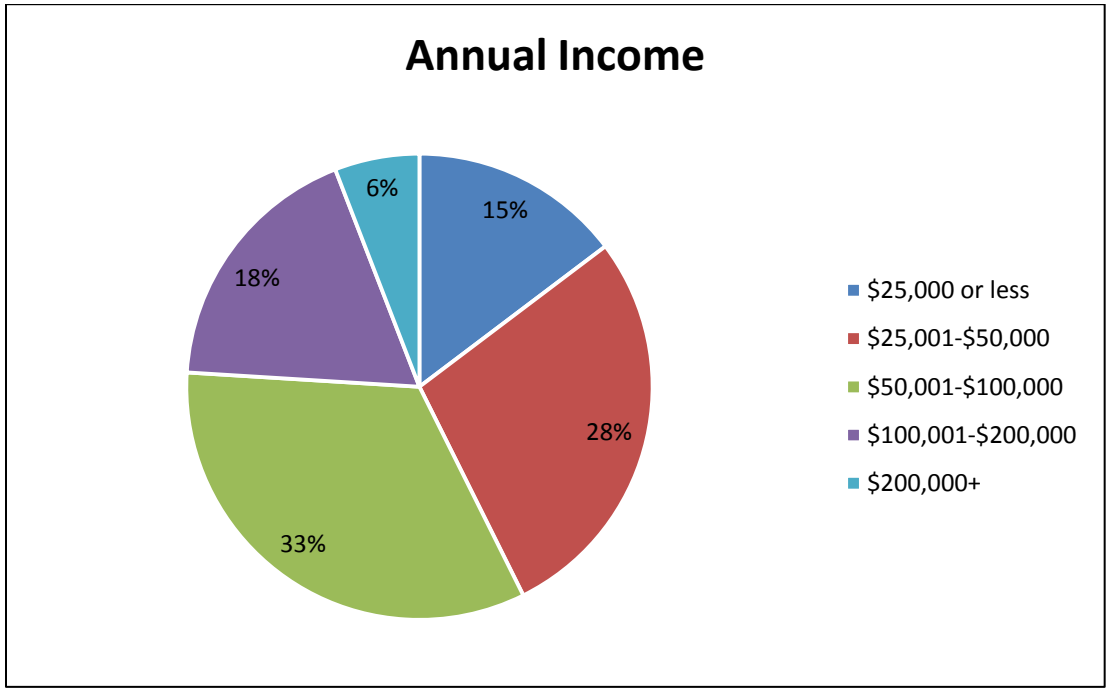


Figure 4.35: Annual household income.

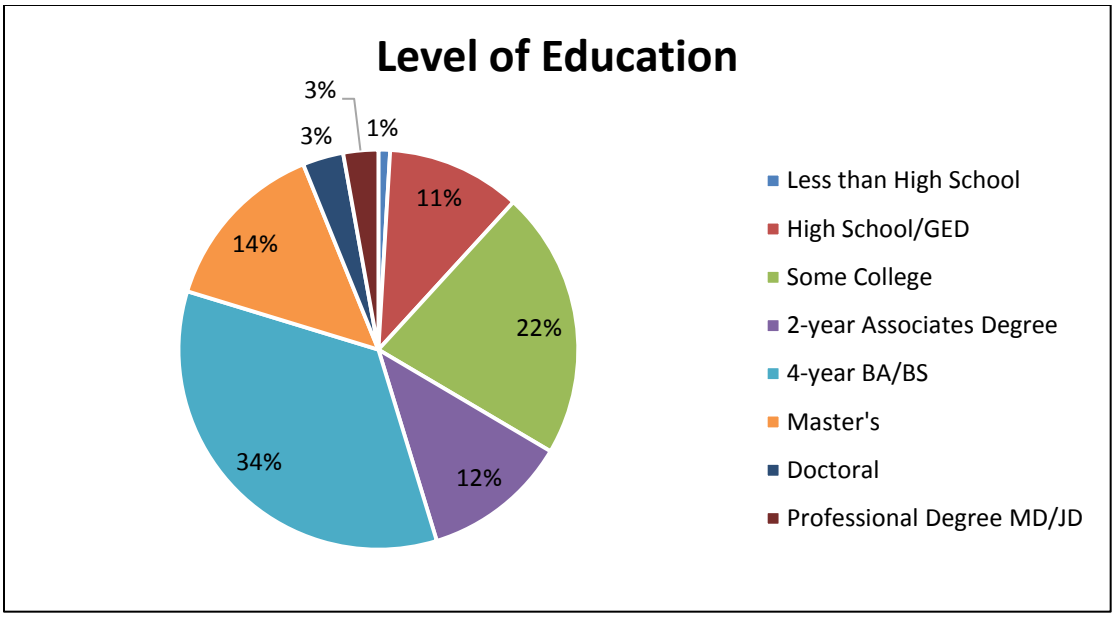


Figure 4.36: Highest level of education attained.

It was found that about 54% of all respondents live in suburban areas of Utah, and 65% were male; see **Figures 4.28** & **4.34** respectively. Interestingly, 79% of total participants have access to public transportation but only 20% are actually using some form of public transportation, see **Figures 4.29** & **4.30** correspondingly. Also, 37% of all respondents drive more than 101 miles per week and 61% drive less than or equal to 100 miles, see **Figure 4.31**. Furthermore, 57% of all respondents in Utah have an annual household income greater than $50,000, and 62% have at least a four-year college degree, see **Figures 4.35** & **4.36** respectively.

4.2.4.2 General Questions Related to Highways and Funding

Questions 1 through 20, in section I of the survey, used the 5-point Likert rating scale, strongly agree to strongly disagree. Nonetheless, for the purpose of this research study analysis, strongly agree and agree categories were combined into a single category since it was assumed equal intervals between the response categories. It was found with 95% confidence that between 31% and 45% of the population in Utah agreed that highway system is in poor condition. That is,

about 38% of the entire population in Utah, +/- 7% error of estimation, agreed that the highway system is in poor condition. Furthermore, it was also found with 95% confidence that between 85% and 93% of the population were in agreement that the quality of the highway system is important to them. That is, 89% of the population, +/- 4% error of estimation, agreed that the quality of the highway system is important to them. **Table 4.23** is a summary of the population opinion with respect to the poor condition of the highway system and its importance to them.

Table 4.23
Summary of the Condition and the Importance of Highway Quality

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	38.00	+/- 7.0	Between 31 and 45
The Quality of the Highway System is important to me	89.00	+/- 4.0	Between 85 and 93

It is worth noting that, it was found with 95% confidence that approximately between 16% and 26% of the population in Utah supported the use of mileage-based user fees to fund the highway system. That is, 21% of the population, +/- 5% error of estimation, supported the use of mileage-based user fees to fund the highway system. Furthermore, it was also found with 95% confidence that between 7% and 15% of the population felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. That is, only about 11%, +/- 4% error of estimation, felt comfortable with having

device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. **Table 4.24** represents the above findings.

Table 4.24
Summary of the Mileage-Based User Fees and its Tracking System

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I support the use of Mileage-Based User Fees to fund the highway system	21.00	+/- 5.00	Between 16 and 26
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe	11.00	+/- 4.00	Between 7 and 15

In addition, a complete table and pie-charts of the results for questions 1 through 20 are included in (Appendix G).

4.2.4.3 Choice of Funding System

For the top three preferences of funding option of the highway system in Utah, it was found with 95% confidence that approximately between 18% and 30% of the population chose increasing the federal gas tax at the time of purchase as their first preference. That is, 24% of the population, +/- 6% error of estimation, picked that option as their first choice. Similarly, it was found with 95% confidence that between 14% and 26% of the population selected the use of High Occupancy Toll (HOT) Lanes. That is, about 20% of the population, +/- 6% error of estimation, chose that option as their second one. For the third preference, with 95% confidence that between 12% and 22% of the population picked increasing the state gas tax at the time of

purchase as their third option. That is, nearly 17% of the population, +/- 5% error of estimation, selected that option as their third preference. **Table 4.25** is a summary of the top three choices of funding highway system in Utah.

Table 4.25
Summary of the Top Funding Options in Utah

Option	Option's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
[1] Increasing the Federal Gas Tax	24.00	+/- 6.00	Between 18 and 30
[2] Use of Highway Occupancy Toll (HOT) Lanes	20.00	+/- 6.00	Between 14 and 26
[3] Increasing the State Gas Tax	17.00	+/- 5.00	Between 12 and 22

4.2.4.4 Correlation Analysis

For the correlation analysis, the Chi-square test was performed to investigate if there was a correlation between any of the demographic questions, section III of the survey, and the choice of funding option, section II, based on the selected P-value of less than or equal to 0.10 (P-value ≤ 0.10). The R Project for Statistical Computing (Ri 386 3.0.2) software was used for the Chi-square test. The Chi-square test for question 23 with the Chi-square value of 27.80 and its associated P-value of 0.14, which is greater than 0.10, revealed that there was no correlation between the choice of funding option and the living environment. In other words, since the P-value is not less than 0.10, the null hypothesis, H_{01}, could not be rejected, and therefore, there is no association. Similarly, it was found that there were no correlations between the choice of funding option and the access to public transportation, the use of public transportation, the vehicle's miles per gallon, age, annual household income, and the highest level of education

attained based on the P-values of 0.29, 0.14, 0.57, 0.26, 0.46, and 0.53, respectively. (i.e. H_{02}, H_{03}, H_{05}, H_{06}, H_{08}, and H_{09}, could not be rejected, and therefore, there are no associations). On the other hand, there were correlations between the choices of funding option, the miles driven per week, and gender with Chi-square test values of 46.80 and 11.80, and their corresponding P-values of 0.02, and 0.10, respectively. In other words, since the P-values are less than 0.10, the null hypotheses, H_{04} and H_{07}, were rejected, and therefore, there are associations. **Table 4.26** represents the Chi-square test results and the associated P-value for each of the demographic question, questions 23 through 31.

Table 4.26
Summary of Chi-square Tests and their Associated P-values

Questions	Chi-Sq	P-Value	Correlation
Q23	27.8	0.14	No
Q24	8.54	0.29	No
Q25	10.9	0.14	No
Q26	46.8	0.02	Yes
Q27	53.5	0.57	No
Q28	32.4	0.26	No
Q29	11.8	0.1	Yes
Q30	28.1	0.46	No
Q31	40.5	0.53	No

For the correlational relationship that existed between the choice of funding option and the miles driven per week, question 26, it was found that almost 32% of people who drive between 51 and 100 miles per week in Utah support the option of increasing the federal gas tax that is collected at the time of purchase. Furthermore, about 29% of people who drive between 101 and 200 miles per week in Utah support the option of the use of High Occupancy Toll (HOT) Lanes and almost 20% of people who drive less than 50 miles per week in Utah support the option of increasing the federal gas tax that is collected at the time of purchase. Interestingly,

approximately 4% of people who drive more than 201 miles per week in Utah support the use of cordon pricing. It is interesting to report that almost 67% of the population in Utah who don't drive and/or don't own a vehicle support the use of mileage-based user fee. **Table 4.27** summarizes the proportion between the choice of funding option and the miles driven per week.

Table 4.27

Percentages of Choice of Funding Option and the Miles Driven per Week

						Proportions				
policy	**N/A**	**50 or less**	**51-100**	**101-200**	**201 or more**	**N/A**	**50 or less**	**51-100**	**101-200**	**201 or more**
Increasing the federal gas tax that is collected at the time of purchase	0	10	23	10	4	0.00%	19.61%	31.51%	20.41%	17.39%
Increasing the state gas tax that is collected at the time of purchase	0	9	11	10	4	0.00%	17.65%	15.07%	20.41%	17.39%
Collection of additional taxes and fees on other driving-related items	0	6	6	2	4	0.00%	11.76%	8.22%	4.08%	17.39%
Collection of additional sales tax on all goods	0	8	4	6	4	0.00%	15.69%	5.48%	12.24%	17.39%
Use of highway tolling	1	2	12	3	0	33.33%	3.92%	16.44%	6.12%	0.00%
Use of High Occupancy Toll (HOT) Lanes	0	8	13	14	4	0.00%	15.69%	17.81%	28.57%	17.39%
Use of Cordon Pricing	0	0	0	0	1	0.00%	0.00%	0.00%	0.00%	4.35%
Use of Mileage-Based User Fees	2	8	4	4	2	66.67%	15.69%	5.48%	8.16%	8.70%
Totals	**3**	**51**	**73**	**49**	**23**	**100%**	**100%**	**100%**	**100%**	**100%**

Finally, it was found that, for the correlational relationship between the choice of funding option and gender, question 29, approximately 23% of people who are females, chose the funding option of increasing the federal gas tax that is collected at the time of purchase. Moreover, about 24% of people who are males support increasing the federal gas tax as well. On the other hand, only 1% of people who are males support the use of Cordon Pricing. No females supported the use Cordon Pricing as the funding option. Finally, nearly 20% of females and 19% of males support the use of High Occupancy Toll (HOT) Lanes as a mean of funding the highway system. **Table 4.28** represents the proportion of the gender and their choice of funding option.

Table 4.28
Percentages of Choice of Funding Option and Gender

			Proportions	
Policy	**F**	**M**	**F**	**M**
Increasing the federal gas tax that is collected at the time of purchase	16	31	23.19%	24.22%
Increasing the state gas tax that is collected at the time of purchase	11	23	15.94%	17.97%
Collection of additional taxes and fees on other driving-related items	3	14	4.35%	10.94%
Collection of additional sales tax on all goods	8	14	11.59%	10.94%
Use of highway tolling	12	6	17.39%	4.69%
Use of High Occupancy Toll (HOT) Lanes	14	24	20.29%	18.75%
Use of Cordon Pricing	0	1	0.00%	0.78%
Use of Mileage-Based User Fees	5	15	7.25%	11.72%
Totals	**69**	**128**	**100%**	**100%**

4.2.5 The State of Wyoming

As a result of soliciting 3,194 surveys that were sent across Wyoming, 261 were received, 6 surveys were eliminated, and 255 surveys were marked as completed. This yielded to a response rate of 7.98% which was lower than the desired response rate of, at least, approximately 12%, about 385 respondents (to have an error of estimation of 5% in inferential statistics as was discussed in Chapter 3).

It is important to note that, the reporting of the results, for analysis purposes, was based on the actual number of respondents for each question. In other words, since not every participant responded to every question the respondents who left the question blank were removed from the total participants for that specific question. **Table 4.29** contains a summary of the total number of respondents, for question 1 through question 31, to the survey.

Table 4.29
Summary of Total and Actual Respondents to Question 1 through Question 31

Questions	Actual Number Responded
Q1	252
Q2	252
Q3	236
Q4	247
Q5	251
Q6	252
Q7	253
Q8	253
Q9	252
Q10	252
Q11	252
Q12	252
Q13	250
Q14	253
Q15	251
Q16	250
Q17	253
Q18	251
Q19	248
Q20	253
Q21	232
Q22	255
Q23	249
Q24	250
Q25	245
Q26	252
Q27	250
Q28	253
Q29	253
Q30	234
Q31	251

4.2.5.1 Demographics

The demographic information for the State of Wyoming is shown in nine pie-charts representing questions 23 through 31. The pie-charts illustrate the percentages of each category in each question.

Figures 4.37 through 4.45 show the demographic results for the nine questions to include living environment, access to public transportation, use of public transportation, average miles driven per week, vehicle's miles per gallon, age, gender, annual household income, and highest level of education attained.

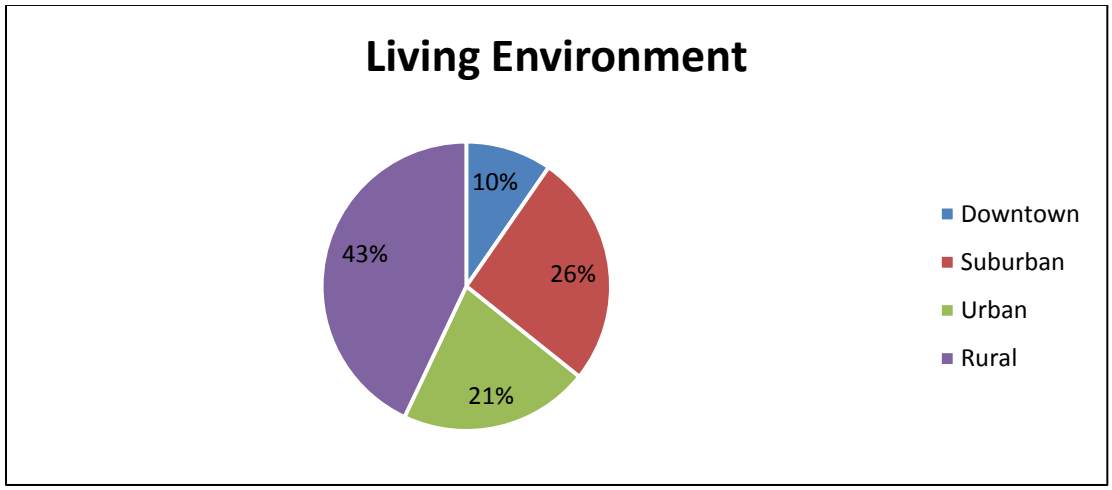


Figure 4.37: Living environment.

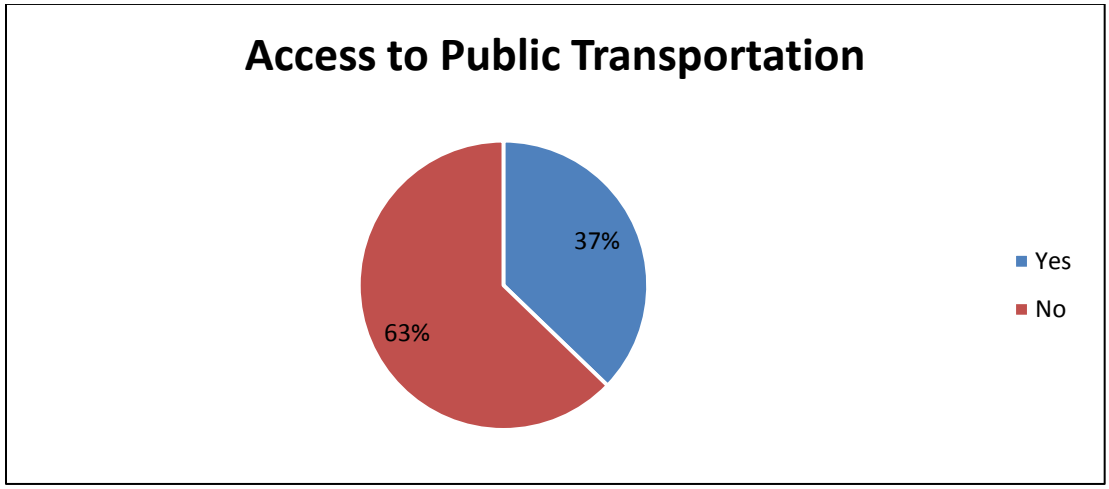


Figure 4.38: Access to public transportation.

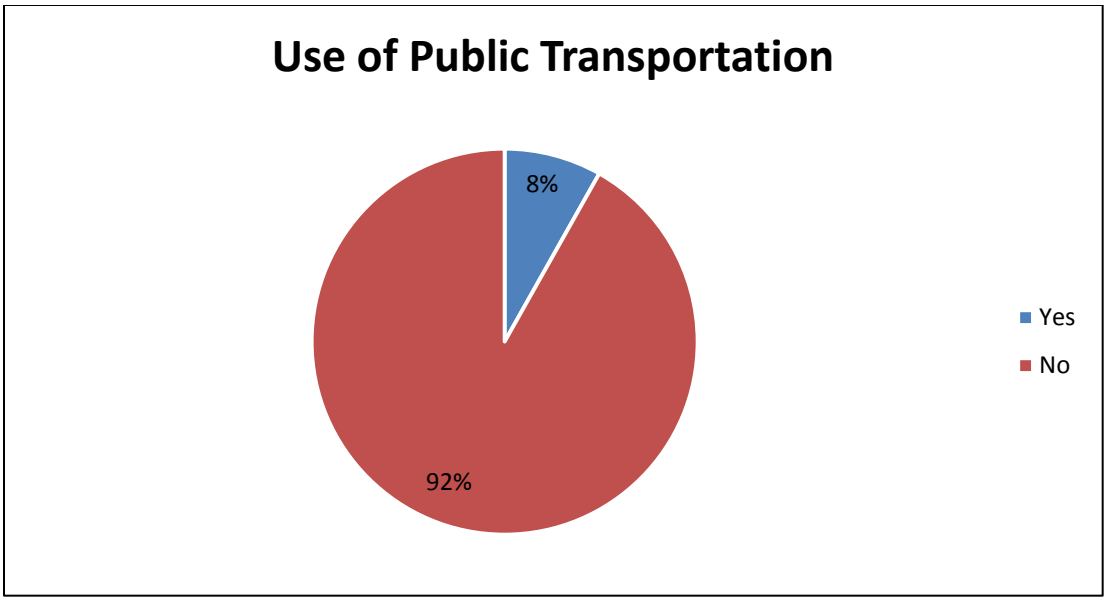


Figure 4.39: Use of public transportation.

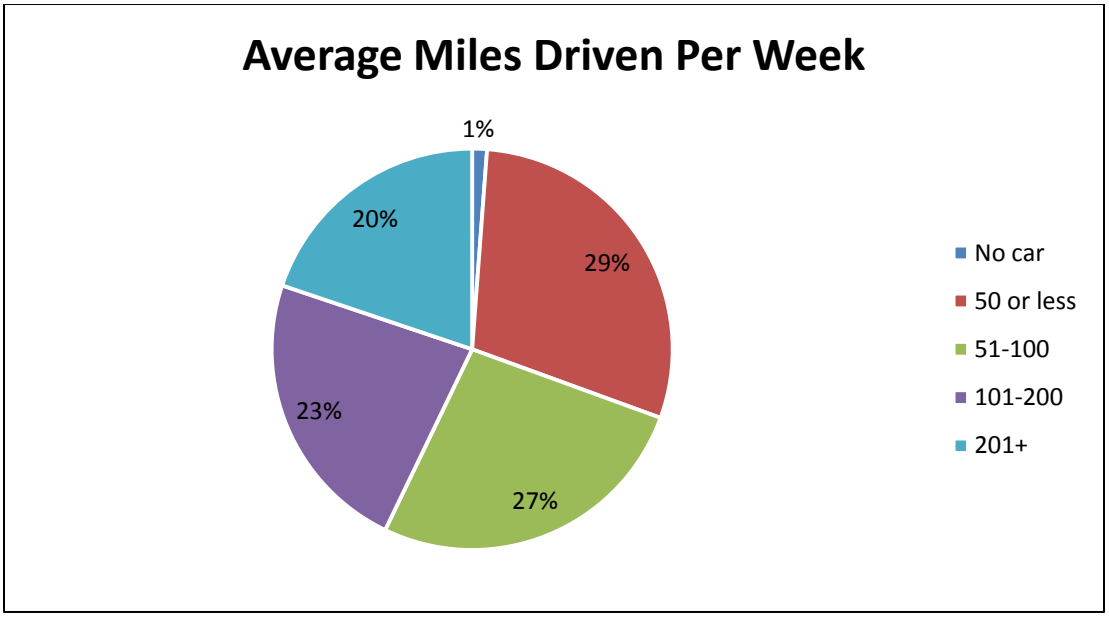


Figure 4.40: Average miles driven per week.

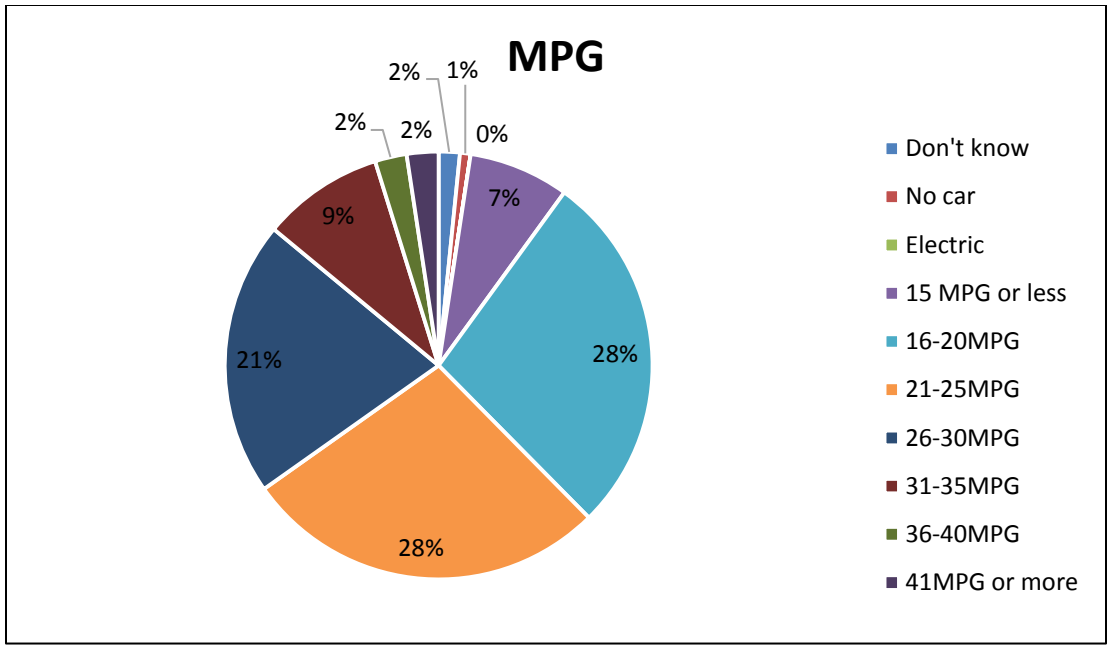


Figure 4.41: Vehicle's miles per gallon.

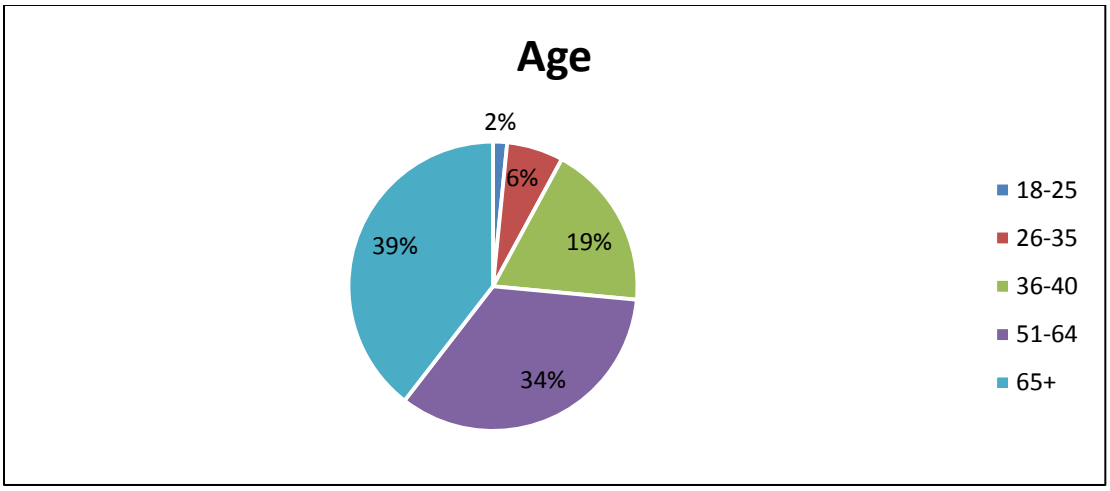


Figure 4.42: Age.

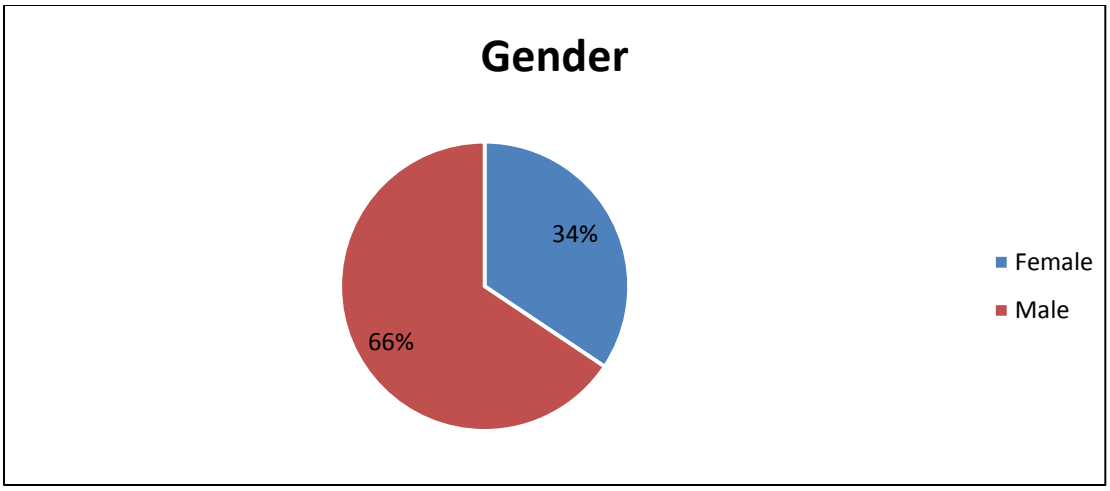


Figure 4.43: Gender.

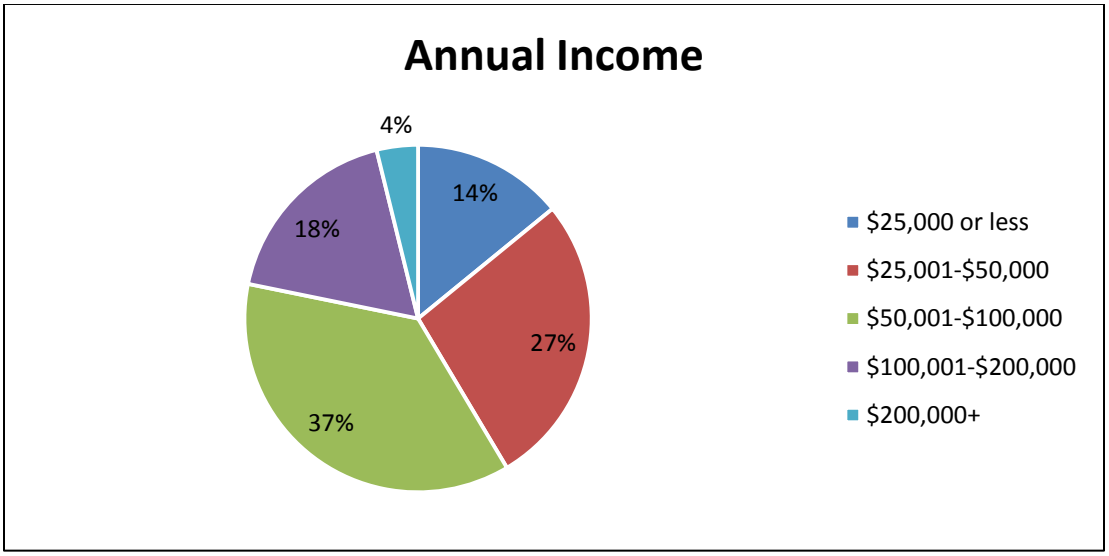


Figure 4.44: Annual household income.

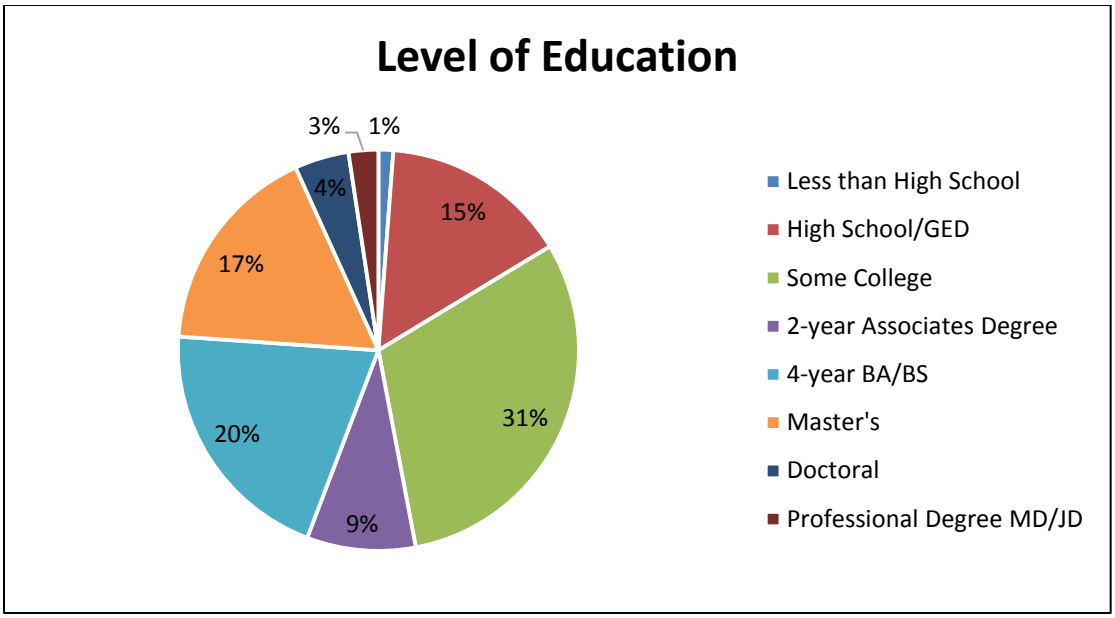


Figure 4.45: Highest level of education attained.

It was found that about 43% of all respondents live in rural areas of Wyoming, and 66% were male; see **Figures 4.37** & **4.43** respectively. Interestingly, 37% of total participants have access to public transportation but only 8% is actually using some form of public transportation, see **Figures 4.38** & **4.39** correspondingly.

Also, 43% of all respondents drive more than 101 miles per week and 56% drive less than or equal to 100 miles, see **Figure 4.40**. Furthermore, 59% of all respondents in Wyoming have an annual household income greater than $50,000, and 44% have at least a four-year college degree, see **Figures 4.44** & **4.45** respectively. Finally, 62% of the respondents stated that their vehicles drive more than 21 miles per gallon, **see Figure 4.41.**

4.2.5.2 General Questions Related to Highways and Funding

Questions 1 through 20, in section I of the survey, used the 5-point Likert rating scale, strongly agree to strongly disagree. Nonetheless, for the purpose of this research study analysis, strongly agree and agree categories were combined into a single category since it was assumed

equal intervals between the response categories. It was found with 95% confidence that between 45% and 57% of the population in Wyoming agreed that highway system is in poor condition. That is, 51% of the entire population in Wyoming, +/- 6% error of estimation, agreed that the highway system is in poor condition. Furthermore, it was also found with 95% confidence that between 86% and 94% of the population were in agreement that the quality of the highway system is important to them. That is, 90% of the population, +/- 4% error of estimation, agreed that the quality of the highway system is important to them. **Table 4.30** is a summary of the population opinion with respect to the poor condition of the highway system and its importance to them.

Table 4.30
Summary of the Condition and the Importance of Highway Quality

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	51.00	+/- 6.00	Between 45 and 57
The Quality of the Highway System is important to me	90.00	+/- 4.0	Between 86 and 94

It is worth noting that, it was found with 95% confidence that approximately between 14% and 24% of the population in Wyoming supported the use of mileage-based user fees to fund the highway system. That is, 19% of the population, +/- 5% error of estimation, supported the use of mileage-based user fees to fund the highway system. Furthermore, it was also found with 95% confidence that between 5% and 13% of the population felt comfortable with having

device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. That is, only about 9%, +/- 4% error of estimation, felt comfortable with having device in their vehicle that can track when and where they are driving for the purpose of determining the fees they owe. **Table 4.31** represents the above findings.

Table 4.31
Summary of the Mileage-Based User Fees and its Tracking System

Question	Question's Response Rate for Strongly Agree and Agree Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I support the use of Mileage-Based User Fees to fund the highway system	19.00	+/- 5.00	Between 14 and 24
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe	9.00	+/- 4.00	Between 5 and 13

In addition, a complete table and pie-charts of the results for questions 1 through 20 are included in (Appendix H).

4.2.5.3 Choice of Funding System

For the top three preferences of funding option of the highway system in Wyoming, it was found with 95% confidence that approximately between 20% and 32% of the population chose increasing the federal gas tax at the time of purchase as their first preference. That is, 26% of the population, +/- 6% error of estimation, picked that option as their first choice. Similarly, it was found with 95% confidence that between 18% and 30% of the population selected increasing the state gas tax at the time of purchase as their second option. That is, about 24% of the

population, +/- 6% error of estimation, chose that option as their second one. For the third preference, with 95% confidence that between 11% and 21% of the population picked the use of highway tolling as their option. That is, nearly 16% of the population, +/- 5% error of estimation, selected that option as their third preference. **Table 4.32** is a summary of the top three choices of funding highway system in Wyoming.

Table 4.32
Summary of the Top Funding Options in Wyoming

Option	Option's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
[1] Increasing the Federal Gas Tax	26.00	+/- 6.00	Between 20 and 32
[2] Increasing the State Gas Tax	24.00	+/- 6.00	Between 18 and 30
[3] Use of Highway Tolling	16.00	+/- 5.00	Between 11and 21

4.2.5.4 Correlation Analysis

For the correlation analysis, the Chi-square test was performed to investigate if there was a correlation between any of the demographic questions, section III of the survey, and the choice of funding option, section II, based on the selected P-value of less than or equal to 0.10 (P-value ≤ 0.10). The R Project for Statistical Computing (Ri 386 3.0.2) software was used for the Chi-square test. The Chi-square test for question 23 with the Chi-square value of 25 and its associated P-value of 0.25, which is greater than 0.10, revealed that there was no correlation between the choice of funding option and the living environment. In other words, since the P-value is not less than 0.10, the null hypothesis, H_{01}, could not be rejected, and therefore, there is no association. Similarly, it was found that there were no correlations between the choice of

funding option and the access to public transportation, the miles driven per week, the vehicle's miles per gallon, gender, annual household income, and the highest level of education attained based on the P-values of 0.48, 0.57, 0.44, 0.64, 0.20, and 0.77, respectively. (i.e. H_{02}, H_{04}, H_{05}, H_{07}, H_{08}, and H_{09}, could not be rejected, and therefore, there are no associations). On the other hand, there were correlations between the choice of funding option, the use of public transportation, and age with Chi-square test values of 14.10, and 53.50, and their corresponding P-values of 0.09, and 0.01, respectively. In other words, since the P-values are less than 0.10, the null hypotheses, H_{03} and H_{06}, were rejected, and therefore, there are associations. **Table 4.33** represents the Chi-square test results and the associated P-value for each of the demographic question, questions 23 through 31.

Table 4.33
Summary of Chi-square Tests and their Associated P-values

Questions	Chi-Sq	P-Value	Correlation
Q23	25.00	0.25	No
Q24	6.53	0.48	No
Q25	14.10	0.09	Yes
Q26	26.00	0.57	No
Q27	56.80	0.44	No
Q28	53.50	0.01	Yes
Q29	5.18	0.64	No
Q30	34.10	0.20	No
Q31	41.40	0.77	No

For the correlational relationship that existed between the choice of funding option and the access to public transportation, question 25, it was found that approximately 16% of people who have access to public transportation in Wyoming support the option of the use of highway tolling. Furthermore, about 37% of people who have access to public transportation in Wyoming

support the option of increasing the federal gas tax that is collected at the time of purchase and almost 25% of people who don't have access to public transportation in Wyoming support the option of increasing the state gas tax that is collected at the time of purchase. Interestingly, none of the people who don't have access to public transportation in Wyoming support the use of cordon pricing. **Table 4.34** summarizes the proportion between the choice of funding option and the access to public transportation.

Table 4.34

Percentages of Choice of Funding Option and the Access to Public Transportation

			Proportions	
Policy	**Yes**	**No**	**Yes**	**No**
Increasing the federal gas tax that is collected at the time of purchase	7	51	36.84%	24.64%
Increasing the state gas tax that is collected at the time of purchase	2	52	10.53%	25.12%
Collection of additional taxes and fees on other driving-related items	1	11	5.26%	5.31%
Collection of additional sales tax on all goods	2	21	10.53%	10.14%
Use of highway tolling	3	32	15.79%	15.46%
Use of High Occupancy Toll (HOT) Lanes	1	23	5.26%	11.11%
Use of Cordon Pricing	1	0	5.26%	0.00%
Use of Mileage-Based User Fees	2	17	10.53%	8.21%
Totals	**19**	**207**	**100%**	**100%**

Finally, it was found that, for the correlational relationship between the choice of funding option and age, question 28, approximately 31% of people who are between the ages of 51 and 64 years old chose the funding option of increasing the federal gas tax that is collected at the time of purchase. Moreover, about 32% of people who are older than 65 years support increasing the federal gas tax as well. On the other hand, 100% of people who are between the ages of 18 and 25 years old were in agreement in supporting the use of High Occupancy Toll (HOT) Lanes. No one with the age range of 18 to 25, 26 to 35, 51 to 64, and older than 65 years supported the cordon pricing. Finally, nearly 28% of people who are between the ages of 36 and 50 support the collection of additional sales tax on all goods. **Table 4.35** represents the proportion of the age of people and their choice of funding option.

Table 4.35

Percentages of Choice of Funding Option and Age

						Proportions				
Policy	**18-25**	**26-35**	**36-50**	**51-64**	**65 or older**	**18-25**	**26-35**	**36-50**	**51-64**	**65 or older**
Increasing the federal gas tax that is collected at the time of purchase	0	2	5	24	29	0.00%	13.33%	10.87%	30.77%	32.22 %
Increasing the state gas tax that is collected at the time of purchase	0	3	14	15	23	0.00%	20.00%	30.43%	19.23%	25.56 %
Collection of additional taxes and fees on other driving-related items	0	0	3	2	7	0.00%	0.00%	6.52%	2.56%	7.78%
Collection of additional sales tax on all goods	0	2	5	9	7	0.00%	13.33%	10.87%	11.54%	7.78%
Use of highway tolling	0	2	13	12	9	0.00%	13.33%	28.26%	15.38%	10.00 %
Use of High Occupancy Toll (HOT) Lanes	3	4	2	9	8	100.00 %	26.67%	4.35%	11.54%	8.89%
Use of Cordon Pricing	0	0	1	0	0	0.00%	0.00%	2.17%	0.00%	0.00%
Use of Mileage-Based User Fees	0	2	3	7	7	0.00%	13.33%	6.52%	8.97%	7.78%
Totals	**3**	**15**	**46**	**78**	**90**	**100%**	**100%**	**100%**	**100%**	**100%**

CHAPTER FIVE

CONCLUSIONS

5.1 Summary of Research

The key purpose of this research study utilizing a survey was to generate an understanding of the public perception of different revenue streams for highway construction and maintenance that are already in existence and being used or that can potentially be used in the future. Another objective was to educate the general public on the issue of the diverse options of revenue generating systems to support the deteriorating highway infrastructure in the United States while trying to achieve the main objective presented earlier. Given that the current funding mechanism to support the highway system in the United States heavily relies on the collection of fuel taxes, at federal and state levels, and its susceptibility to become more and more unreliable as was proven by the shortfalls in the Highway Trust Fund (HTF), it was the right time to assess the public's opinion of other alternatives of revenue generating systems that are needed to construct and maintain the large network of highway system in the U.S. Some of the anticipated benefits from this research study include enabling the policy-makers to make the appropriate decision on which revenue generation system to implement taking into consideration the public's input and educating the general public on the issue of highway funding by raising awareness about the importance of maintaining the highway system in the U.S. .

The survey was administered in five states including Colorado, North Dakota, South Dakota, Utah, and Wyoming that were covered by the Mountain Plains Consortium (MPC). A sample of good representation of the population in all areas within each state was attempted to be

attained. The survey that was developed for this study could be used in other states as well. The research consisted of the following steps:

1. A literature review that includes the history of the current funding system in the U.S. and alternative options of revenue generating systems,
2. Development of the initial survey for pilot study purposes,
3. Development of the final survey based on the feedback received during the pilot study,
4. Administering the final survey to all participants in the study, and
5. Analysis of the survey results through descriptive and inferential statistics as well as statistical tests.

Below is a summary of the steps listed above.

5.1.1 Step One: Literature Review

A literature review was performed to understand the history of the current funding system of the highways in the United States. In addition, eight different options of generating revenue to replace or supplement the current funding system were reviewed in the literature review as well. These options are:

1. Increasing the federal gas tax that is collected at the time of purchase
2. Increasing the state gas tax that is collected at the time of purchase
3. Collection of additional taxes and fees on other driving-related items
4. Collection of additional sales tax on all goods
5. Use of highway tolling
6. Use of High Occupancy Toll (HOT) Lanes
7. Use of Cordon Pricing

8. Use of Mileage-Based User Fee

5.1.2 Step Two: Pilot Survey

A pilot survey was developed to administer in a smaller scale in an attempt to receive feedback on the content and format of the survey from the respondents and thus to improve it. For the pilot study, the survey consisted of two pages information sheet containing general information regarding alternative methods of generating revenues to educate the public prior to answering the questionnaire, and a three-page survey which was divided into three sections. The survey included 30 questions in all sections, 22 items in section I, one item in section II, and 7 items in section III.

5.1.3 Step Three: Final Survey

The final survey was developed after receiving the comments and suggestions made during pilot study survey process. The final survey contained a cover letter, information sheet, and questionnaire at their final format. The final cover letter and the information sheet portion of the survey were one page each in length. However, the final survey is comprised of one page, double-sided, that included three sections with the total of 31 items.

Section I of the survey contained 20 general questions that asked for the public's opinion regarding the highway system and the alternative ways of generating revenues to support it. Section II of the survey, which was the main focus of this study, asked about the respondent's choice of the funding system.

The final part of the survey, Section III, consisted of demographic questions such as living environment, access to public transportation, etc.

5.1.4 Step Four: Administering the Final Survey

The study population was defined as people who reside and have mailing addresses in the selected five states (Colorado, North Dakota, South Dakota, Utah, and Wyoming). For the purpose of this study, a random sample of 16,500 representing the five states (3,300 per state) was purchased from Marketing Systems Groups. All 16,500 addresses were run through the National Change of Address (NCOA) for verification. As a result, 555 addresses were eliminated from the sample. The remaining 15,945 addresses consisted of 3,163 addresses from Colorado, 3,204 from North Dakota, 3,182 from South Dakota, 3,202 from Utah, and 3,194 from Wyoming. After mailing the survey, responses were received and a total of 1,163 surveys were deemed to be complete to be included in the analysis. The overall response rate was 7.29% which is much lower than anticipated. As mentioned in Chapter 3, the desired number of completed surveys was 385 per state which yielded to a response rate of 11.67% per state for inferential statistics purposes. Nonetheless, the response rates for Colorado, North Dakota, South Dakota, Utah, and Wyoming were 9.26%, 5.81%, 6.76%, 6.68%, and 7.98% respectively.

5.1.5 Step Five: Analysis of the Survey Results

The analysis of the survey for the five states to include Colorado, North Dakota, South Dakota, Utah, and Wyoming based on the results received had led to the following findings:

5.1.5.1 The State of Colorado

For the top three preferences of funding option of the highway system in Colorado, it was found that 23%, +/- 5%, of the population chose increasing the federal gas tax at the time of purchase as their first preference. Similarly, it was found that 21%, +/- 5%, of the population selected increasing the state gas tax at the time of purchase as their second option. The third preference was a tie among three options and it was found that 14%, +/- 4%, of the population

picked these options as their third preference. The tie that occurred among the three options includes collecting of additional sales tax on all goods, the use of highway tolling, and the use of Highway Occupancy Toll (HOT) Lanes.

For the correlation analysis, there were correlations between the choice of funding option, the living environment, and having access to public transportation with Chi-square test values of 33.10, and 13.80, and their corresponding P-values of 0.07, and 0.05, respectively.

5.1.5.2 The State of North Dakota

For the top three preferences of funding option of the highway system in North Dakota, it was found that approximately 32%, +/- 7%, of the population chose increasing the federal gas tax at the time of purchase as their first preference. Similarly, it was found that 24%, +/- 7%, of the population selected increasing the state gas tax at the time of purchase as their second option. For the third preference, it was found that nearly 14%, +/- 5%, of the population picked the additional sales taxes on all goods as their choice of option.

For the correlation analysis, it was found that there were no correlations between the choice of funding option and living environment, access to public transportation, use of public transportation, average miles driven per week, vehicle's miles per gallon, age, gender, annual household income, and highest level of education attained based on the P-values of 0.20, 0.32, 0.34, 0.58, 0.46, 0.38, 0.18, 0.97, and 0.89, respectively.

5.1.5.3 The State of South Dakota

For the top three preferences of funding option of the highway system in South Dakota, it was found that approximately 32%, +/- 6%, of the population chose increasing the federal gas tax at the time of purchase as their first preference. Similarly, it was found that 19%, +/- 5%, of the population selected increasing the state gas tax at the time of purchase as their second option.

For the third preference, it was found that nearly 15%, +/- 5%, of the population picked the additional sales taxes on all goods as their choice.

For the correlation analysis, there were correlations between the choice of funding option, the use of public transportation, and age with Chi-square test values of 16.30, and 47.90, and their corresponding P-values of 0.09, and 0.01, respectively.

5.1.5.4 The State of Utah

For the top three preferences of funding option of the highway system in Utah, it was found that approximately 24%, +/- 6%, of the population chose increasing the federal gas tax at the time of purchase as their first preference. Similarly, it was found that 20%, +/- 6% of the population selected the use of High Occupancy Toll (HOT) Lanes as their second option. For the third preference, it was found that 17%, +/- 5%, of the population picked increasing the state gas tax at the time of purchase as their third option.

For the correlation analysis, there were correlations between the choices of funding option, the miles driven per week, and gender with Chi-square test values of 46.80 and 11.80, and their corresponding P-values of 0.02, and 0.10, respectively

5.1.5.5 The State of Wyoming

For the top three preferences of funding option of the highway system in Wyoming, it was found that approximately 26%, +/- 6%, of the population chose increasing the federal gas tax at the time of purchase as their first preference. Similarly, it was found that 24%, +/- 6%, of the population selected increasing the state gas tax at the time of purchase as their second option. For the third preference, it was found that 16%, +/- 5%, of the population picked the use of highway tolling as their option.

For the correlation analysis, there were correlations between the choice of funding option, the use of public transportation, and age with Chi-square test values of 14.10, and 53.50, and their corresponding P-values of 0.09, and 0.01, respectively.

5.2 Concluding Remarks

The results of this survey indicate that the public in the states of Colorado, North Dakota, South Dakota, Utah, and Wyoming selected increasing the federal gas tax that is collected at the time of purchase as their first choice of funding option. In addition, the population across the five states was in agreement with respect to the highway system being in poor condition with 58% in Colorado (+/- 6% error of estimation), 49% in North Dakota (+/- 7% error of estimation), 46% in South Dakota (+/- 7% error of estimation), 38% in Utah (+/- 7% error of estimation), and 51% in Wyoming (+/- 6% error of estimation). Moreover, it was found that the quality of the highway system was deemed to be important to majority of the people in all five states with 89% of the people in Colorado (+/- 4% error of estimation), 92% in North Dakota (+/- 4% error of estimation), 91% in South Dakota (+/- 4% error of estimation), 89% in Utah (+/- 4% error of estimation), and 90% in Wyoming (+/- 4% error of estimation). The population across the five states was not generally supporting the idea that people who drive fuel efficient or electric vehicles should pay less to fund the highway system. In fact, only 16% of the population in Colorado (+/- 4% error of estimation), 10% in North Dakota (+/- 4% error of estimation), 13% in South Dakota (+/- 5% error of estimation), 15% in Utah (+/- 5% error of estimation), and only 13% in Wyoming (+/- 4% error of estimation) support that people who drive fuel efficient or electric vehicles should pay less to support the highway system. It is worth noting that 80% of the population in Colorado, North Dakota, Utah, Wyoming (+/- 5%, +/- 6%, +/- 5%, +/- 5%,

error of estimations, respectively), and 84% in South Dakota (+/- 5% error of estimation) agreed that vehicles which cause more damage to the highway system should pay more to maintain it.

The support for the use of highway tolling to fund the highway system was somewhat moderate among the population across the five states with 38% in Colorado (+/- 6% error of estimation), 29% in North Dakota (+/- 7% error of estimation), 40% in South Dakota (+/- 7% error of estimation), 32% in Utah (+/- 6% error of estimation), and 40% in Wyoming (+/- 6% error of estimation). The collection of additional sales tax on all goods to fund the highway system was unpopular funding mechanism among the population in the five states with 20% in Colorado (+/- 5% error of estimation), 18% in North Dakota (+/- 5% error of estimation), 24% in South Dakota (+/- 6% error of estimation), 15% in Utah (+/- 5% error of estimation), and only 13% in Wyoming (+/- 4% error of estimation). Similarly, the support for the use of mileage-based user fees was disliked among the population in the five states with 18% in Colorado and North Dakota (+/- 4%, +/- 5% error of estimation, respectively), 23% in South Dakota (+/- 6% error of estimation), 21% in Utah (+/- 5% error of estimation), and 19% in Wyoming (+/- 5% error of estimation).

Two states, South Dakota and Wyoming, had similar correlations between the choice of funding option, the use of public transportation, and age. The state of Colorado had correlation between the choice of funding option, living environment, and having access to public transportation. Additionally, Utah had correlation that existed between the choices of funding option, miles driven per week, and gender. However, no correlation was identified when analyzing North Dakota.

The findings of this survey, as detailed in Chapter 4, could be used by the law-makers in the five states under study to make better decisions with respect to the alternative options of

funding the highway system in their state based on the general public's attitude in the state. Furthermore, the generic survey could be utilized in other states as well to assess the perceptions of public in those states.

5.3 Future Research

As can be gathered from the results presented earlier, there is a common trend in the public perceptions across the five states that is worth being investigated further in future research.

In addition, if this survey is to be standardized and used by the federal government to assess public perceptions, then future research could also be focused on the identifying trends among all states. Such research would involve rigorous statistical methods and huge databases to compile all survey results and transform them into meaningful findings.

Finally, based on the public perceptions, future research could be aimed to study the impact of the utilized option on each state with regard to its social, economic, and behavioral issues that could result from its implementation.

REFERENCES

Agrawal, A., & Nixon, H. (2013). What Do Americans Think About Federal Tax Options to Support Public Transit, Highways, and Local Streets and Roads? Results from Year Four of a National Survey. *Mineta Transportation Institute.* Retrieved from http://transweb.sjsu.edu/PDFs/research/1228-American-tax-poll-2013-public-transit-highways- streets-roads-bf.pdf

Agrawal, A., Murthy, V., & Nixon, H. (2012). What Do Americans Think About Federal Tax Options to Support Public Transit, Highways, and Local Streets and Roads? Results from Year 3 of a National Survey. *Mineta Transportation Institute.* Retrieved from http://transweb.sjsu.edu/PDFs/research/1128-american-survey-federal-taxes-public-transit-highways-streets-roads.pdf

America Association of State Highway and Transportation Officials. (2009). *Rough roads ahead: Fix them now or pay for it later.* (TRB Publication No. 161508). Retrieved from http://www.ttap.mtu.edu/library/RoughRoadsAhead.pdf

America THINKS 2013 Tolling Survey. (2013). *The time for tolls is now.* Retrieved from http://www.pwmag.com/Images/AThinks_Tolling_factsheet_041813_tcm111-1904954.pdf

American Society of Civil Engineers. (2014). *2013 report card for America's infrastructure.* Retrieved from http://www.infrastructurereportcard.org/roads/

Angulo Ibañez, J. M. (2012). *Advanced statistical methods for the analysis of large data-sets.* Berlin: Springer. Available from https://ezproxy2.library.colostate.edu/login?url=http://dx.doi.org/10.1007/978-3-642-21037-2

Arizona Department of Administration. (2012). *azstats.gov/pubs/demography/**2006**-**055**AZ**ProjectionS**ummary.xls.* retrieved from http://www.workforce.az.gov/Search.aspx?q=2006+-+2055+population+projections&cx=013173311846497028359%3afbk5a7a-_zq&cof=FORID%3a11

Attard, M., & Ison, S. G. (2010). The implementation of road user charging and the lessons learnt: The case of Valletta, Malta. *Journal of Transport Geography*, *18*(1), 14-22.

Blaikie, N. W. H. (2003). *Analyzing quantitative data: From description to explanation.* London: Sage Publications.

Biehler, A. (2009). *National LTAP/TTAP Conference.* Retrieved from http://www.ltap.org/conference/2009/downloads/7_28_09_8001000Plenary.pdf

Cawley, J. (2012, May 29). *Need to address transportation funding shortages in Virginia gaining traction.* Retrieved from http://articles.dailypress.com/2012-05-29/news/dp-nws-transportation-funding-20120528_1_transportation-funding-toll-revenues-gas-tax

Congestion pricing: Examples around the world. (2014, June 2). Retrieved from http://www.etc.dot.gov/world_examples.htm

Congressional Budget Office. (2012). *Infrastructure banks and surface transportation.* (CBO Publication No. 43361). Retrieved from https://www.cbo.gov/sites/default/files/cbofiles/attachments/InfrastructureBanks_One-Col_0.pdf

Congressional Budget Office. (2012). *How would proposed fuel economy standards affect the highway trust fund?* (CBO Publication No. 43198). Retrieved from http://www.cbo.gov/sites/default/files/cbofiles/attachments/05-02-CAFE_brief.pdf

Copeland, L., & Overberg, P. (2012, June 5). *States explore new ways to tax motorists for road repair.* Retrieved from http://usatoday30.usatoday.com/news/nation/story/2012-06-03/states-motorist-taxes/55367022/1

Copeland, L. (2009, December 21). *Southern states do a U-turn on toll roads.* Retrieved from http://usatoday30.usatoday.com/news/nation/2009-12-21-toll-lanes-south_N.htm

Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* (3rd ed.) Upper Saddle River, N.J.: Pearson/Merrill Prentice Hall.

Doan, J. Q. (2010). International scan: Reducing congestion & funding transportation using road pricing. Retrieved from http://www.international.fhwa.dot.gov/pubs/roadpricing/roadpricing.pdf

Ehl, L. (2012, July 5). *MAP-21 Annotated –Funding sources.* Retrieved from http://www.transportationissuesdaily.com/map-21-annotated-funding-sources/

Eyer, M. (2010, March 09). *Interstate 80 tolls will hurt area residents.* Retrieved from http://www.pennlive.com/letters/index.ssf/2010/03/interstate_80_tolls_will_hurt.html

Federal Highway Administration. (2005). *A summary of highway provisions in SAFETEA-LU.* Retrieved from http://www.fhwa.dot.gov/safetealu/summary.htm

Federal Highway Administration. (2012). *Safe, accountable, flexible, efficient transportation equity act: A legacy for users (SAFETEA-LU) extension acts.* Retrieved from http://www.fhwa.dot.gov/safetealu/legis.htm

Federal Highway Administration. (2012). *The national highway system.* Retrieved from http://www.fhwa.dot.gov/planning/nhs/

Fink, A. (2003). *The survey handbook.* (2nd ed.) Thousand Oaks, CA: Sage.

Florida express lanes project showing huge improvement in average speeds. (2009, October 2). Retrieved from http://www.aashtojournal.org/Pages/100209florida.aspx

Forkenbrock, D. J., & Hanley, P. F. (2006). Mileage-Based road user charges. *Public Roads, 69*(5), 2

Forkenbrock, D. (2008). Policy options for varying mileage-based road user charges. *Transportation Research Record: Journal of the Transportation Research Board, 2079*(1), 29-36.

Gliner, J. A., Morgan, G. A. (2000). *Research methods in applied settings: An integrated approach to design and analysis.* Mahwah, N.J.: Lawrence Erlbaum.

Green, W. (2012, March 24). *Transportation infrastructure: How to improve the "transeconomy?" invest in infrastructure now!* Retrieved from http://www.freerepublic.com/focus/news/2478935/posts

Hannan, L. (2012, August 1). *Florida will consider tolling flyover connecting Interstate 95 to Butler.* Retrieved from http://jacksonville.com/news/florida/2012-08-01/story/florida-will-consider-tolling-flyover-connecting-interstate-95-butler

Hancock, L. (2009, January 25). *70% of Utahns oppose raising gas tax to fund transportation.* Retrieved from http://www.deseretnews.com/article/705280160/70-of-Utahns-oppose-raising-gas-tax-to-fund-transportation.html

Holland enacts plan to charge motorists for each kilometer driven. (2009, November 20). Retrieved from http://www.aashtojournal.org/Pages/112009holland.aspx

Holeywell, R. (2012, August 1). *What the Georgia vote means for transportation.* Retrieved from http://www.governing.com/blogs/fedwatch/What-The-Georgia-Vote-Means-for-the-Future-of-Transportation.html

Hoover, T. (2012, May 22). *Suit claims Colorado car-fee hike for bridge repair violates TABOR.* Retrieved from http://www.denverpost.com/ci_20676330/suit-claims-colorado-car-fee-hike-bridge-repairs

I-85 express lanes: Overview and benefits. (2010, June 16). Retrieved from http://www.dot.ga.gov/travelingingeorgia/expresslanes/I85expresslanes/Documents/Factsheets/OverviewandBenefits.pdf

Ieromonachou, P., Potter, S., & Warren, J. (2005). Comparing urban road pricing implementation and management strategies from the UK and Norway. In *PIARC Seminar on Road Pricing with emphasis on Financing, Regulation and Equity, Cancun, Mexico* (pp. 11-13).

Institute on Taxation and Economic Policy. (2014). *How long has it been since your state raised its gas tax?* (ITEP Publication No. 0414). Retrieved from http://itep.org/ itep_reports/2014/04/how-long-has-it-been-since-your-state-raised-its-gas-tax.php#.U5TM-XaTA4x

Kalauskas, R., Taylor, B. D., Iseki, H., Demisch, A., Eckert, J., & Sacramento, C. A. (2010). Technical report documentation page.

Kasperowics, P. (2012, June 28). *House puts brakes on taxing cars by the mile.* Retrieved from http://thehill.com/blogs/floor-action/house/235261-house-slams-the-door-on-taxing-cars-by-the-mile

Kerr, D. (2012, August 13). *Big costs, little revenue: Panel looks at ways of paying for transportation, transit.* Retrieved from http://finance-commerce.com/2012/08/big-costs-little-revenue-panel- looks-at-ways-of-paying-for-transportation-transit/

Koczela, S., & Parr, R. (2013). *Construction ahead? Public opinion on transportation in Massachusetts.* Retrieved from http://www.transportationinvestment.org/wp-content/uploads/2014/01/MA-Poll-Public-Opinion-on-Transportation-in-Massachusetts.pdf

Kunkle, F., & Vozzella, L. (2013, February 23). *Virginia lawmakers approve sweeping transportation plan.* Retrieved from http://www.washingtonpost.com/local/va-politics/va-lawmakers-approve-landmark-transportation-plan/2013/02/23/712969d8-7de4-11e2-82e8-61a46c2cde3d_story.html

Lawmakers must act on road funds. (2012, May 19). Retrieved from http://www.wyomingnews.com/articles/2012/06/17/opinion/staff_editorials/column480.txt#.U44 VsXaTA4w

Leib, J. (2008, November 14). *Panel presses new fees, taxes for transportation.* Retrieved from http://www.denverpost.com/ci_10979264

Linking gas tax to environmental benefits boosts support, Mineta Institute survey finds. (2010, July 02). Retrieved from http://www.aashtojournal.org/Pages/070210commonwealth.aspx

Lobeck, J. (2012, June 24). *ADOT tries to cope with falling revenue.* Retrieved from http://www.yumasun.com/news/revenue-79947-transportation-highway.html

Max, A. (2009, November 14). *Dutch drivers to pay tax on road time, not on car.* Retrieved from http://prev.dailyherald.com/story/?id=336575&src=110

McBride, W. (2014, April 30). *Federal gas tax hikes proposed by Senator Carper.* Retrieved from http://taxfoundation.org/blog/federal-gas-tax-hikes-proposed-senator-carper

Millar, M. M., & Dillman, D. A. (2011). Improving response to web and mixed-mode surveys. *Public Opinion Quarterly, 75*(2), 249-269.

Minnesota opens hot lanes on Interstate 35W. (2009, October 2). Retrieved from http://www.aashtojournal.org/Pages/100209minnesota.aspx

Morisugi, H., & Ravinder, K. (2004). Quantitative welfare analysis of road pricing/toll pricing-post evaluation. *Policy, 38*(Part 2).

Moving Ahead for Progress in the 21st Century Act (MAP-21). (2012, July 17). Retrieved from http://www.fhwa.dot.gov/MAP21/summaryinfo.cfm

Nebraska Department of Roads. (2014). *Total state taxes on motor fuel.* Retrieved from http://www.transportation.nebraska.gov/city-county/pdfs/gas-tax.pdf

Nelson, D. (2012, June 18). *Potholes forever: The state's transportation-funding impasse.* Retrieved fromhttp://crosscut.com/2012/06/18/politics-government/109199/mckenna-inslee-governor-transportation-funding/

New York looks to repeal higher fee for license plates. (2009, November 20). Retrieved from http://www.aashtojournal.org/Pages/112009ny.aspx

Odeck, J., & Brathen, S. (1997). On public attitudes toward implementation of toll roads—The case of Oslo toll ring. *Transport Policy*, 4(2), 73-83.

Ostmeyer, A. (2009, August 20). *Arkansas plans to use tolls to help pay for bypass.* Retrieved from http://www.joplinglobe.com/local/x1896310626/Arkansas-plans-to-use-tolls-to-help-pay-for-bypass

Ott, L., Longnecker, M. (2001). *An introduction to statistical methods and data analysis.* 5th ed. Pacific Grove, CA: Duxbury. *Wary governments shake up municipal bond landscape.* (2014, June 2). Retrieved from http://www.cnbc.com/id/101722434#.

Ozbek, M. E., Youssef, T., and Prakash, S. (2010). Synthesis and taxonomy of systems used to generate revenues to be used for highway construction and maintenance. In: *Proceedings of the Associated Schools of Construction 46th Annual International Conference*, 637-646, April 7-10, Boston, MA.

Pennsylvania again seeks federal okay to toll I-80. (2009, August 7). Retrieved from http://www.aashtojournal.org/Pages/080709pennsylvania.aspx

Peck, R., Devore, J. L. (2005). *Statistics: The exploration and analysis of data.* (5th ed.) USA: Brooks/Cole, Thomson Learning

Phelan, R., & Phelan, M. E. (2008). Environmental considerations for a proposed tolled highway project. *Journal Of Professional Issues In Engineering Education & Practice, 134*(1), 116-118. doi:10.1061/(ASCE)1052-3928(2008)134:1(116)

Porter, J., Kim, D., Vergara, H., Whitty, J., Svadlenak, J., Larsen, N., et al. (2005). Development and performance evaluation of a revenue collection system based on vehicle miles traveled. *Transportation Research Record: Journal of the Transportation Research Board, 1932*(1), 9-15.

Rendell to lawmakers: Raise $3.5 billion annually for transportation. (2010, May 7). Retrieved from http://www.aashtojournal.org/Pages/050710pennsylvania.aspx

Report identifies $50 billion shortfall in Minnesota. (2009, August 28). Retrieved from http://www.aashtojournal.org/Pages/082809minnesota.aspx

Rolon, A. (2008). Evaluation of value capture mechanisms from linkage capture to special assessment districts. *Transportation Research Record: Journal of the Transportation Research Board, 2079*(1), 127-135.

Rotaris, L., Danielis, R., Marcucci, E., & Massiani, J. (2010). The urban road pricing scheme to curb pollution in Milan, Italy: Description, impacts and preliminary cost–benefit analysis assessment. *Transportation Research Part A: Policy and Practice*, *44*(5), 359-375.

Schmitz, J. (2010, August 7). *Rendell urges fee increases, higher gas tax to raise funds*. Retrieved from http://www.post-gazette.com/news/transportation/2010/08/07/Rendell-urges-fee-increases-higher-gas-tax-to-raise-funds/stories/201008070202

Schmitz, J. (2009, October 13). *Report backs I-80 toll foes.* Retrieved from http://www.post-gazette.com/news/transportation/2009/10/13/Report-backs-I-80-toll-foes/stories/200910130256

Six months into SR 520 tolling: Traffic and revenue on track. (2012, June 23). Retrieved from http://www.ncwtv.com/six-months-into-sr-520-tolling-traffic-and-revenue-on-track-3088/

Tate, C. (2012, July 3). *Congress took $20 billion from Treasury fund to pay for transit bill.* Retrieved from http://www.denverpost.com/nationworld/ci_20992941/congress-took-20-billion-from-treasury-fund-pay

The Council of State Governments. (2014, Jan/Feb). *State gas taxes.* Retrieved from http://www.csg.org/pubs/capitolideas/july_august_2011/StateGasTaxes.aspx

Transportation Bill Signed into Law. (2012, July 13). Retrieved from http://www.aashtojournal.org/Pages/071312transpobill.aspx

Transportation for Tomorrow. (2007, December). *National surface transportation policy and revenue study commission.* Retrieved from http://transportationfortomorrow.com/final_report/pdf/final_report.pdf

Wachs, M. (2003). A dozen reasons for raising gasoline taxes. *Institute of Transportation Studies, University of California at Berkeley,* 0192 4095.

Whitfield, J. (2012, July 23). *Mo. highway projects: Where is the money going to come from?* Retrieved from http://www.connecttristates.com/news/story.aspx?id=779544#.U44ZTXaTA4y

Weirsma, G. (2000). *Research methods in education.* Boston: Allyn & Bacon.

Zmud, J. P., & Arce, C. (2008). NCHRP synthesis of highway practice 377: Compilation of public opinion data on tolls and road pricing. *Transportation Research Board of the National Academies, Washington, DC*.

Appendix A: Pilot Survey

SECTION I: GENERAL QUESTION

Please select only one (1) answer by completely filling in the bubble that best reflects your opinion. You can use a pen or a pencil.

	Agree	Disagree	Neither Agree nor Disagree
1. Our nation's highway system is in poor condition.	❍	❍	❍
2. The quality of the highway system is important to me.	❍	❍	❍
3. A low quality highway system costs me time and money.	❍	❍	❍
4. Any solution to highway funding should also address the traffic congestion problem.	❍	❍	❍
5. Any solution to highway funding should also encourage people to drive more fuel efficient vehicles.	❍	❍	❍
6. Those driving fuel efficient vehicles should **not** pay less to support the highway system.	❍	❍	❍
7. Any solution to highway funding should be able to account for changes in future driving patterns and fuel efficiencies.	❍	❍	❍
8. Gas tax should be indexed to the price of gas and change (increase or decrease) as gas prices change (increase or decrease).	❍	❍	❍
9. Toll money collected should only be used to operate and maintain that specific toll road; but **not** to operate and maintain other roads, **nor** to build new roads in the state.	❍	❍	❍
10. States should only charge a toll for out of state vehicles passing through; but **not** for in-state vehicles.	❍	❍	❍
11. I do **not** mind having to pay a fee to enter a city center by my vehicle during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days).			
12. The technology that is used to collect tolls is **not** important to me.			

	Agree	Disagree	Neither Agree nor Disagree
13. I feel comfortable with having a device in my vehicle that can track when and where I am driving (only for user fee purposes).	❍	❍	❍
14. Private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return.	❍	❍	❍
15. I support **increasing the federal gas tax** that is collected at the time of purchase to fund the highway system.	❍	❍	❍
16. I support **increasing the state gas tax** that is collected at the time of purchase to fund the highway system.	❍	❍	❍
17. I support **implementing additional taxes and fees on other driving-related items** to fund the highway system.	❍	❍	❍
18. I support **implementing additional sales taxes** to fund the highway system.	❍	❍	❍
19. I support **the use of highway tolling** to fund the highway system.	❍	❍	❍
20. I support **the use of High Occupancy Tolls (HOT Lanes)** to fund the highway system.	❍	❍	❍
21. I support the **use of Area Pricing (Cordon Pricing)** to fund the highway system.	❍	❍	❍
22. I support the **use of Mileage-Based User Fees** to fund the highway system.	❍	❍	❍

SECTION II: CHOICE OF FUNDING SYSTEM

23. Please indicate your top choice for a highway funding system. Please select only one (1) answer by completely filling in the bubble. You can use a pen or a pencil.

❍ Increasing the federal gas tax that is collected at the time of purchase
❍ Increasing the state gas tax that is collected at the time of purchase
❍ Implementing additional taxes and fees on other driving-related items
❍ Implementing additional sales taxes
❍ Use of highway tolling
❍ Use of High Occupancy Tolls (HOT Lanes)
❍ Use of Area Pricing (Cordon Pricing)
❍ Use of Mileage-Based User Fees

SECTION III: DEMOGRAPHICS

Please provide the following demographic information by completely filling in the bubble. You can use a pen or a pencil.

24. Which state do you reside in?

❍ Colorado ❍ North Dakota ❍ South Dakota ❍ Utah ❍ Wyoming

25. Where do you live?

❍ Downtown area ❍ Suburb area ❍ Rural area

26. On average, how many miles do you drive a week?

❍I don't own/drive a vehicle ❍50 or less ❍51-100 ❍101-200 ❍201 or more

27. How many miles does your primary vehicle get per gallon (miles per gallon- MPG)?

❍ I don't own/drive a vehicle ❍ Electric vehicle (no use of gas)
❍ 15 MPG or less ❍ 16-20 MPG ❍ 21-25 MPG ❍ 26 MPG or more

28. What is your age?

❍ 18-35 ❍ 36- 50 ❍ 51-64 ❍ 65 or older

29. What is your gender?

❍ Female ❍ Male

30. What is your annual household income?

❍ Less than $50,000 ❍ $50,000-$100,000 ❍ More than $100,000

Appendix A-1: Introduction to the Pilot Survey

PLEASE READ THE FOLLOWING 2 PAGES BEFORE COMPLETING THE SURVEY

Gas tax has been the major funding system for the construction and maintenance of the highway networks in the US. Gas tax is divided into two components: i) the Federal tax with a current value of 18.4 cents/gallon and ii) state taxes that are individually assessed by each state. This funding system has served its purpose for a long time; but failed to do so in recent years due to: (i) the fact that the Federal tax on gas has stayed the same since 1993 despite inflation and increasing needs on the highway system, (ii) the increase in the utilization of fuel-efficient vehicles and electric vehicles (resulting in collection of less gas tax), (iii) the decrease in the vehicle miles travelled during/after the recession in the economy (resulting in collection of less gas tax) and (iv) the increase in the cost of construction, maintenance, and operation.

Given that the current funding system for highways mainly relies on the collection of gas taxes which is prone to become less and less reliable due to the reasons discussed above, it is time to evaluate alternative funding systems in addition to the current ones. It is critical to get the input from the road users (who will eventually bear the cost based on the system implemented) and understand their perceptions as a part of this evaluation process. The findings of this study can help the policy-makers in making better informed decisions on which funding system to implement considering the public input.

Listed below are the different funding systems that are included in this study. Some of these have been around for a long time (some of which are not utilized frequently) while others are rather newly-developed funding systems which have been implemented in pilot projects. Under each funding system, you will find brief bullet points highlighting the distinctive and important characteristics of that system. As can be seen, certain systems also have the potential to change driver behavior (e.g., encouraging the use of fuel-efficient vehicles to pay less gas tax or driving only at certain times of the day to avoid higher tolls which in turn may reduce congestion). **This information is provided to give you a better idea on each system before answering the questions in the survey following this section**.

Funding Systems

1) Federal Gas Tax: Collected at the time of purchase.

- Does not directly address congestion
- May encourage drivers to use more fuel-efficient vehicles
- Will generate less revenue with increased use of fuel-efficient vehicles
- Easy to implement with existing collection mechanisms

2) State Gas Tax: Collected at the time of purchase.

- Each state can decide on the rate based on its need
- Does not directly address congestion
- May encourage drivers to use more fuel-efficient vehicles
- Will generate less revenue with increased use of fuel-efficient vehicles
- Easy to implement with existing collection mechanisms

3) Taxes and Fees on Other Driving-related Items: A portion of the **proposed additional (increased)** sales tax on vehicles and on vehicle parts such as tires as well as vehicle registration fees are allocated to support the highway system.

- Does not directly address congestion
- Does not necessarily encourage drivers to use more fuel-efficient vehicles
- Generates revenue independent of how fuel efficient the vehicle is
- Easy to implement with existing collection mechanisms

4) Sales Tax: A portion of the **proposed additional (increased)** sales tax is allocated to support the highway system.

- Does not address congestion
- Does not necessarily encourage drivers to use more fuel-efficient vehicles
- Generates revenue independent of how fuel efficient the vehicle is
- Easy to implement with existing collection mechanisms

5) Highway Tolling: Every lane in the highway is tolled.

- All drivers who use the tolled highway pay. Drivers may use alternative roads/routes instead of the tolled highway.
- Rates can fluctuate by time of day; which in turn may address congestion (as certain drivers may choose to drive at non-peak times to avoid increased rates or drive on alternative roads/routes)
- Does not necessarily encourage drivers to use more fuel-efficient vehicles
- Generates revenue independent of how fuel efficient the vehicle is
- Current technology allows drivers to drive through toll collection stations without stopping and have their tolls deducted from their account or be billed

6) High Occupancy Tolls (HOT Lanes): Only specific lanes are tolled in order to control demand; thereby increasing the travelling speed (and reduce travel time) for those drivers willing to pay the toll.

- Provides free lanes for those drivers not willing to pay tolls
- Rates can fluctuate by time of day or amount of traffic on free lanes to address congestion and reduce travel times for those willing to pay the additional toll
- Does not necessarily encourage drivers to use more fuel-efficient vehicles
- Generates revenue independent of how fuel efficient the vehicle is
- Current technology allows drivers to drive through automated toll collection stations without stopping and have their tolls deducted from their account or be billed

7) Area Pricing (Cordon Pricing): Drivers are charged a fee to travel in a city center typically only during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days).

- Rates can fluctuate by time of day and zones of the city to address congestion and reduce the amount of vehicles traveling in a city center
- Does not necessarily encourage drivers to use more fuel-efficient vehicles
- Generates revenue independent of how fuel efficient the vehicle is
- Current technology allows drivers to drive through automated toll collection stations without stopping and have their tolls deducted from their account or be billed

8) Mileage-Based User Fees: Charges drivers a fee for every mile they drive.

- A different rate per mile can be charged for different road types, different zones/locations, different time periods, and for different vehicle types; which in turn may address congestion (as certain drivers may choose to drive at non-peak times and locations to avoid increased rates)
- Does not necessarily encourage drivers to use more fuel-efficient vehicles
- Generates revenue independent of how fuel efficient the vehicle is
- Current technology depends on GPS and GIS (i.e., location tracking) to enable the system assess different rates for different locations

Appendix A-2: Specific Feedback for the Pilot Survey

Specific Feedback for the Pilot Survey

1) Would you recommend a 5-level Likert scale; or just having 3 options (Agree/Disagree/Neither) is good?

2) Is the order of questions good? Any suggestions on the order?

3) Do you like the term "Neither Agree or Disagree" as the neutral option? Any other suggestions?

4) Section II of the survey asks for the top choice for a highway funding system. If you did not like any of the 8 options; how would you respond to that question? We still want the respondents to pick the top (the best of the worst) even if they don't like any of the systems. Is there a good way to prompt the respondent to do that?

5) What do you think about the negative questions (e.g., Question 6, 11, and 12)? Did they make you confused?

6) Is the length of the survey appropriate?

7) Is the information sheet clear and easy to understand?

8) Is the survey format/layout acceptable?

9) Referring to the demographic portion (Section III) of the survey, are the questions appropriate? Would you recommend adding or deleting any question? If so, please expand on the answer,

10) Overall, what is your opinion about the survey? Any specific areas to be improved?

11) For those of you who are familiar with the subject (highway funding); any content suggestions (i.e., questions to add to the survey, section to add to the information sheet)?

Appendix B: Survey

Understanding Public Perceptions of Different Options to Fund the Highway System

Instructions: Please read the **blue "Information Sheet"** included in the package you received before completing the survey. It has a brief overview of each funding option that is included in this survey. When answering, please completely fill in the bubble using a pencil or dark-colored pen.

SECTION I: GENERAL QUESTIONS— Please select only one (1) answer that best reflects your opinion.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Our nation's highway system is in poor condition.	O	O	O	O	O
2	The quality of the highway system is important to me.	O	O	O	O	O
3	A low quality highway system costs me time and money.	O	O	O	O	O
4	Gas tax should be **indexed** to the price of gas and change (increase or decrease) as gas prices change (increase or decrease).	O	O	O	O	O
5	Those driving fuel efficient or electric vehicles should pay less to fund the highway system.	O	O	O	O	O
6	Vehicles that cause more wear and tear on the highways should pay more to fund the highway system.	O	O	O	O	O
7	People who do not own vehicles should not pay taxes to fund the highway system.	O	O	O	O	O
8	Toll money collected should only be used for that specific toll road; **not** for other roads in the state.	O	O	O	O	O
9	States should only charge a toll for out of state vehicles passing through; **not** for in-state vehicles.	O	O	O	O	O
10	I would **not** mind having to pay a fee to enter a city center by my vehicle during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days) (as discussed in the blue Information Sheet under "Cordon Pricing").	O	O	O	O	O
11	I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe (as discussed in the blue Information Sheet under "Mileage-Based User Fees").	O	O	O	O	O
12	The private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return.	O	O	O	O	O
13	I support **increasing the federal gas tax** that is collected at the time of purchase to fund the highway system.	O	O	O	O	O
14	I support **increasing the state gas tax** that is collected at the time of purchase to fund the highway system.	O	O	O	O	O
15	I support the **collection of additional taxes and fees on other driving-related items** to fund the highway system.	O	O	O	O	O
16	I support the **collection of additional sales tax on all goods** to fund the highway system.	O	O	O	O	O
17	I support the **use of highway tolling** to fund the highway system.	O	O	O	O	O
18	I support the **use of High Occupancy Toll (HOT) Lanes** to fund the highway system.	O	O	O	O	O
19	I support the **use of Cordon Pricing** to fund the highway system.	O	O	O	O	O
20	I support the **use of Mileage-Based User Fees** to fund the highway system.	O	O	O	O	O

Thank you for your answers so far. Please continue onto the next page.

Understanding Public Perceptions of Different Options to Fund the Highway System

Instructions: Please read the **blue "Information Sheet"** included in the package you received before completing the survey. It has a brief overview of each funding option that is included in this survey. When answering, please completely fill in the bubble using a pencil or dark-colored pen.

SECTION II: CHOICE OF FUNDING OPTION

21. If you had to choose one of the following options to fund the highway system, which one would you choose? Please select only one (1) answer that indicates your top choice for a highway funding option. You can refer back to the blue Information Sheet for a brief overview of each funding option listed below.

❍ Increasing the federal gas tax that is collected at the time of purchase

❍ Increasing the state gas tax that is collected at the time of purchase

❍ Collection of additional taxes and fees on other driving-related items

❍ Collection of additional sales tax on all goods

❍ Use of highway tolling

❍ Use of High Occupancy Toll (HOT) Lanes

❍ Use of Cordon Pricing

❍ Use of Mileage-Based User Fees

SECTION III: DEMOGRAPHICS— Please provide the following demographic information.

22. In which state do you reside?
❍ Colorado ❍ North Dakota ❍ South Dakota ❍ Utah ❍ Wyoming

23. Where do you live?
❍ Downtown ❍ Suburban ❍ Urban ❍ Rural

24. Do you have access to public transportation in the area you live/commute? ❍ Yes ❍ No

25. Do you use public transportation in the area you live/commute? ❍ Yes ❍ No

26. On average, how many miles do you drive a week?
❍ I don't own/drive a vehicle ❍ 50 miles or less ❍ 51-100 miles ❍ 101-200 miles ❍ 201 miles or more

27. How many miles does your primary vehicle get per gallon (miles per gallon- MPG)?
❍ I don't know ❍ I don't own/drive a vehicle ❍ Electric vehicle (no use of gas) ❍ 15 MPG or less
❍ 16-20 MPG ❍ 21-25 MPG ❍ 26-30 MPG ❍ 31-35 MPG ❍ 36-40 MPG ❍ 41 MPG or more

28. What is your age?
❍ 18-25 ❍ 26-35 ❍ 36-50 ❍ 51-64 ❍ 65 or older

29. What is your gender? ❍ Female ❍ Male

30. What is your annual household income?
❍ $25,000 or less ❍ $25,001-$50,000 ❍ $50,001-$100,000 ❍ $100,001-$200,000 ❍ $200,001 or more

31. What is the highest level of education you have completed?
❍Less than High School ❍High School/GED ❍ Some College ❍2-Year College Degree (Associates)
❍ 4-Year College Degree (BA, BS) ❍Master's Degree ❍ Doctoral Degree ❍ Professional Degree (MD, JD)

Thank you for completing the survey. Please return it using the enclosed postage paid return envelope.

Appendix B-1: Introduction to the Survey

6/7/2013

Colorado State University
Department of Construction Management
1584 Campus Delivery
Fort Collins, Colorado 80523-1584
(970) 491-7353
FAX: (970) 491-2473
www.cm.colostate.edu

Dear Sir or Madam,

My name is Dr. Mehmet E. Ozbek. I am an assistant professor at Colorado State University in the Department of Construction Management. We are conducting a study to understand the public perceptions of different options to fund the highway system. This study is sponsored by the Mountain-Plains Consortium (MPC) which is a university program sponsored by the U.S. Department of Transportation through its Research and Innovative Technology Administration.

Several states are investigating various options to fund the highway system. As a part of this process, it is critical to get input from the public who will eventually bear the cost based on the funding option implemented. You were randomly selected to participate in this study by completing a short survey; and your participation is voluntary. Reading the **blue "Information Sheet"** and then completing the survey will take approximately 15-20 minutes of your time. You can return the completed survey using the enclosed postage paid return envelope.

Why is it important that you respond to this survey?

The results of this study will be shared with policy-makers. States may use this information to make better informed decisions on which funding option to implement in the future considering input from the public; **therefore your responses are very important.**

The survey **does not ask for any personal information** other than a few demographic questions (to enable different types of analyses). The survey will be received by a third party handler at Colorado State University who will open the mail and forward the completed survey to the researchers. Therefore, researchers will not have any specific information as to who completed and sent the survey. In summary, when the data is gathered and reported, no information can be provided that can link you to the survey. The final report describing the findings of the study will not present any individual information; rather it will present combined results.

If you have any questions, please contact Mr. Nasser Albeiruti at 970-491-7959 or Dr. Mehmet Ozbek at 970-491-4101. If you have any questions about your rights as a volunteer in this research, contact Ms. Janell Barker, Human Research Administrator for the Institutional Review Board, at 970-491-1655. This study was determined to be Exempt from the federal regulations for the protection of human subjects.

I thank you in advance for your kind cooperation and look forward to your response.

Mehmet E. Ozbek, Ph.D.
Colorado State University, Department of Construction Management

Appendix B-2: Information Sheet

PLEASE READ THIS INFORMATION SHEET BEFORE COMPLETING THE SURVEY. THANK YOU...

- Gas tax has been the major source to fund the highway system in the US.
- Gas tax is divided into two components: i) the federal tax with a current value of 18.4 cents/gallon (24.4 cents/gallon for diesel) and ii) state taxes that are individually collected by each state.
- This funding source has served its purpose for a long time; but failed to do so in recent years, mainly due to:
  1. the federal gas tax staying the same since 1993 **despite inflation** and increasing needs on the highway system
  2. the **increase in the cost** of construction, maintenance, and operation of highways
  3. the increase in the utilization of **fuel-efficient vehicles and electric vehicles** (resulting in collection of less gas tax)
- Given these, several states are evaluating alternative funding options in addition to the current ones.

YOUR INPUT IS CRITICAL AS A PART OF THIS EVALUATION PROCESS

Presented below are 8 options to fund the highway system and their basic characteristics so that you can get a better idea on each option **before answering the questions in the survey following this section.**

1) Federal Gas Tax: Collected at the time of purchase. • Rate determined by the federal government.	**5) Highway Tolling:** Every lane in the highway is tolled. • All drivers who use the tolled highway pay. Drivers may use alternative roads/routes instead of the tolled highway. • Rates can increase during peak hours.
2) State Gas Tax: Collected at the time of purchase. • Each state can decide on the rate.	**6) High Occupancy Toll (HOT) Lanes:** Only specific lanes are tolled in order to control demand; thereby increasing the travelling speed (and reducing the travel time) for those drivers willing to pay the toll. • Provides free lanes in the same road segment for those drivers not willing to pay tolls. • Rates can fluctuate by time of day and/or amount of traffic to reduce travel times for those drivers willing to pay the toll.
3) Collection of Additional Taxes and Fees on Other Driving-related Items: Additional (increased) sales tax is collected on vehicles and on vehicle parts such as tires, and/or additional (increased) vehicle registration fees are collected.	**7) Cordon Pricing:** Drivers are charged a fee to travel in a city center typically only during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days). For example, you are charged a fee when your vehicle enters a metropolitan area between 6 and 9 a.m., Monday through Friday. • Rates can increase by time of day and zones of the city to reduce the amount of vehicles traveling in a city center.
4) Collection of Additional Sales Tax on All Goods: Additional (increased) sales tax is collected. • Taxes are collected on all goods. Everybody pays, regardless of vehicle ownership, at the time of purchasing any good.	**8) Mileage-Based User Fees:** Drivers are charged a fee for every mile they drive. • A different rate per mile can be charged for different road types, different zones/locations, different time periods, and for different vehicle types. • Current technology can record the vehicle's location and time to enable the collection of different rates for different locations and different times of driving.

Appendix C: IRB Approval

Colorado State University

Research Integrity & Compliance Review Office
Office of Vice President for Research
Fort Collins, CO 80523-2011
(970) 491-1553
FAX (970) 491-2293

DATE: May 30, 2013

TO: Dr. Mehmet Ozbek, Construction Management
Dr. Rebecca Atadero, Civil Engineering

FROM: Janell Barker, IRB Coordinator
Research Integrity & Compliance Review Office

TITLE: Understanding Public Perceptions of Different Revenue Generation Systems for Highway Construction and Maintenance

IRB ID: 133-13H **Review Date:** May 30, 2013

The Institutional Review Board (IRB) Coordinator has reviewed the modification of this project:

- To remove the incentive and follow-up letter and to use the revised cover letter reflecting these changes and to use the final version of the survey and information sheet.

and has declared the study remains exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b)(2). The IRB determination of exemption means that:

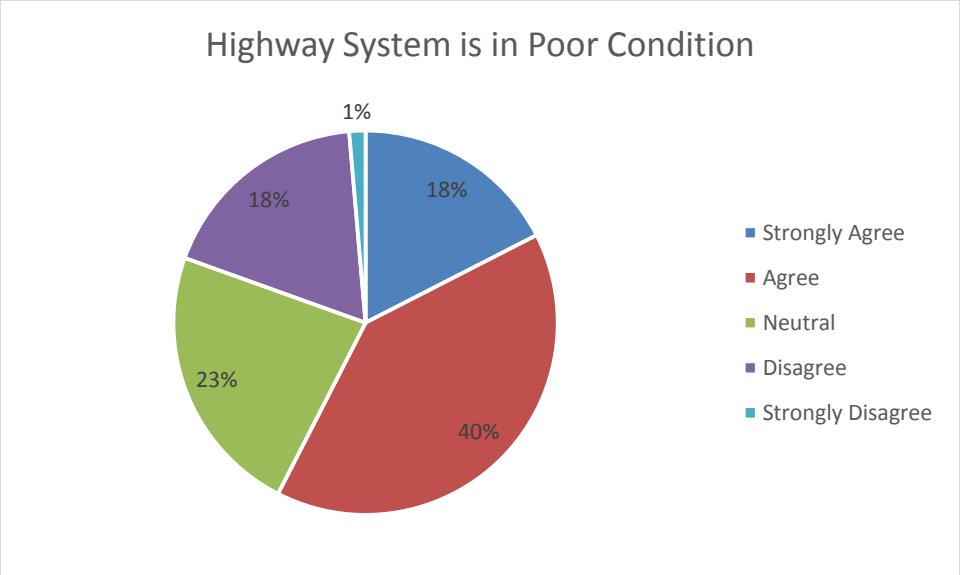
- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as proposed in the IRB application**, including obtaining and documenting (signed) informed consent if stated in your application or if required by the IRB.
- **Any modification of this research should be submitted to the IRB through an email to the IRB Coordinator, prior to making any changes**, to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.
- **Please notify the IRB if any problems or complaints of the research occur.**

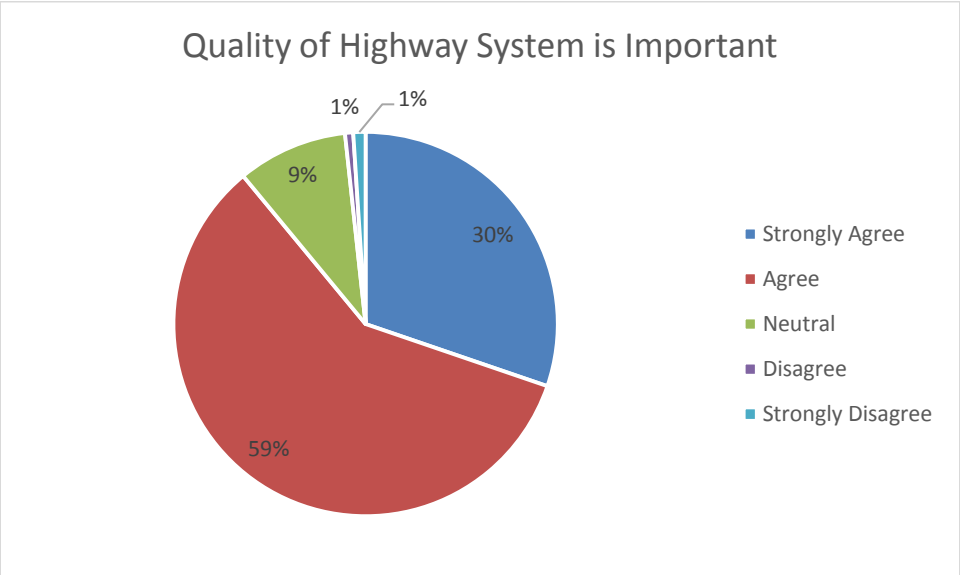
Please note that you must submit all research involving human participants for review by the IRB. **Only the IRB may make the determination of exemption**, even if you conduct a similar study in the future.

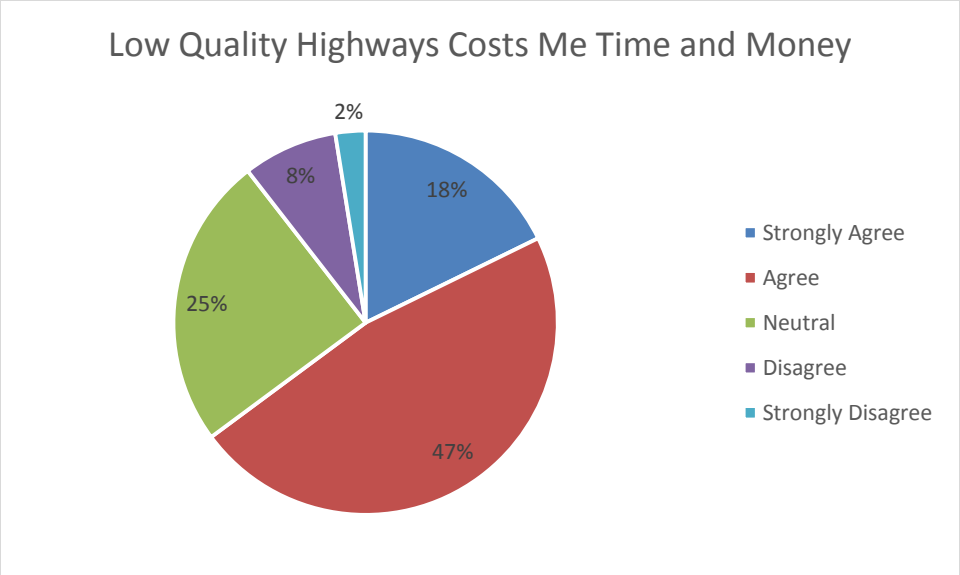
Appendix D: The State of Colorado

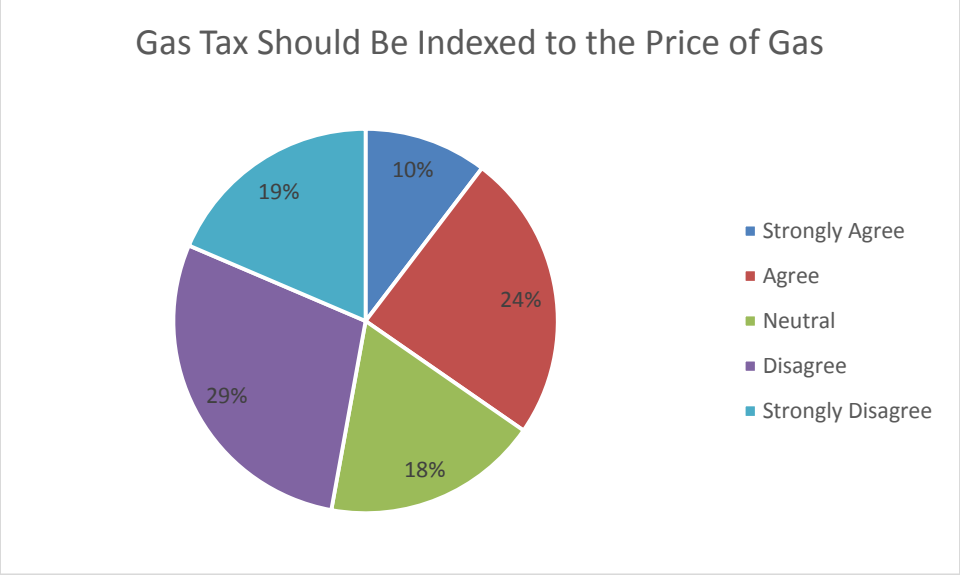
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	58.00	+/- 6.00	Between 52 and 64
The Quality of the Highway System is important to me	89.00	+/- 4.00	Between 85 and 93
A low quality highway system costs me time and money.	65.00	+/- 6.00	Between 59 and 71
Gas tax should be **indexed** to the price of gas and change (increase or decrease) as gas prices change (increase or decrease).	34.00	+/- 6.00	Between 28 and 40
Those driving fuel efficient or electric vehicles should pay less to fund the highway system.	15.00	+/- 4.00	Between 11 and 19
Vehicles that cause more wear and tear on the highways should pay more to fund the highway system.	80.00	+/- 5.00	Between 75 and 85
People who do not own vehicles should not pay taxes to fund the highway system.	24.00	+/- 5.00	Between 19 and 29
Toll money collected should only be used for that specific toll road; **not** for other roads in the state.	56.00	+/- 6.00	Between 50 and 62
States should only charge a toll for out of state vehicles passing through; **not** for in-state vehicles.	6.00	+/- 3.00	Between 3 and 9
I would **not** mind having to pay a fee to enter a city center by my vehicle during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days) (as discussed in the blue Information Sheet under "Cordon Pricing").	17.00	+/- 4.00	Between 13 and 21

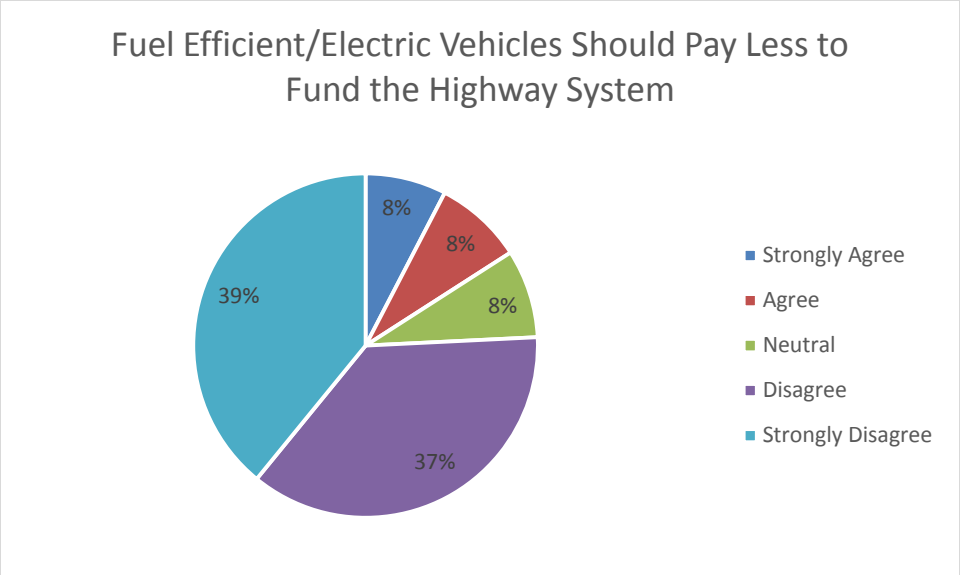
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe (as discussed in the blue Information Sheet under "Mileage-Based User Fees").	11.00	+/- 4.00	Between 7 and 15
The private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return.	34.00	+/- 5.00	Between 29 and 39
I support **increasing the federal gas tax** that is collected at the time of purchase to fund the highway system.	44.00	+/- 6.00	Between 38 and 50
I support **increasing the state gas tax** that is collected at the time of purchase to fund the highway system.	47.00	+/- 6.00	Between 41 and 53
I support the **collection of additional taxes and fees on other driving-related items** to fund the highway system.	32.00	+/- 5.00	Between 27 and 37
I support the **collection of additional sales tax on all goods** to fund the highway system.	20.00	+/- 5.00	Between 15 and 25
I support the **use of highway tolling** to fund the highway system.	38.00	+/- 6.00	Between 32 and 44
I support the **use of High Occupancy Toll (HOT) Lanes** to fund the highway system.	58.00	+/- 6.00	Between 52 and 64
I support the **use of Cordon Pricing** to fund the highway system.	14.00	+/- 4.00	Between 10 and 18
I support the **use of Mileage-Based User Fees** to fund the highway system.	18.00	+/- 4.00	Between 14 and 22

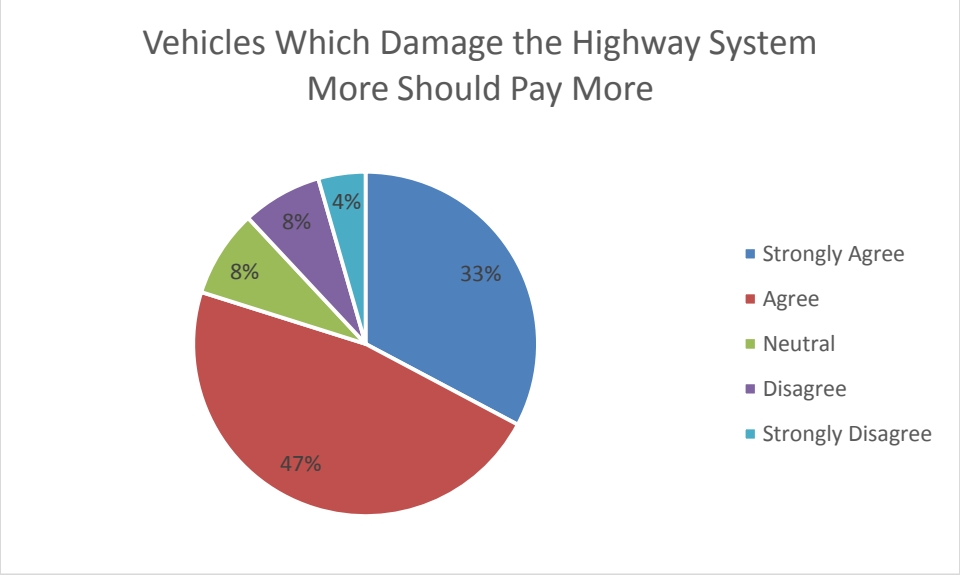

Highway System is in Poor Condition
1%
18%
18%
23%
40%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

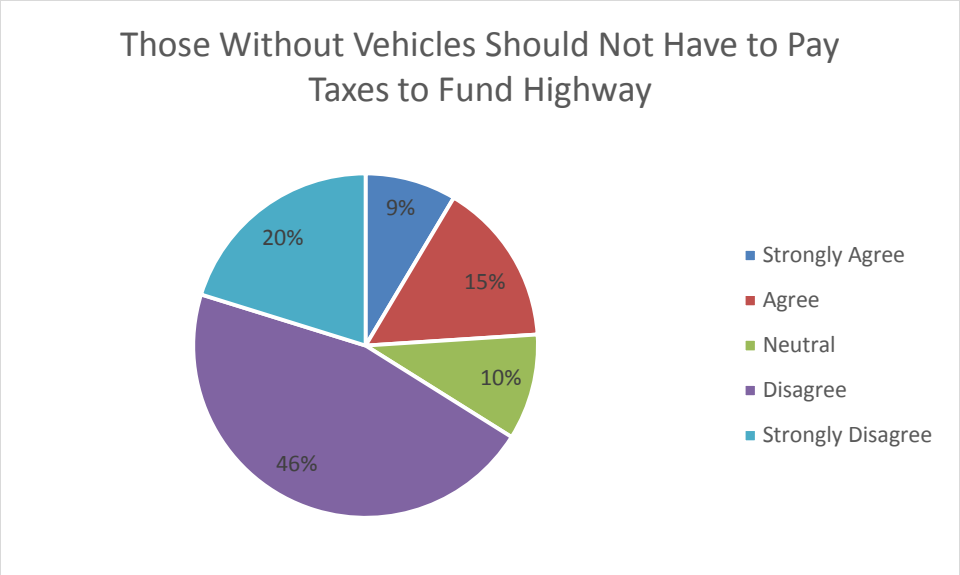

Quality of Highway System is Important
1%
1%
9%
30%
59%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

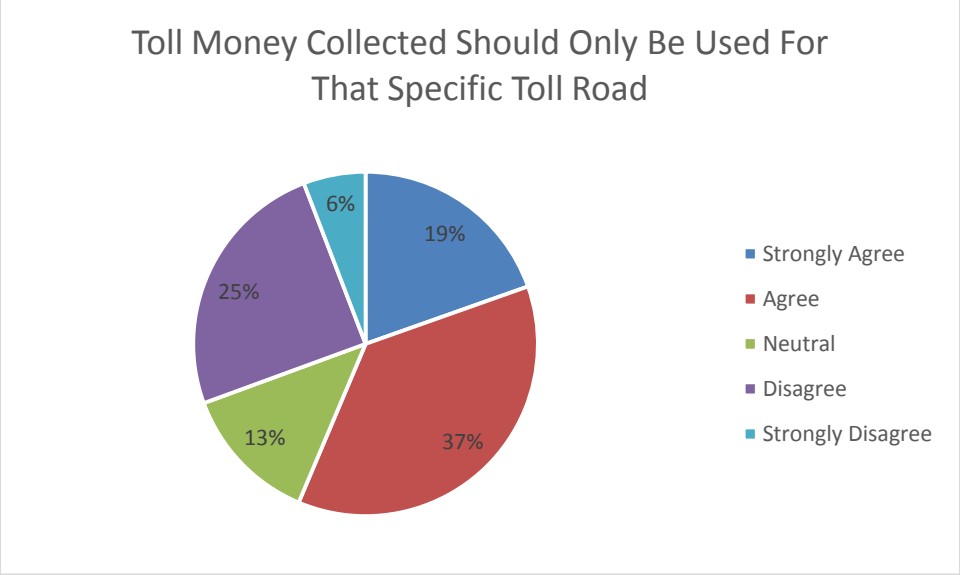

Low Quality Highways Costs Me Time and Money
2%
8%
18%
25%
47%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

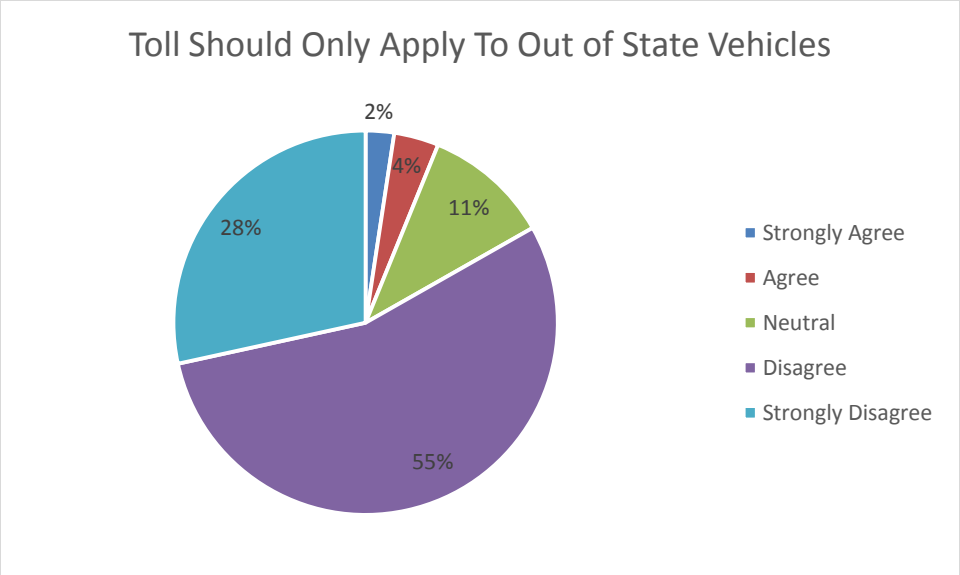

Gas Tax Should Be Indexed to the Price of Gas
10%
19%
24%
29%
18%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

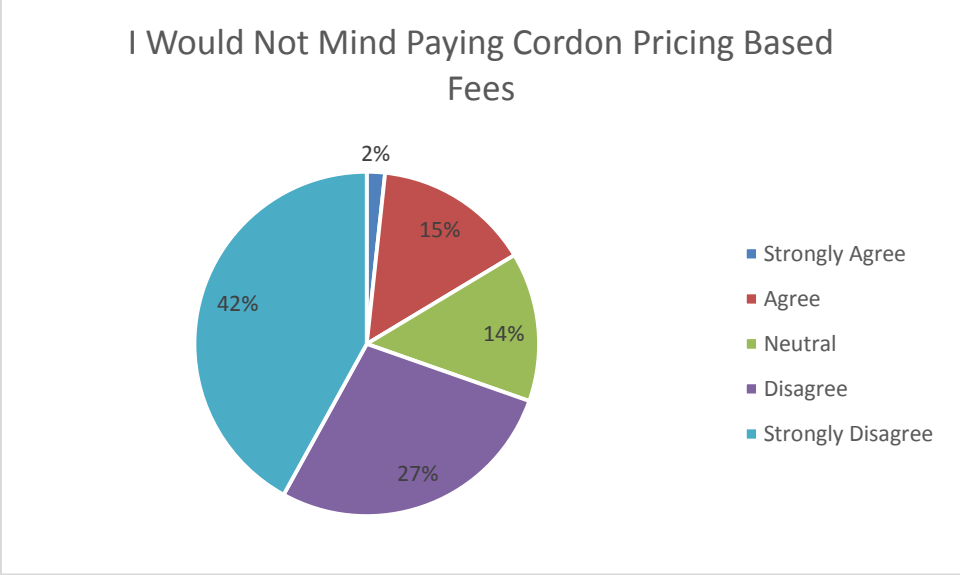

Fuel Efficient/Electric Vehicles Should Pay Less to Fund the Highway System
8%
8%
8%
37%
39%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

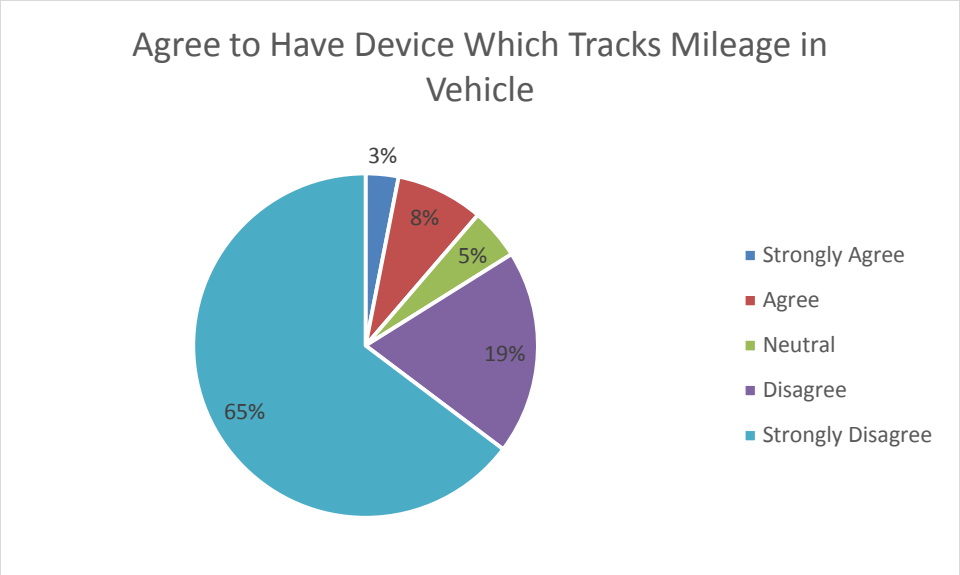

Vehicles Which Damage the Highway System More Should Pay More
33%
47%
8%
8%
4%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

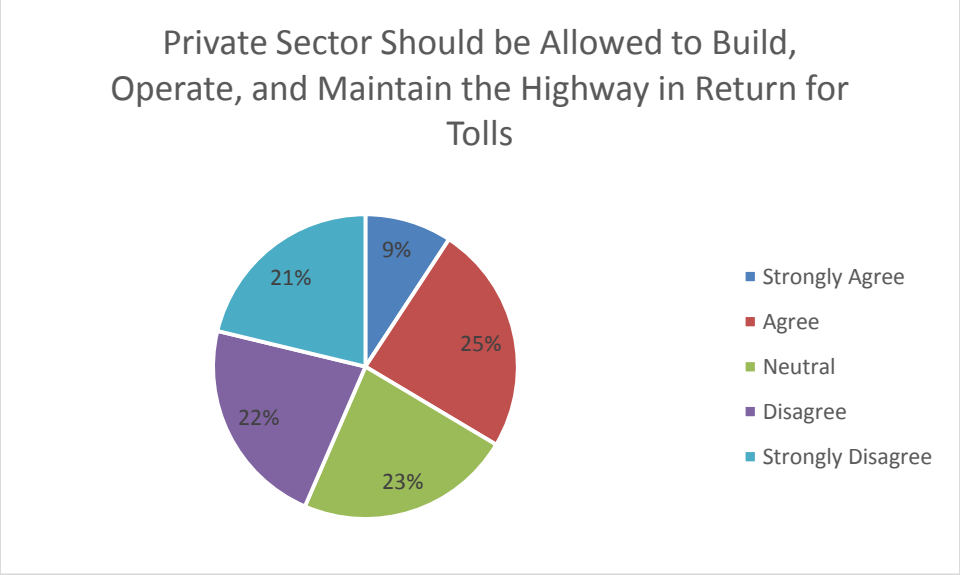

Those Without Vehicles Should Not Have to Pay Taxes to Fund Highway
9%
15%
10%
46%
20%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

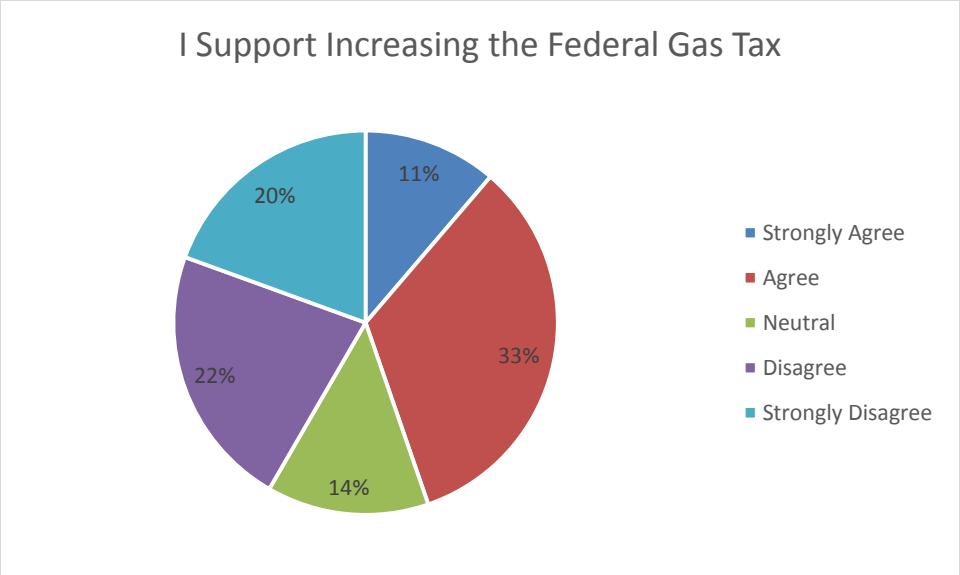

Toll Money Collected Should Only Be Used For That Specific Toll Road
19%
37%
13%
25%
6%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

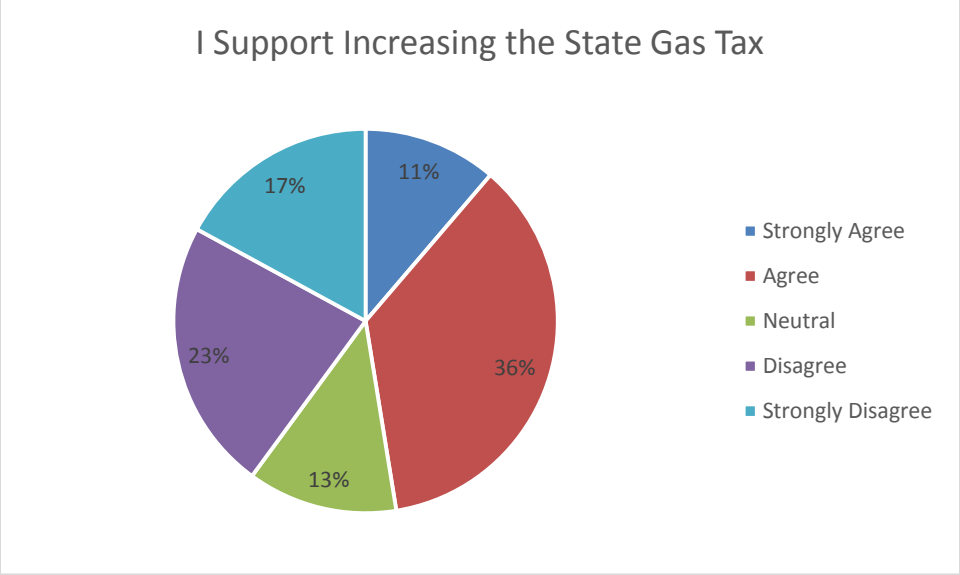

Toll Should Only Apply To Out of State Vehicles
2%
4%
11%
28%
55%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

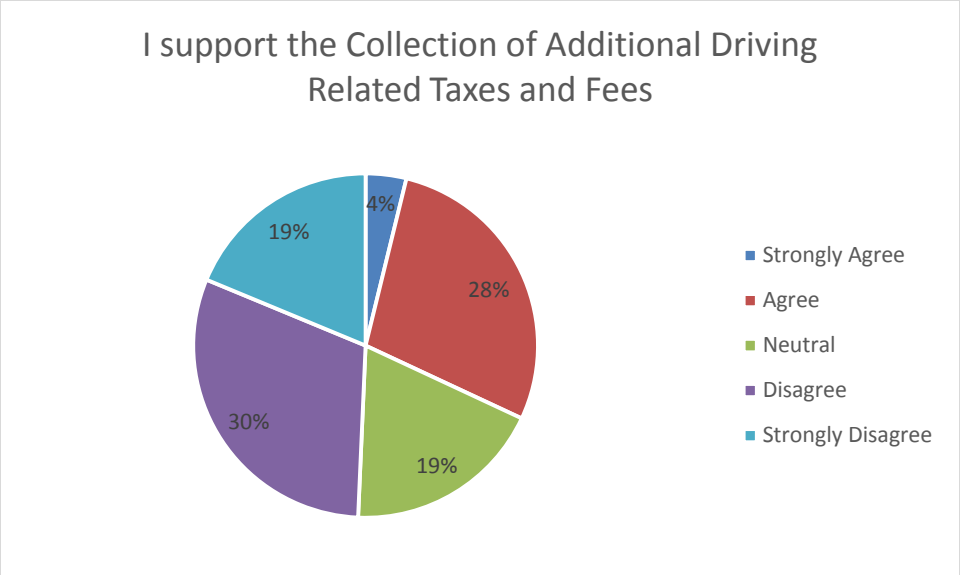

I Would Not Mind Paying Cordon Pricing Based Fees
2%
15%
42%
14%
27%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

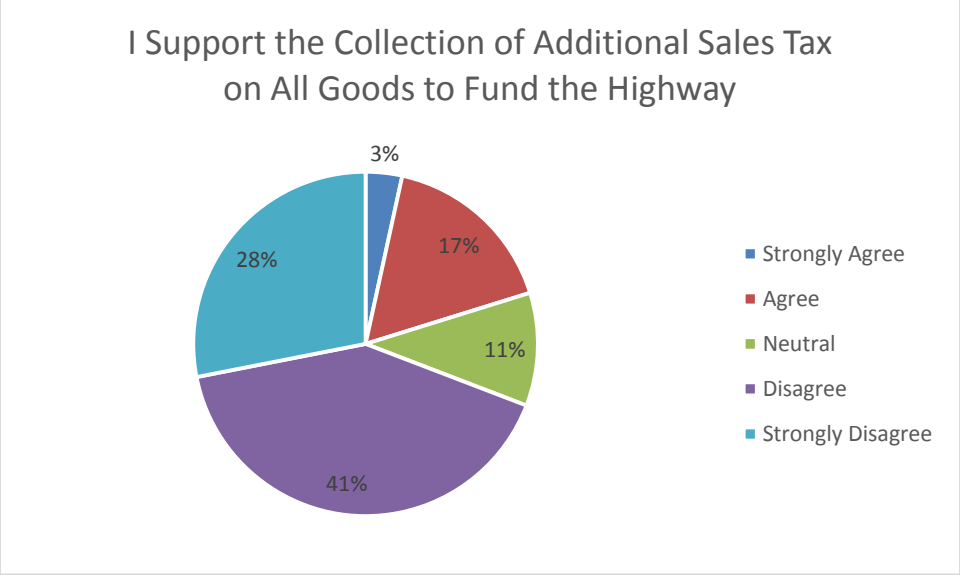

Agree to Have Device Which Tracks Mileage in Vehicle
3%
8%
5%
19%
65%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

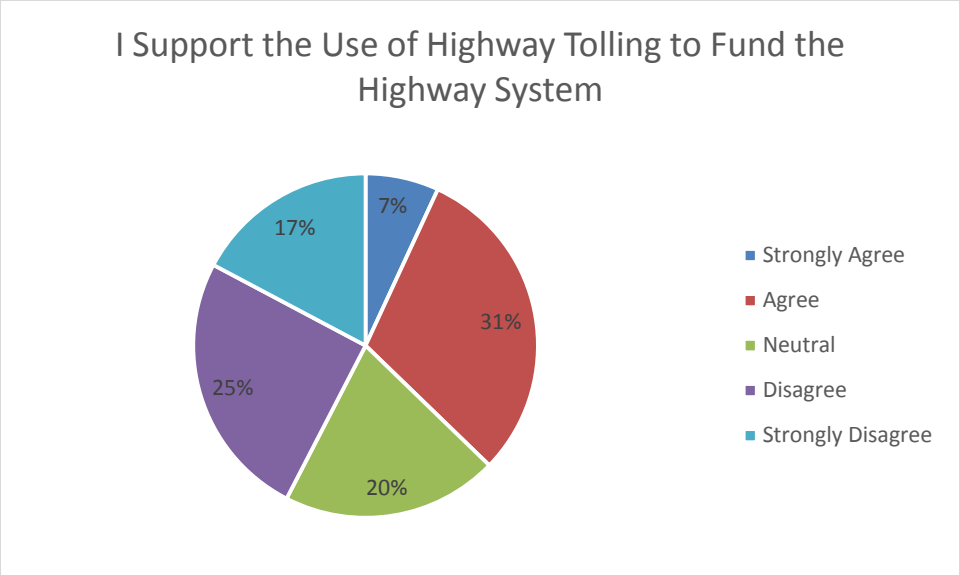

Private Sector Should be Allowed to Build, Operate, and Maintain the Highway in Return for Tolls
9%
25%
23%
22%
21%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

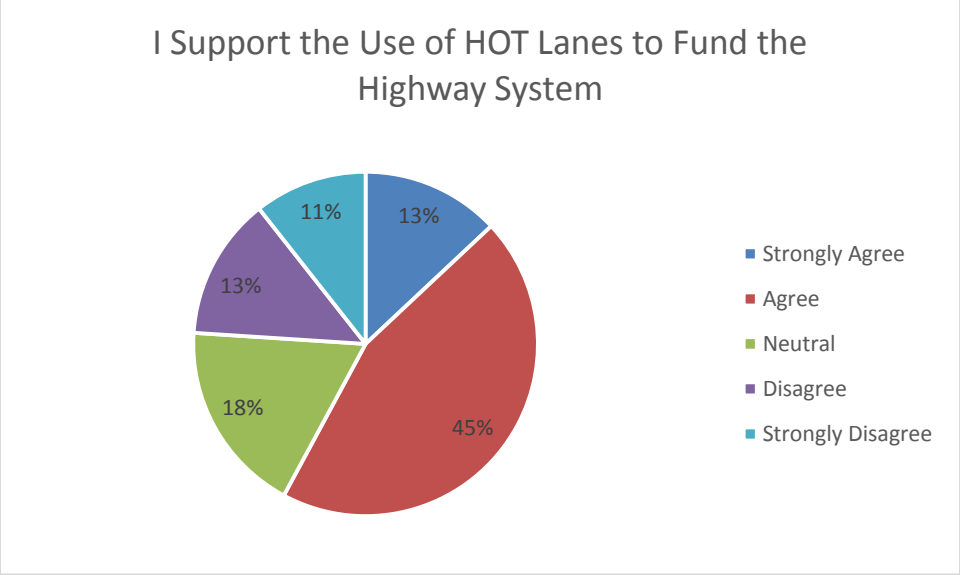

I Support Increasing the Federal Gas Tax
11%
33%
14%
22%
20%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

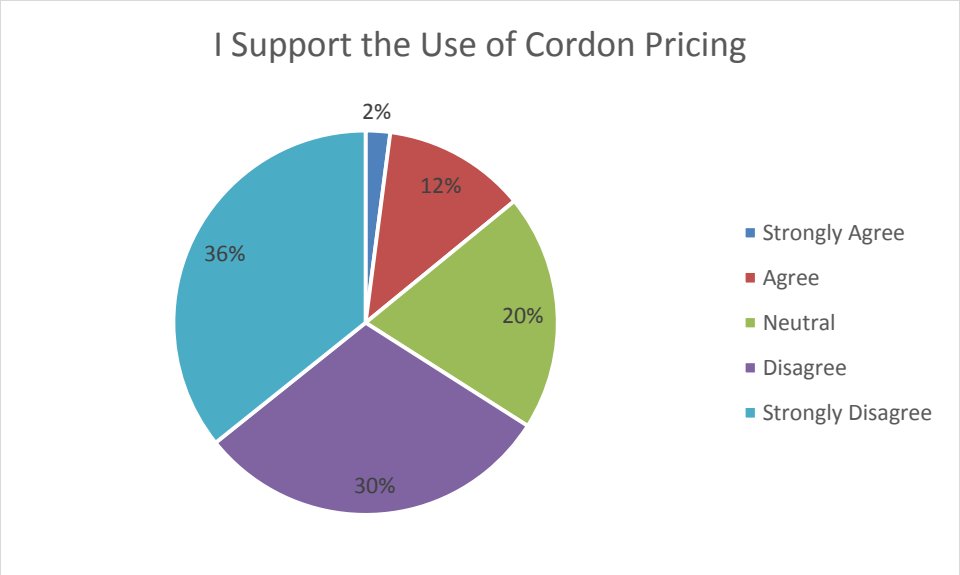

I Support Increasing the State Gas Tax
11%
36%
13%
23%
17%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

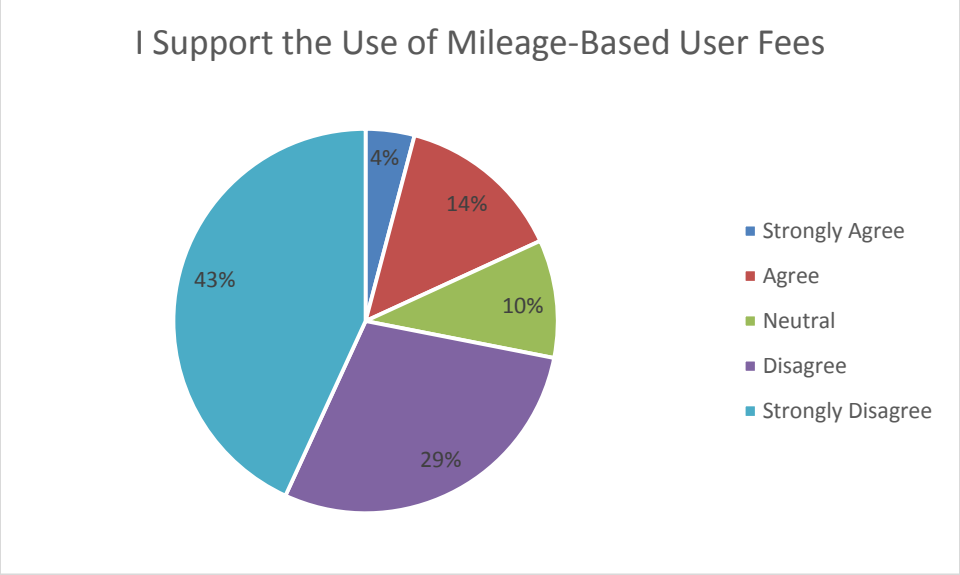

I support the Collection of Additional Driving Related Taxes and Fees
4%
28%
19%
30%
19%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Collection of Additional Sales Tax on All Goods to Fund the Highway
3%
17%
11%
41%
28%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of Highway Tolling to Fund the Highway System
7%
31%
20%
25%
17%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of HOT Lanes to Fund the Highway System
13%
45%
18%
13%
11%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

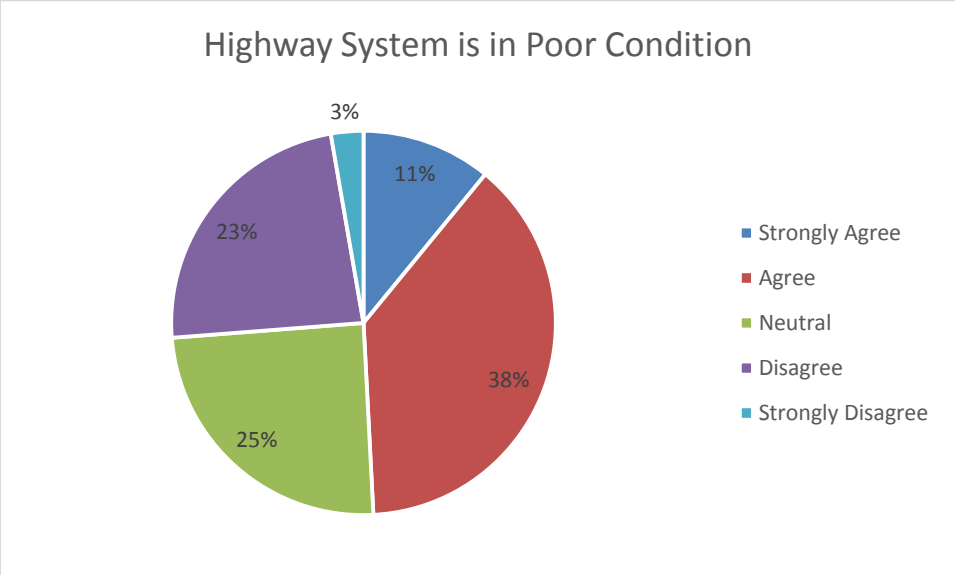

I Support the Use of Cordon Pricing
2%
12%
20%
30%
36%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

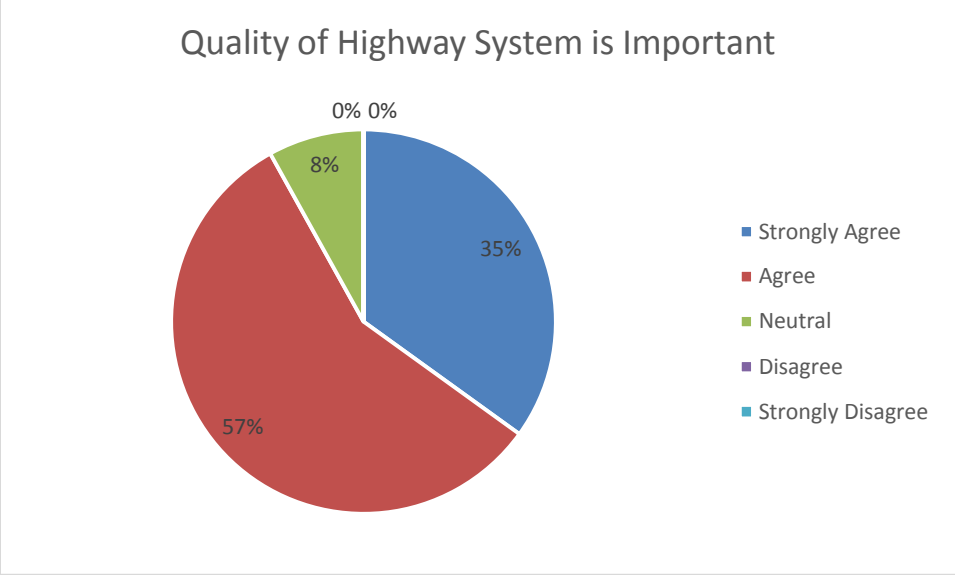

I Support the Use of Mileage-Based User Fees
4%
14%
10%
29%
43%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

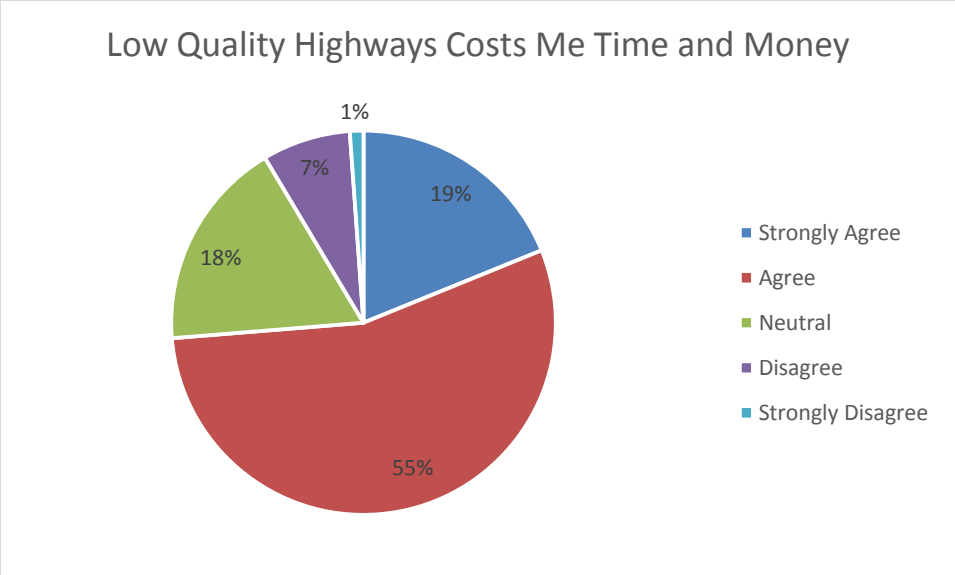
Appendix E: The State of North Dakota

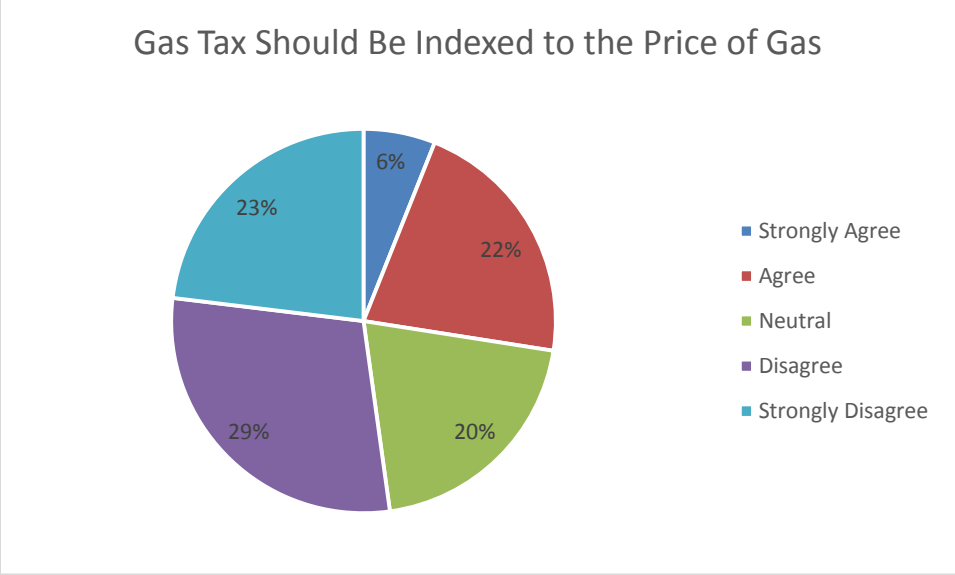
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	49.00	+/- 7.00	Between 52 and 64
The Quality of the Highway System is important to me	92.00	+/- 4.00	Between 85 and 93
A low quality highway system costs me time and money.	74.00	+/- 7.00	Between 67 and 81
Gas tax should be **indexed** to the price of gas and change (increase or decrease) as gas prices change (increase or decrease).	28.00	+/- 6.00	Between 22 and 34
Those driving fuel efficient or electric vehicles should pay less to fund the highway system.	10.00	+/- 4.00	Between 6 and 14
Vehicles that cause more wear and tear on the highways should pay more to fund the highway system.	80.00	+/- 6.00	Between 74 and 86
People who do not own vehicles should not pay taxes to fund the highway system.	19.00	+/- 6.00	Between 13 and 25
Toll money collected should only be used for that specific toll road; **not** for other roads in the state.	59.00	+/- 7.00	Between 52 and 66
States should only charge a toll for out of state vehicles passing through; **not** for in-state vehicles.	10.00	+/- 4.00	Between 6 and 14
I would **not** mind having to pay a fee to enter a city center by my vehicle during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days) (as discussed in the blue Information Sheet under "Cordon Pricing").	11.00	+/- 4.00	Between 7 and 15

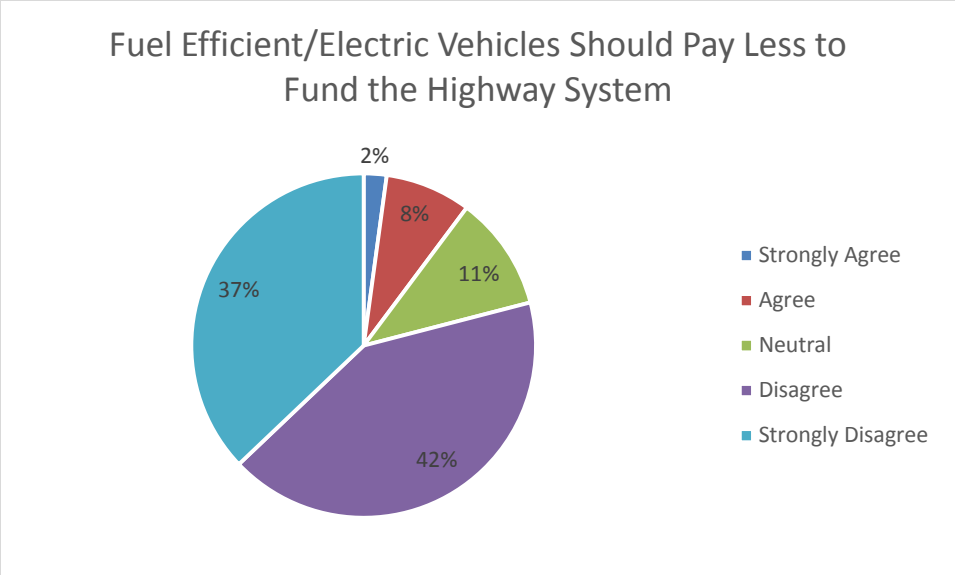
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe (as discussed in the blue Information Sheet under "Mileage-Based User Fees").	11.00	+/- 5.00	Between 6 and 16
The private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return.	26.00	+/- 6.00	Between 20 and 32
I support **increasing the federal gas tax** that is collected at the time of purchase to fund the highway system.	50.00	+/- 7.00	Between 43 and 57
I support **increasing the state gas tax** that is collected at the time of purchase to fund the highway system.	54.00	+/- 7.00	Between 47 and 61
I support the **collection of additional taxes and fees on other driving-related items** to fund the highway system.	35.00	+/- 7.00	Between 28 and 42
I support the **collection of additional sales tax on all goods** to fund the highway system.	18.00	+/- 6.00	Between 12 and 24
I support the **use of highway tolling** to fund the highway system.	29.00	+/- 6.00	Between 23 and 35
I support the **use of High Occupancy Toll (HOT) Lanes** to fund the highway system.	33.00	+/- 7.00	Between 26 and 40
I support the **use of Cordon Pricing** to fund the highway system.	10.00	+/- 4.00	Between 6 and 14
I support the **use of Mileage-Based User Fees** to fund the highway system.	18.00	+/- 5.00	Between 13 and 23

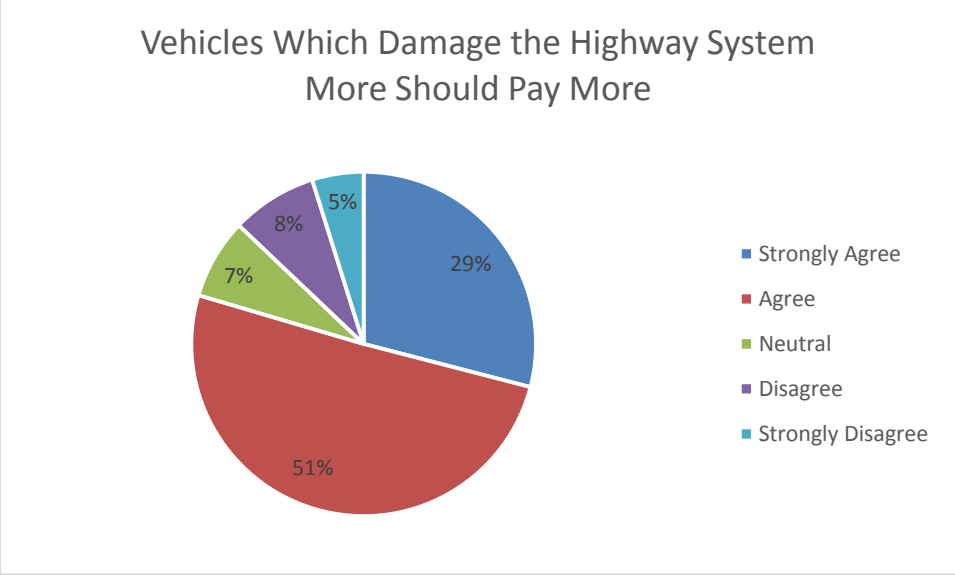

Highway System is in Poor Condition
3%
11%
23%
38%
25%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

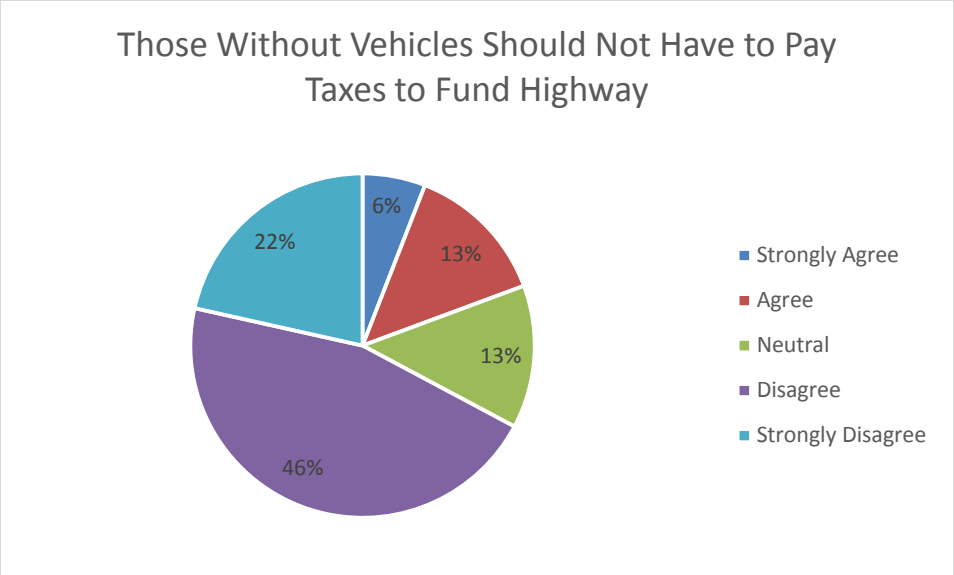

Quality of Highway System is Important
0% 0%
8%
35%
57%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

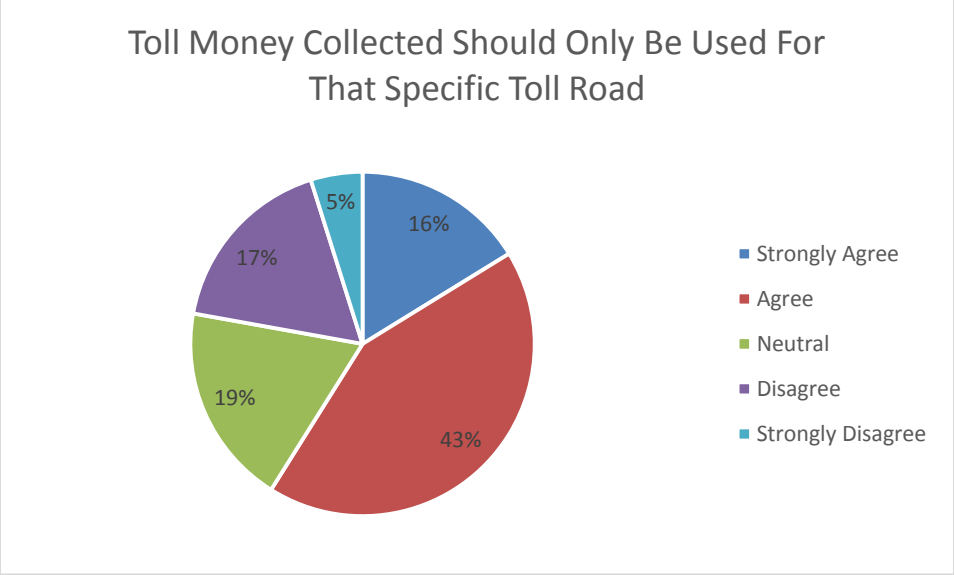

Low Quality Highways Costs Me Time and Money
1%
7%
19%
18%
55%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

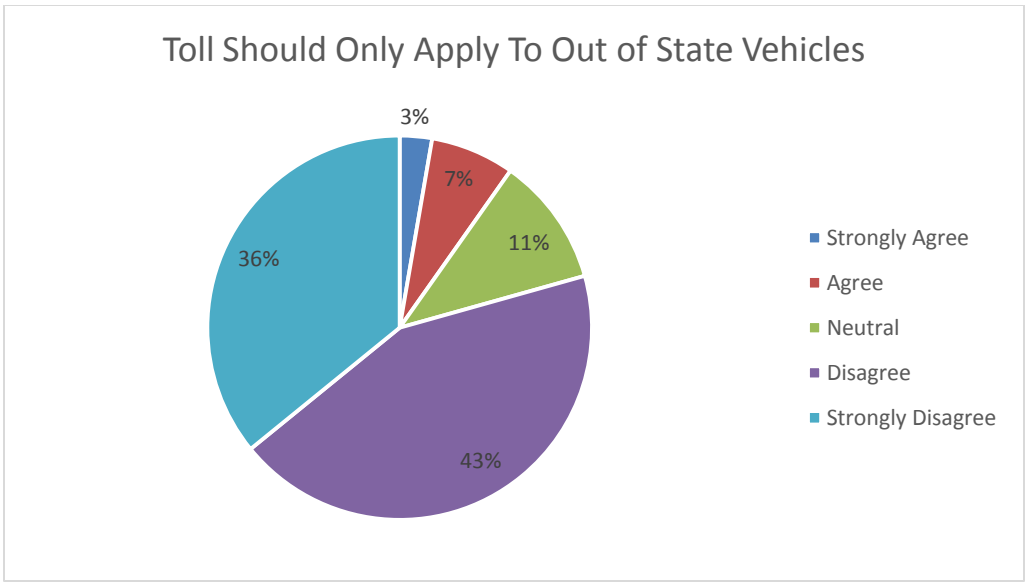

Gas Tax Should Be Indexed to the Price of Gas
6%
22%
23%
29%
20%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

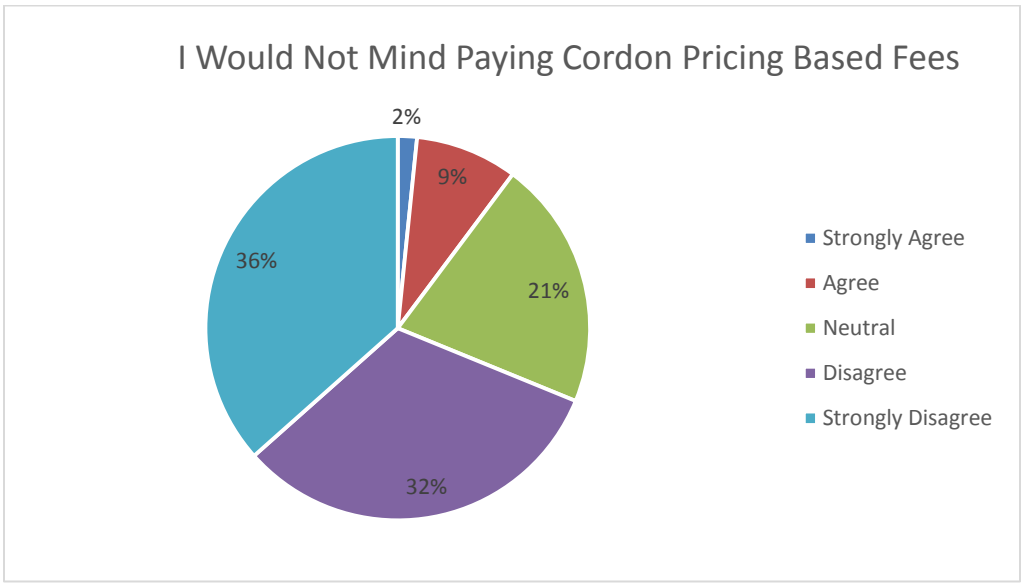

Fuel Efficient/Electric Vehicles Should Pay Less to Fund the Highway System
2%
8%
11%
37%
42%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

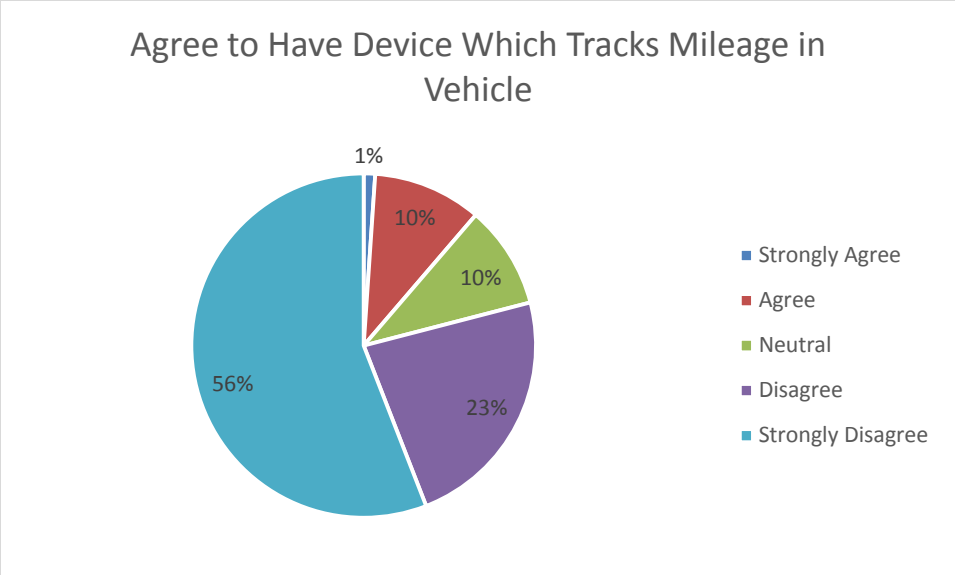

Vehicles Which Damage the Highway System More Should Pay More
5%
8%
29%
7%
51%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

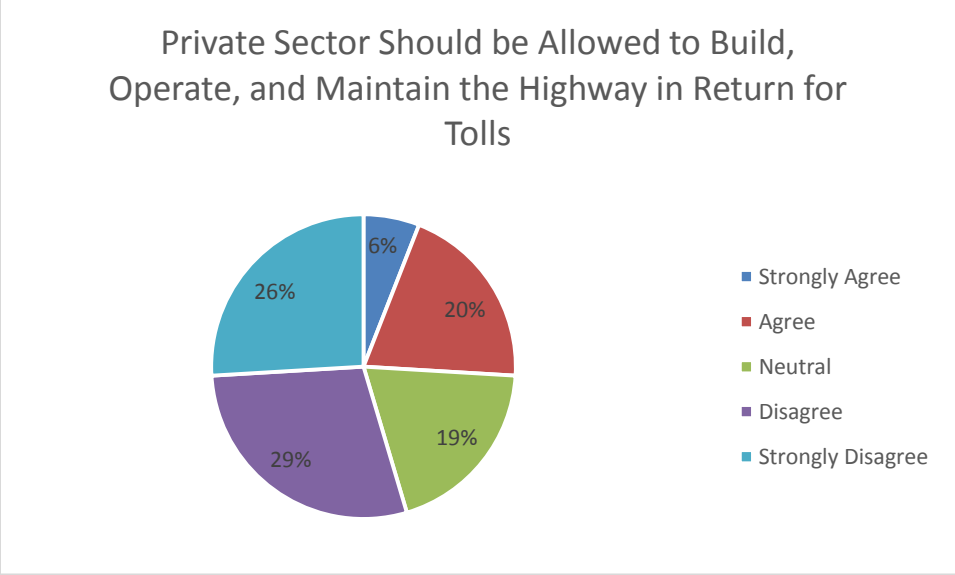

Those Without Vehicles Should Not Have to Pay Taxes to Fund Highway
6%
13%
13%
46%
22%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

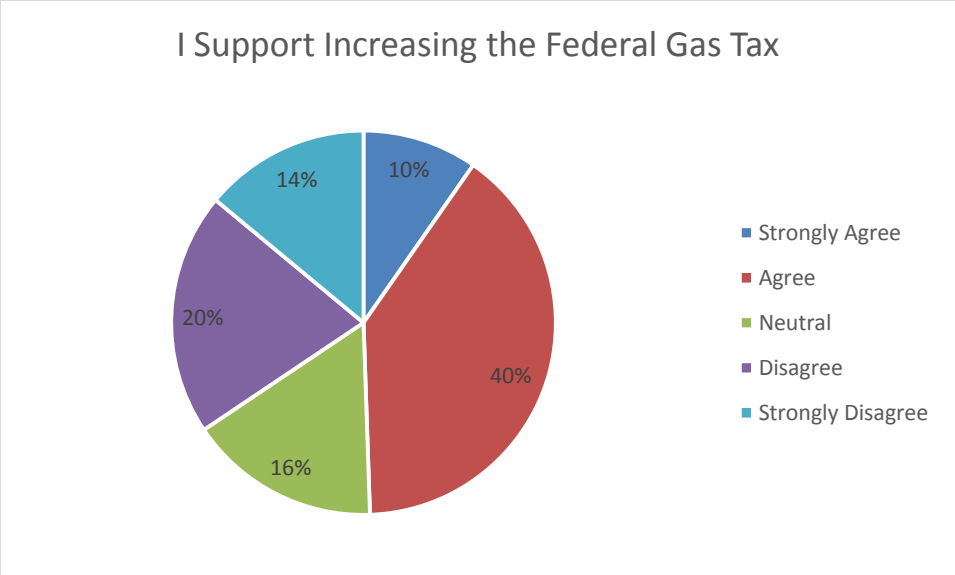

Toll Money Collected Should Only Be Used For That Specific Toll Road
16%
43%
19%
17%
5%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

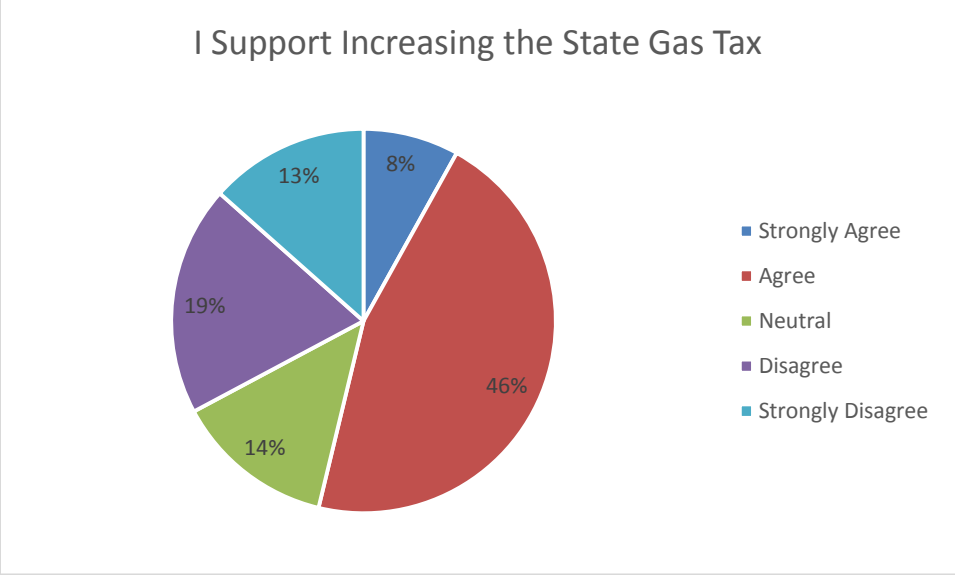

Toll Should Only Apply To Out of State Vehicles
3%
7%
11%
36%
43%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

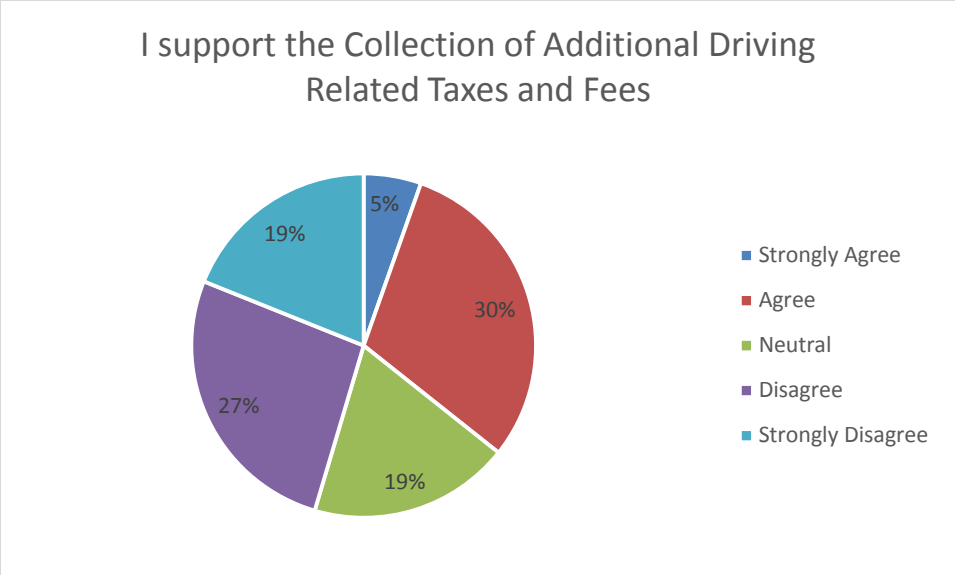

I Would Not Mind Paying Cordon Pricing Based Fees
2%
9%
21%
36%
32%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

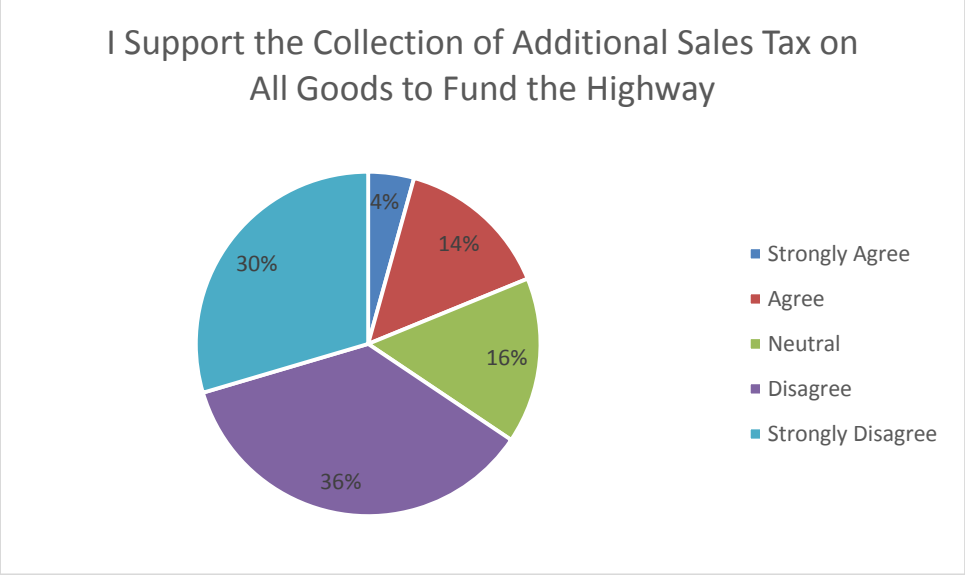

Agree to Have Device Which Tracks Mileage in Vehicle
1%
10%
10%
23%
56%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

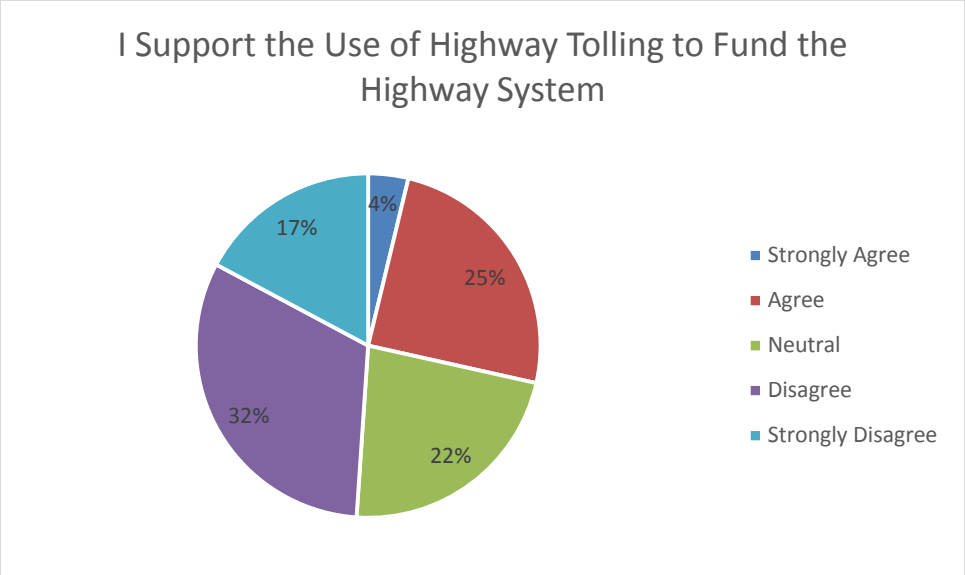

Private Sector Should be Allowed to Build, Operate, and Maintain the Highway in Return for Tolls
6%
20%
19%
29%
26%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

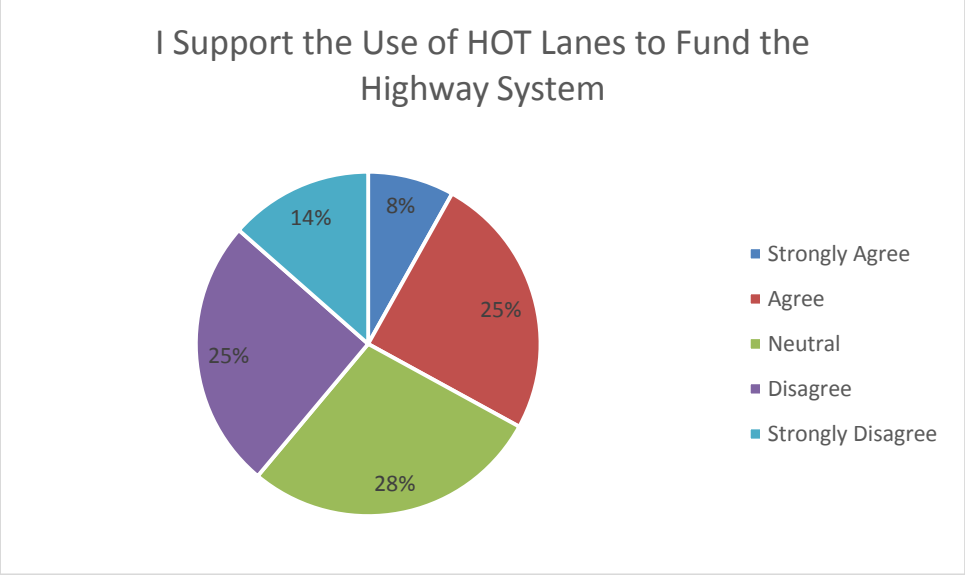

I Support Increasing the Federal Gas Tax
10%
40%
16%
20%
14%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

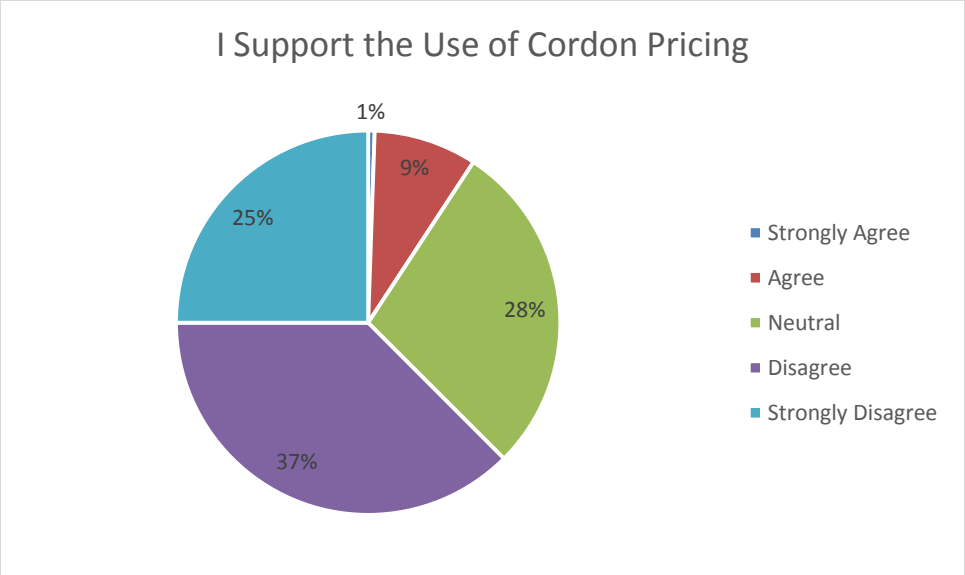

I Support Increasing the State Gas Tax
8%
46%
14%
19%
13%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

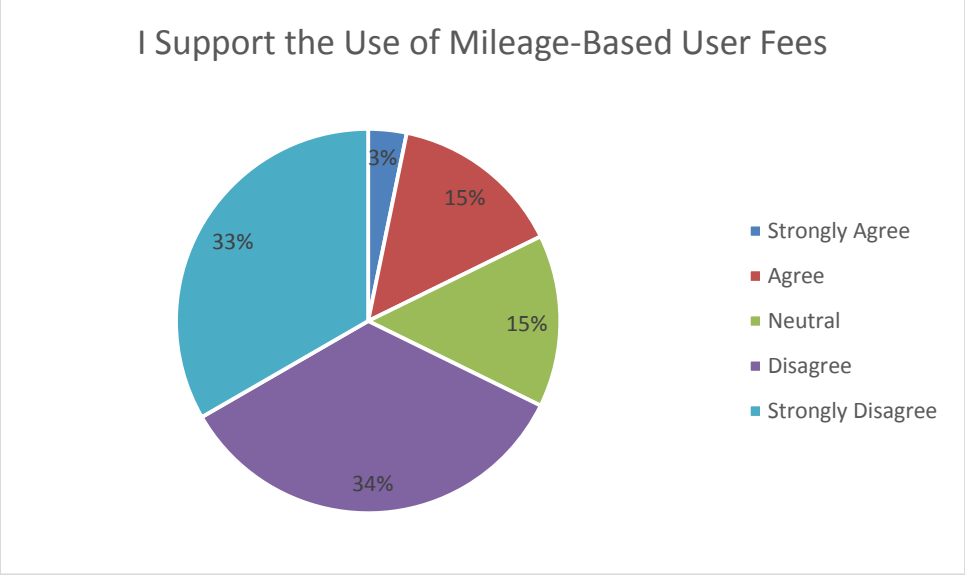

I support the Collection of Additional Driving Related Taxes and Fees
5%
30%
19%
27%
19%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Collection of Additional Sales Tax on All Goods to Fund the Highway
4%
14%
16%
36%
30%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of Highway Tolling to Fund the Highway System
4%
25%
22%
32%
17%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of HOT Lanes to Fund the Highway System
8%
25%
28%
25%
14%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

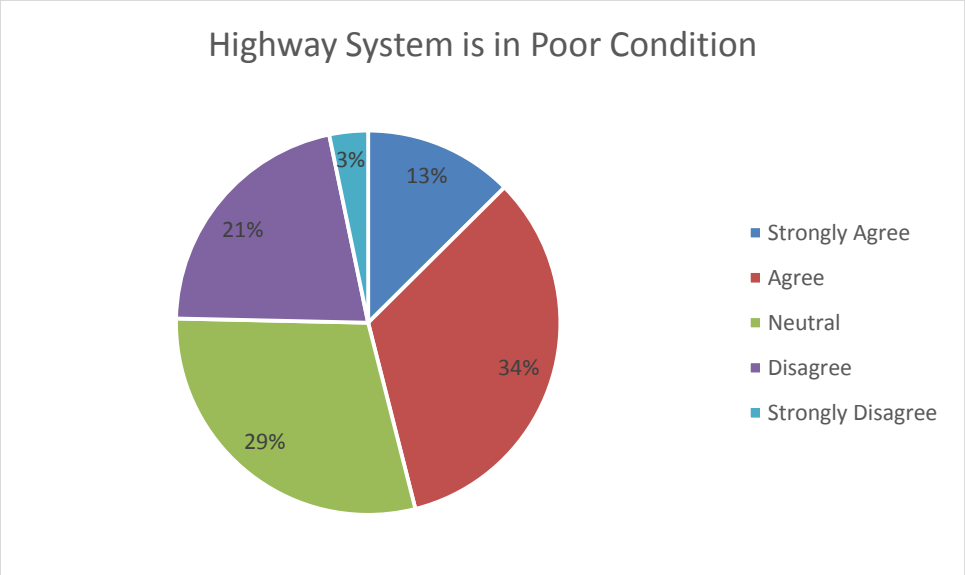

I Support the Use of Cordon Pricing
1%
9%
28%
37%
25%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

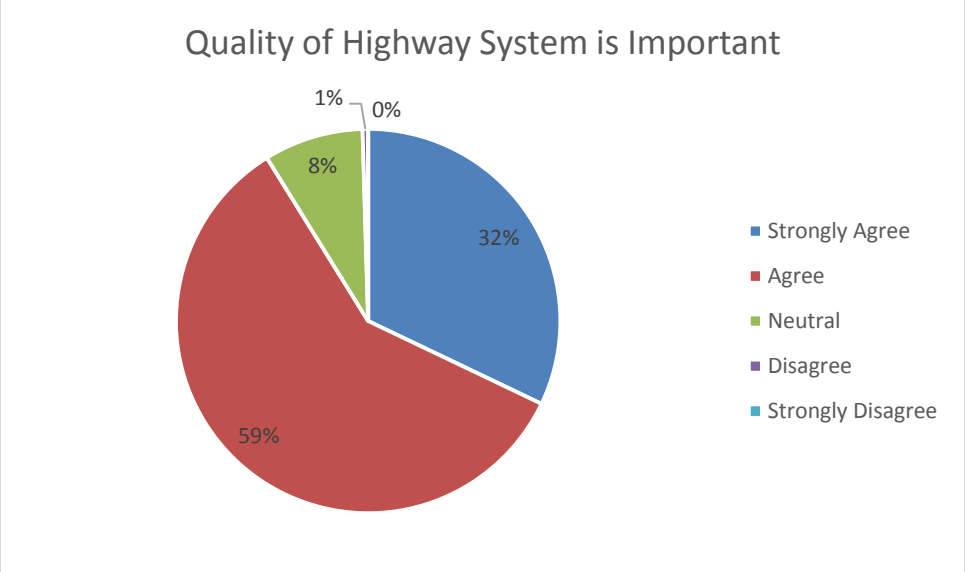

I Support the Use of Mileage-Based User Fees
3%
15%
15%
34%
33%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

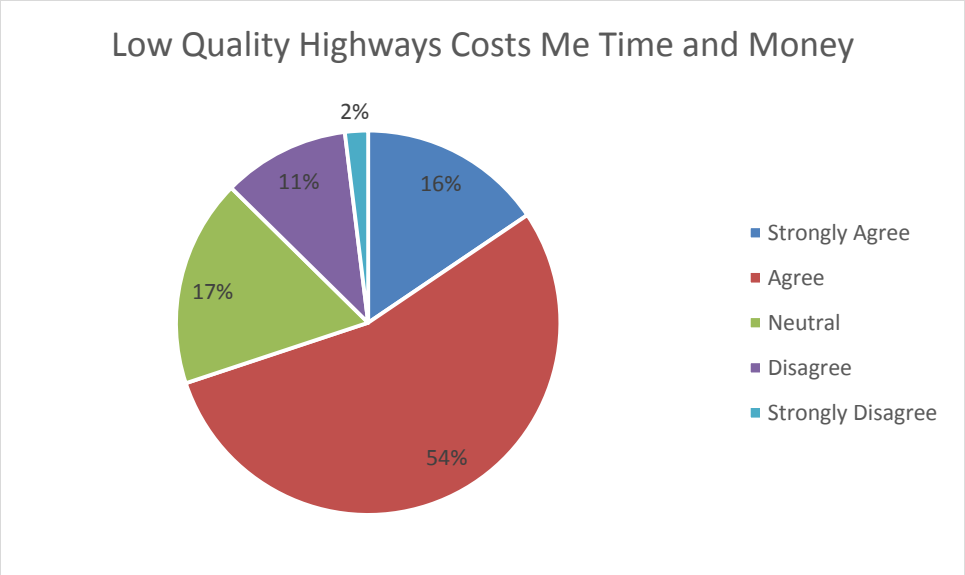
Appendix F: The State of South Dakota

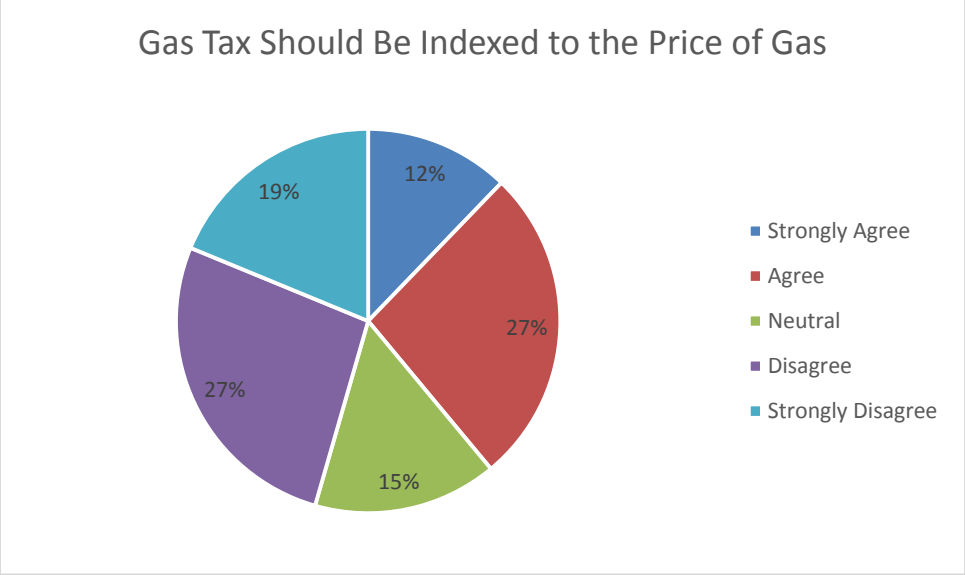
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	46.00	+/- 7.00	Between 39 and 53
The Quality of the Highway System is important to me	91.00	+/- 4.00	Between 87 and 95
A low quality highway system costs me time and money.	70.00	+/- 6.00	Between 64 and 76
Gas tax should be **indexed** to the price of gas and change (increase or decrease) as gas prices change (increase or decrease).	39.00	+/- 7.00	Between 32 and 46
Those driving fuel efficient or electric vehicles should pay less to fund the highway system.	13.00	+/- 5.00	Between 8 and 18
Vehicles that cause more wear and tear on the highways should pay more to fund the highway system.	84.00	+/- 5.00	Between 79 and 89
People who do not own vehicles should not pay taxes to fund the highway system.	20.00	+/- 5.00	Between 15 and 25
Toll money collected should only be used for that specific toll road; **not** for other roads in the state.	47.00	+/- 7.00	Between 40 and 54
States should only charge a toll for out of state vehicles passing through; **not** for in-state vehicles.	8.00	+/- 4.00	Between 4 and 12
I would **not** mind having to pay a fee to enter a city center by my vehicle during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days) (as discussed in the blue Information Sheet under "Cordon Pricing").	20.00	+/- 5.00	Between 15 and 25

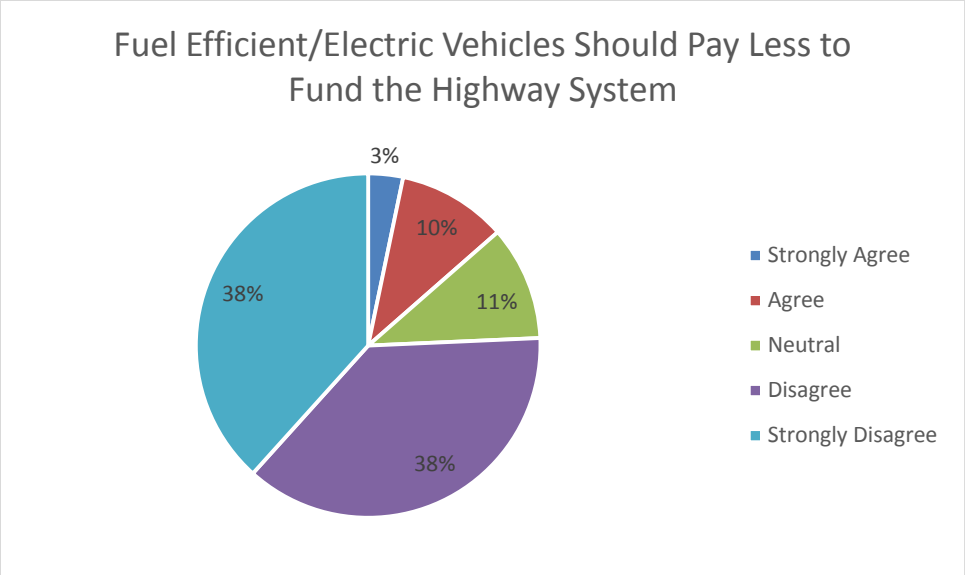
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe (as discussed in the blue Information Sheet under "Mileage-Based User Fees").	14.00	+/- 5.00	Between 9 and 19
The private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return.	22.00	+/- 6.00	Between 16 and 28
I support **increasing the federal gas tax** that is collected at the time of purchase to fund the highway system.	45.00	+/- 7.00	Between 38 and 52
I support **increasing the state gas tax** that is collected at the time of purchase to fund the highway system.	53.00	+/- 7.00	Between 46 and 60
I support the **collection of additional taxes and fees on other driving-related items** to fund the highway system.	42.00	+/- 7.00	Between 35 and 49
I support the **collection of additional sales tax on all goods** to fund the highway system.	24.00	+/- 6.00	Between 18 and 30
I support the **use of highway tolling** to fund the highway system.	40.00	+/- 7.00	Between 33 and 47
I support the **use of High Occupancy Toll (HOT) Lanes** to fund the highway system.	45.00	+/- 7.00	Between 38 and 52
I support the **use of Cordon Pricing** to fund the highway system.	20.00	+/- 5.00	Between 15 and 25
I support the **use of Mileage-Based User Fees** to fund the highway system.	23.00	+/- 6.00	Between 17 and 29

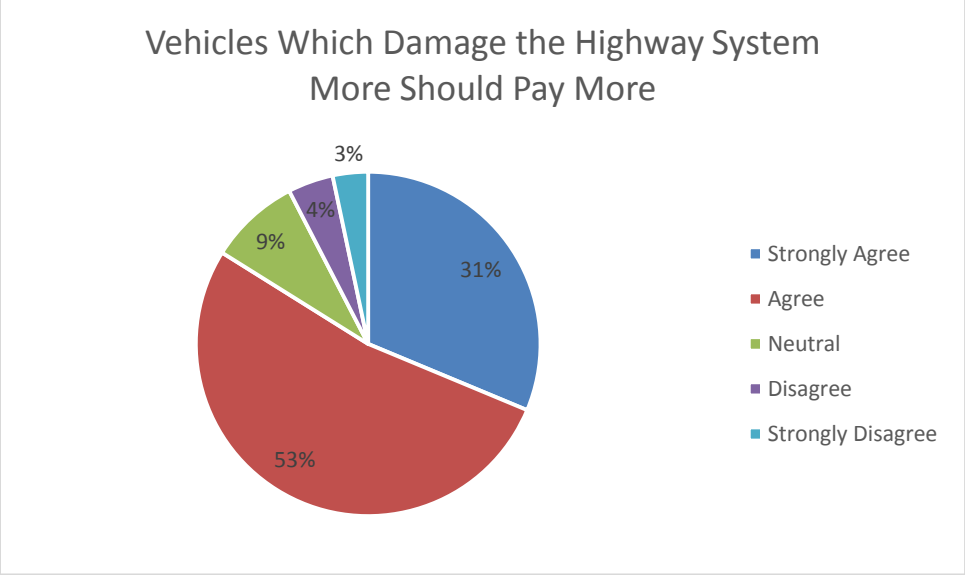

Highway System is in Poor Condition
13%
34%
29%
21%
3%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

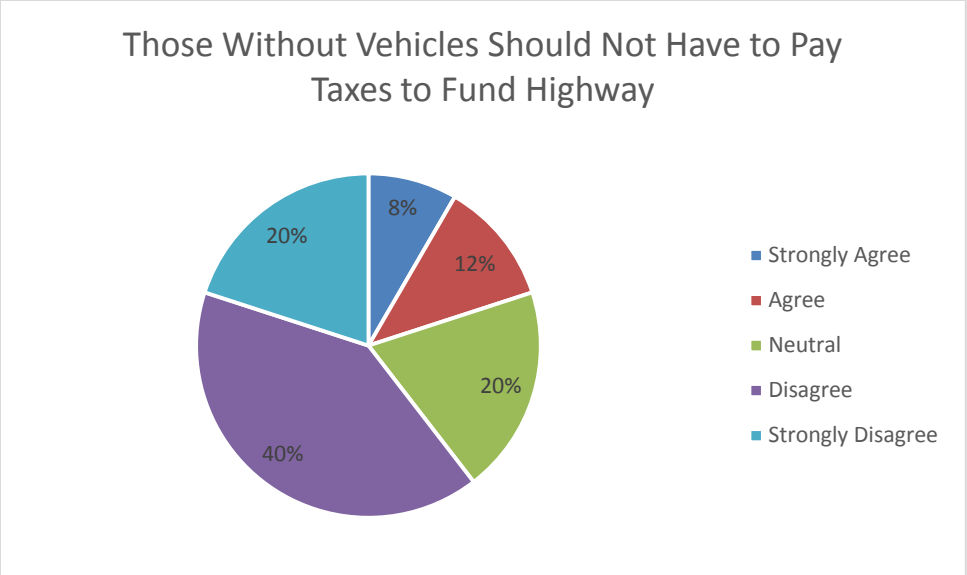

Quality of Highway System is Important
32%
59%
8%
1%
0%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

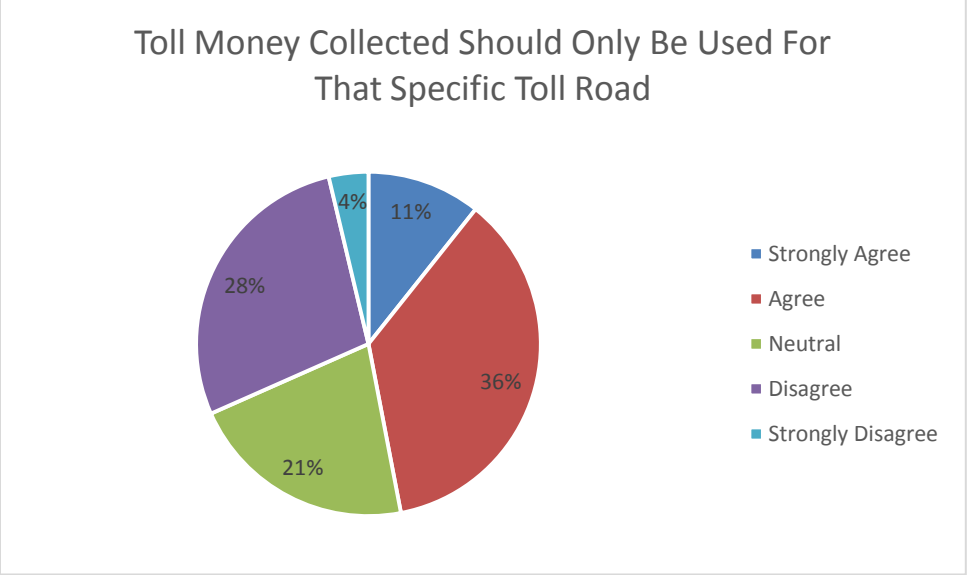

Low Quality Highways Costs Me Time and Money
2%
11%
16%
17%
54%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

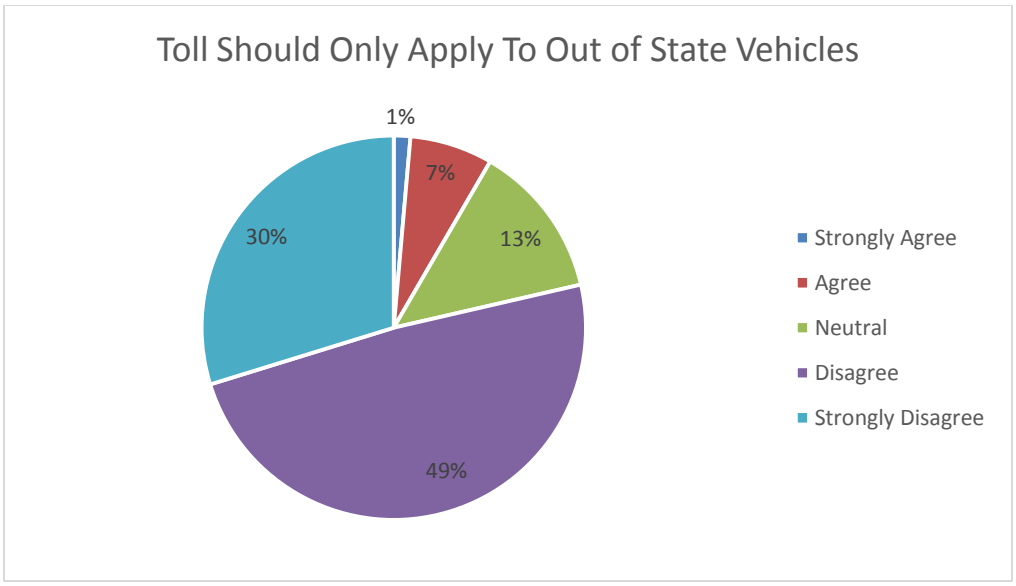

Gas Tax Should Be Indexed to the Price of Gas
19%
12%
27%
27%
15%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

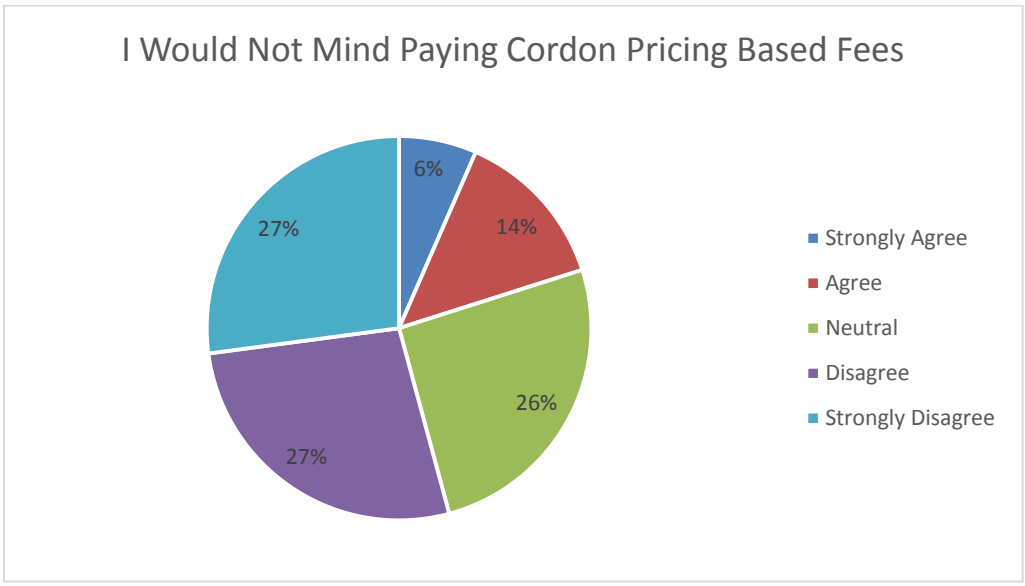

Fuel Efficient/Electric Vehicles Should Pay Less to Fund the Highway System
3%
10%
11%
38%
38%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

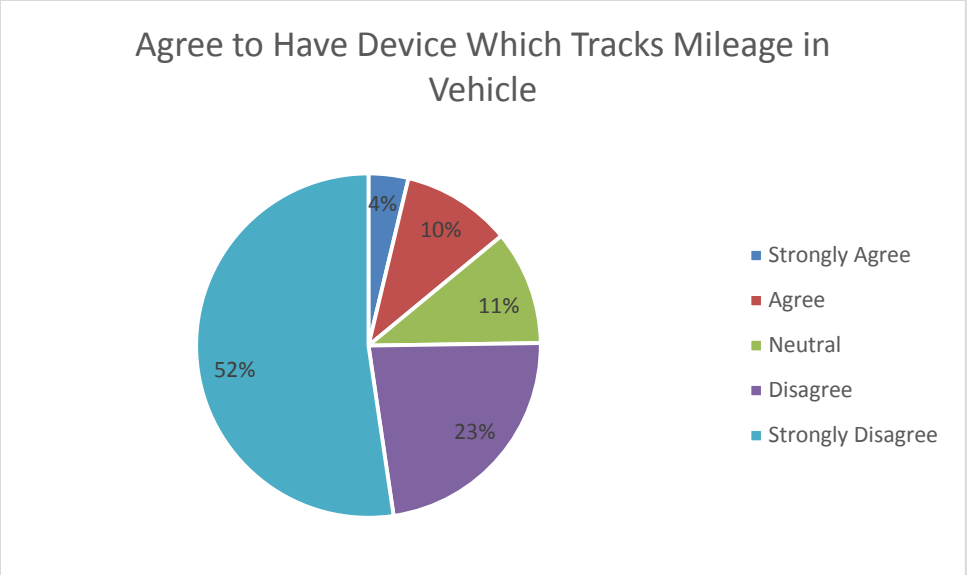

Vehicles Which Damage the Highway System More Should Pay More
3%
4%
9%
31%
53%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

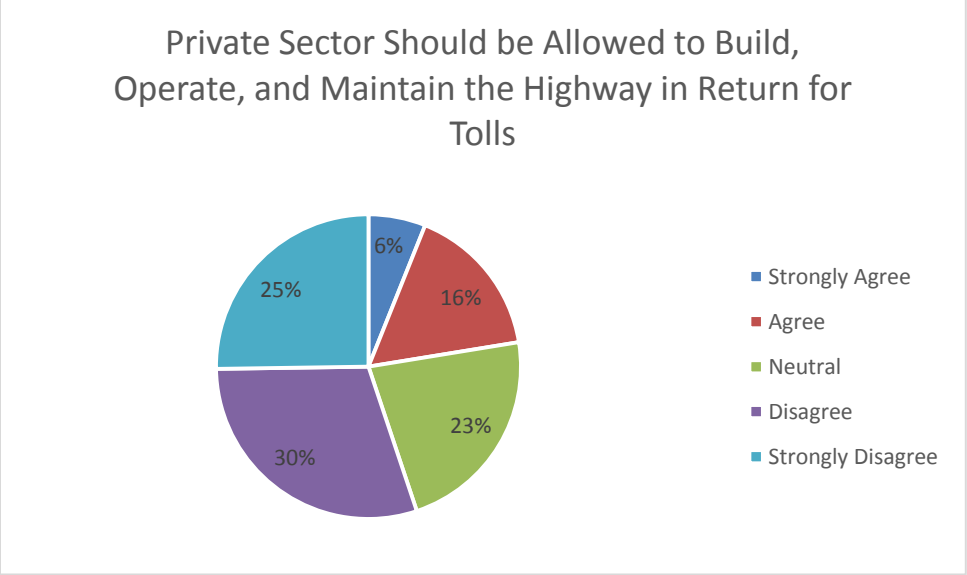

Those Without Vehicles Should Not Have to Pay Taxes to Fund Highway
8%
12%
20%
40%
20%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

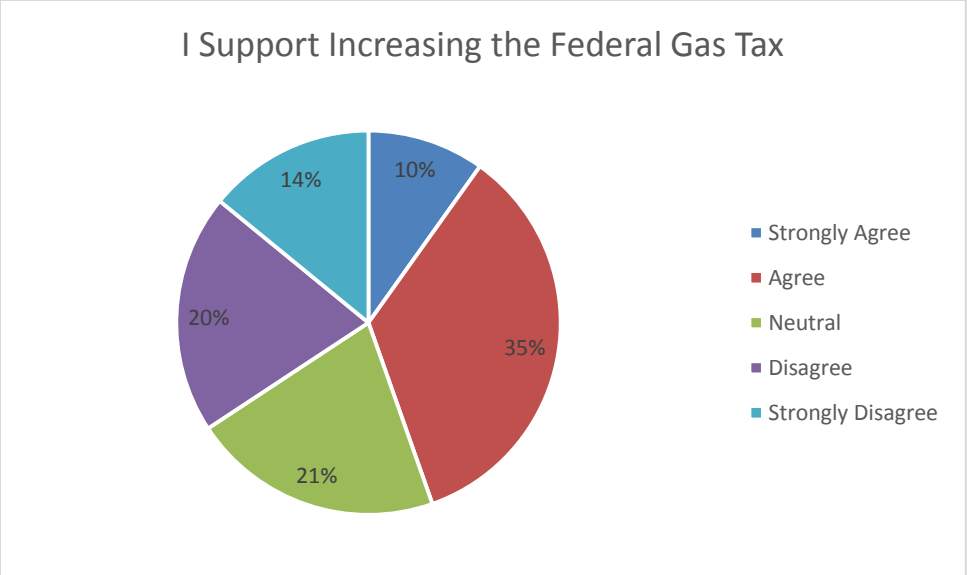

Toll Money Collected Should Only Be Used For That Specific Toll Road
11%
36%
21%
28%
4%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

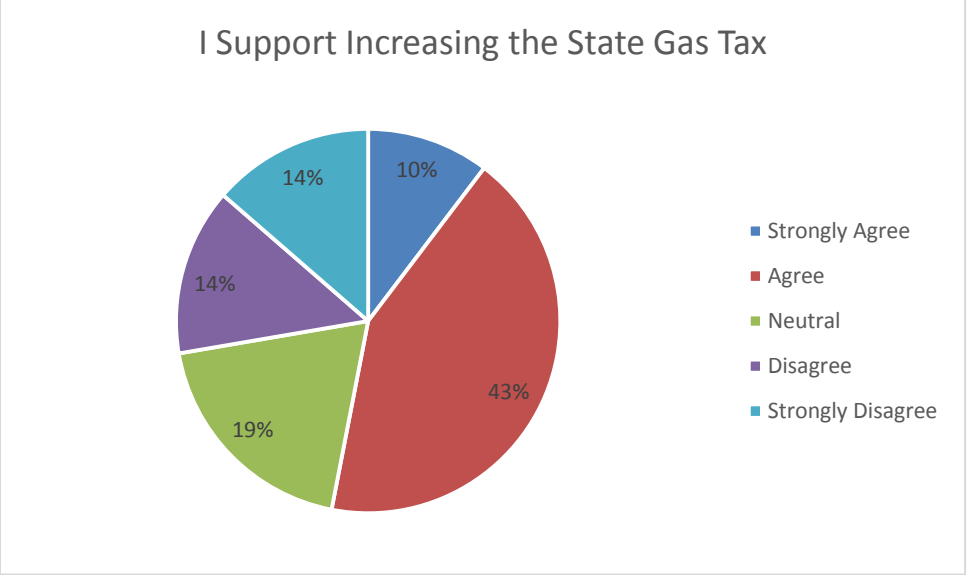

Toll Should Only Apply To Out of State Vehicles
1%
7%
13%
30%
49%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

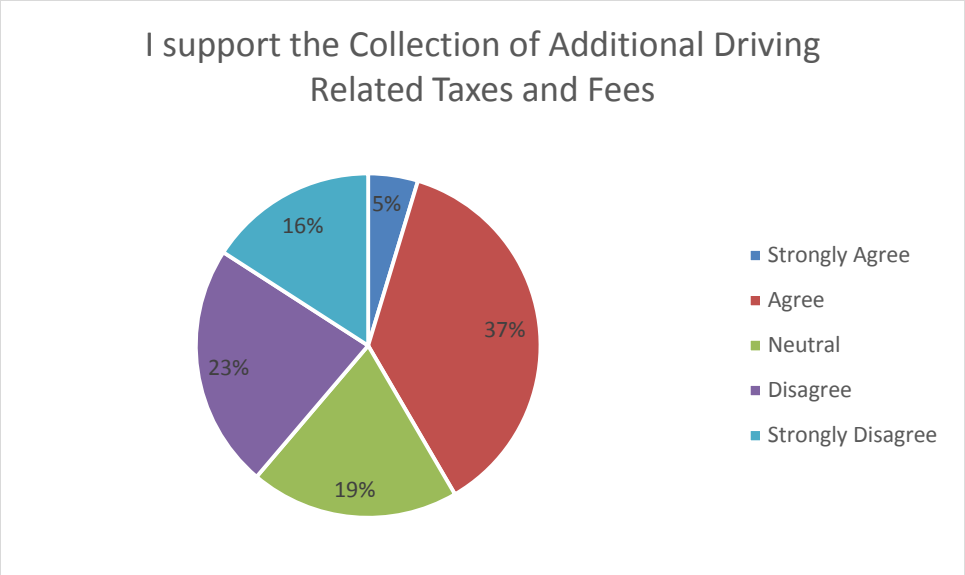

I Would Not Mind Paying Cordon Pricing Based Fees
6%
14%
27%
26%
27%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

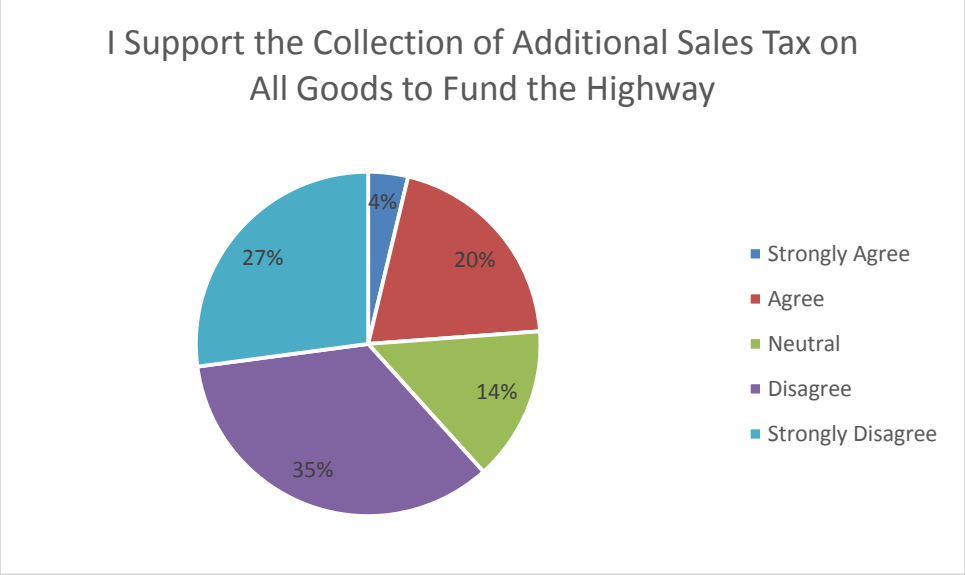

Agree to Have Device Which Tracks Mileage in Vehicle
4%
10%
11%
23%
52%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

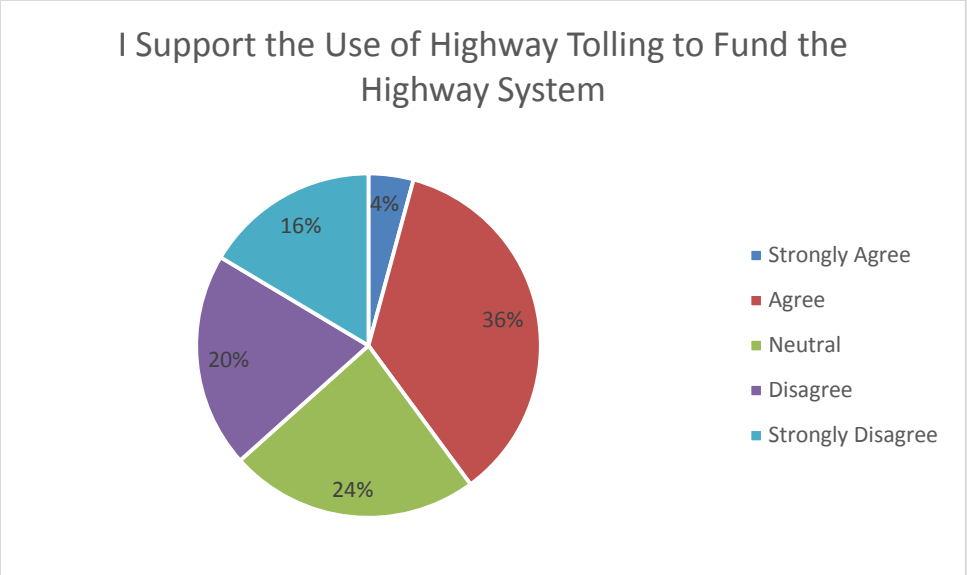

Private Sector Should be Allowed to Build, Operate, and Maintain the Highway in Return for Tolls
6%
16%
23%
30%
25%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

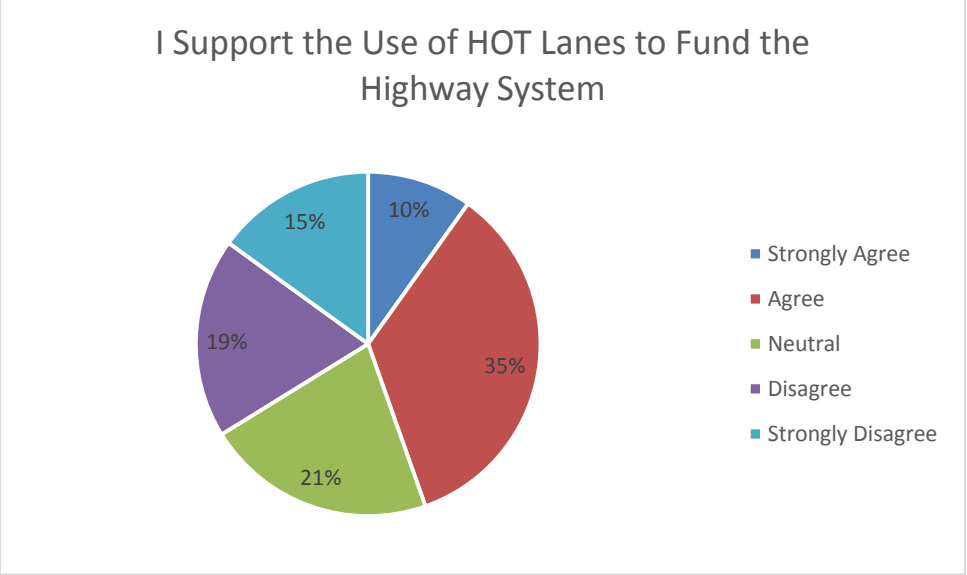

I Support Increasing the Federal Gas Tax
10%
35%
21%
20%
14%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

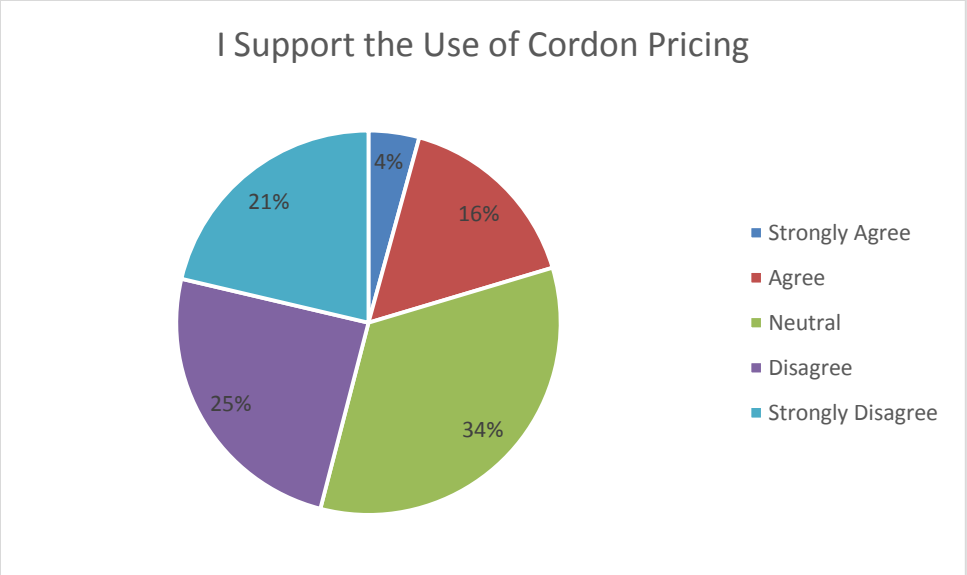

I Support Increasing the State Gas Tax
10%
43%
19%
14%
14%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

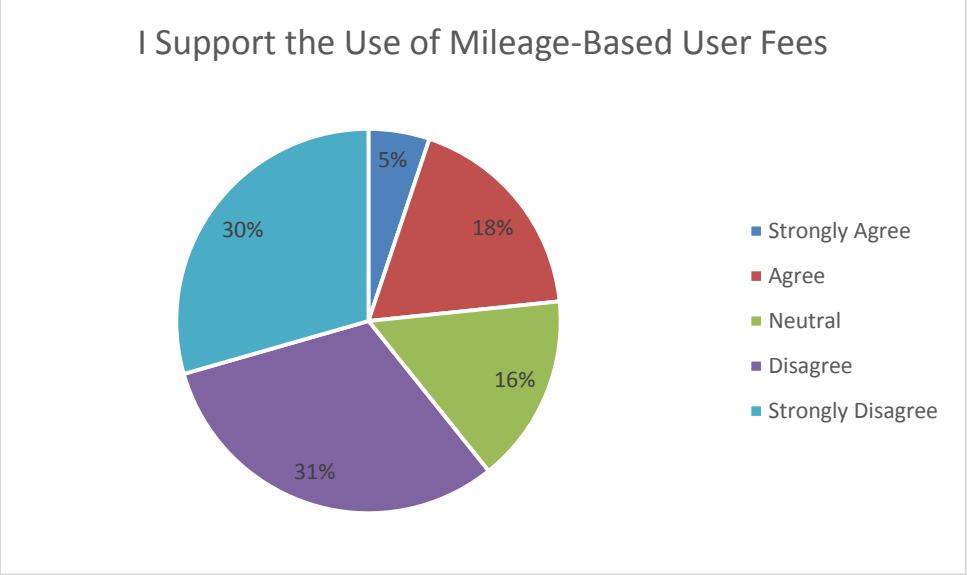

I support the Collection of Additional Driving Related Taxes and Fees
5%
37%
19%
23%
16%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Collection of Additional Sales Tax on All Goods to Fund the Highway
4%
20%
14%
35%
27%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of Highway Tolling to Fund the Highway System
4%
36%
24%
20%
16%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of HOT Lanes to Fund the Highway System
10%
35%
21%
19%
15%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

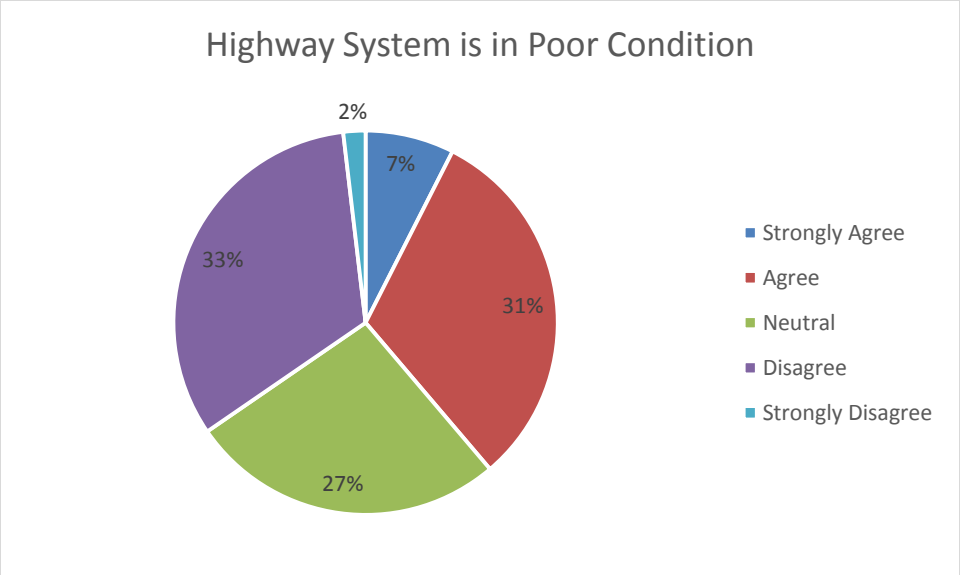

I Support the Use of Cordon Pricing
4%
16%
34%
25%
21%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

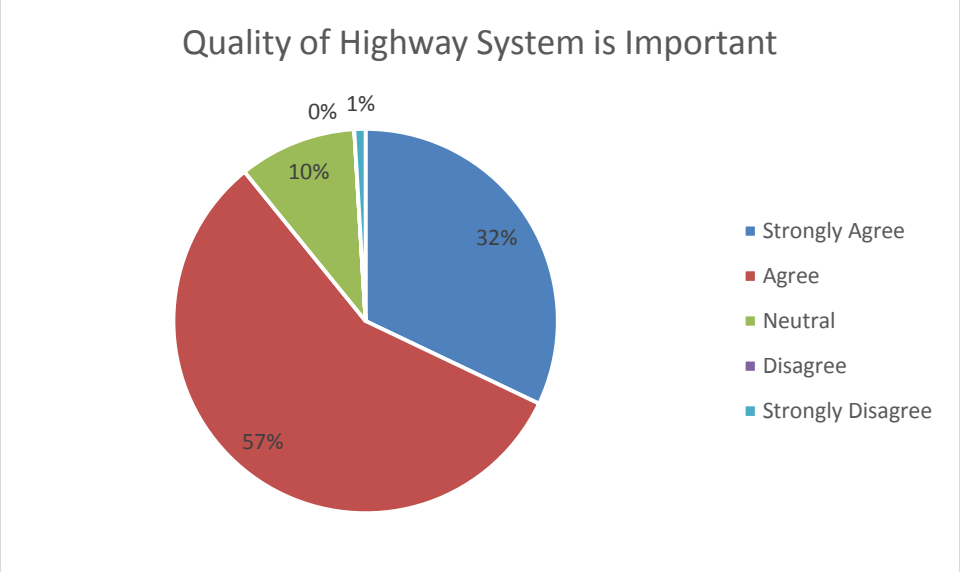

I Support the Use of Mileage-Based User Fees
5%
18%
16%
31%
30%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

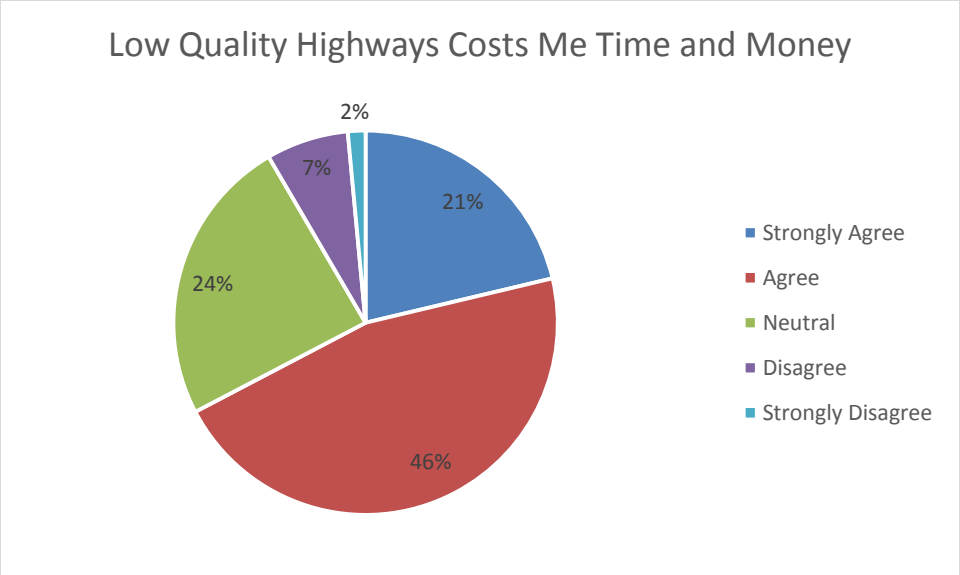
Appendix G: The State of Utah

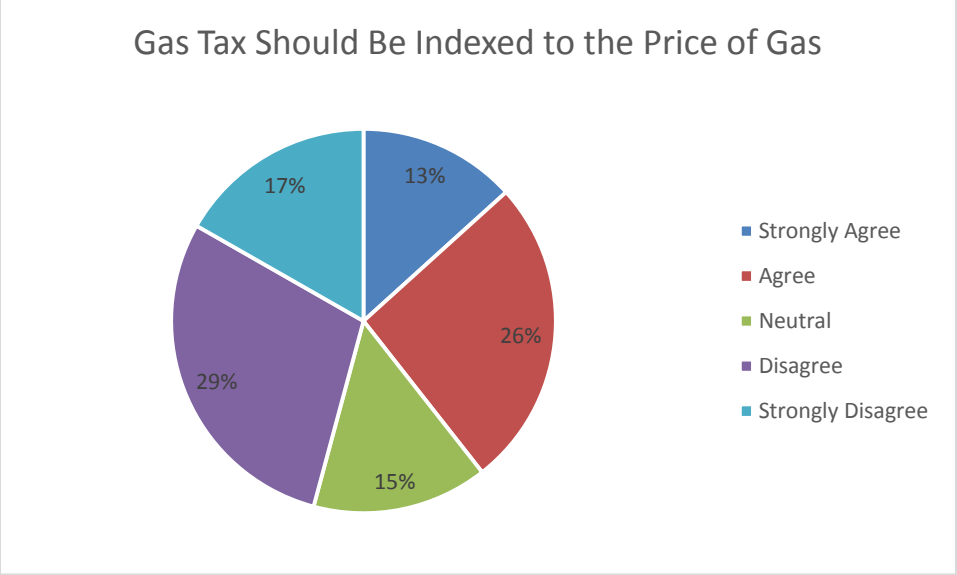
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	39.00	+/- 7.00	Between 32 and 46
The Quality of the Highway System is important to me	89.00	+/- 4.00	Between 85 and 93
A low quality highway system costs me time and money.	67.00	+/- 6.00	Between 61 and 73
Gas tax should be **indexed** to the price of gas and change (increase or decrease) as gas prices change (increase or decrease).	39.00	+/- 7.00	Between 32 and 46
Those driving fuel efficient or electric vehicles should pay less to fund the highway system.	15.00	+/- 5.00	Between 10 and 20
Vehicles that cause more wear and tear on the highways should pay more to fund the highway system.	80.00	+/- 5.00	Between 75 and 85
People who do not own vehicles should not pay taxes to fund the highway system.	26.00	+/- 6.00	Between 20 and 32
Toll money collected should only be used for that specific toll road; **not** for other roads in the state.	54.00	+/- 7.00	Between 47 and 61
States should only charge a toll for out of state vehicles passing through; **not** for in-state vehicles.	5.00	+/- 3.00	Between 2 and 8
I would **not** mind having to pay a fee to enter a city center by my vehicle during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days) (as discussed in the blue Information Sheet under "Cordon Pricing").	17.00	+/- 5.00	Between 12 and 22

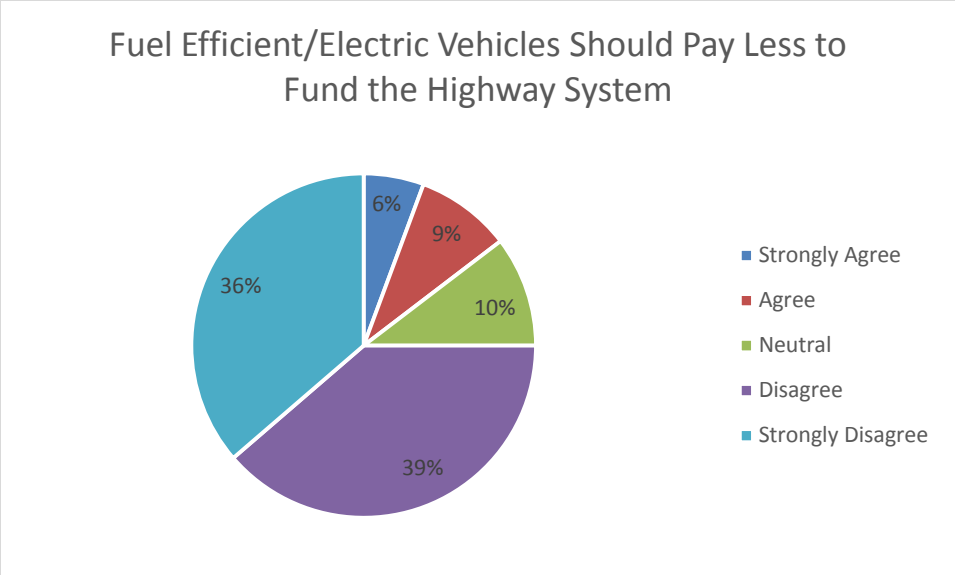
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe (as discussed in the blue Information Sheet under "Mileage-Based User Fees").	11.00	+/- 4.00	Between 7 and 15
The private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return.	24.00	+/- 6.00	Between 18 and 30
I support **increasing the federal gas tax** that is collected at the time of purchase to fund the highway system.	43.00	+/- 7.00	Between 36 and 50
I support **increasing the state gas tax** that is collected at the time of purchase to fund the highway system.	45.00	+/- 7.00	Between 38 and 52
I support the **collection of additional taxes and fees on other driving-related items** to fund the highway system.	28.00	+/- 6.00	Between 22 and 34
I support the **collection of additional sales tax on all goods** to fund the highway system.	15.00	+/- 5.00	Between 10 and 20
I support the **use of highway tolling** to fund the highway system.	33.00	+/- 6.00	Between 27 and 39
I support the **use of High Occupancy Toll (HOT) Lanes** to fund the highway system.	63.00	+/- 6.00	Between 57 and 69
I support the **use of Cordon Pricing** to fund the highway system.	11.00	+/- 4.00	Between 7 and 15
I support the **use of Mileage-Based User Fees** to fund the highway system.	21.00	+/- 5.00	Between 16 and 26

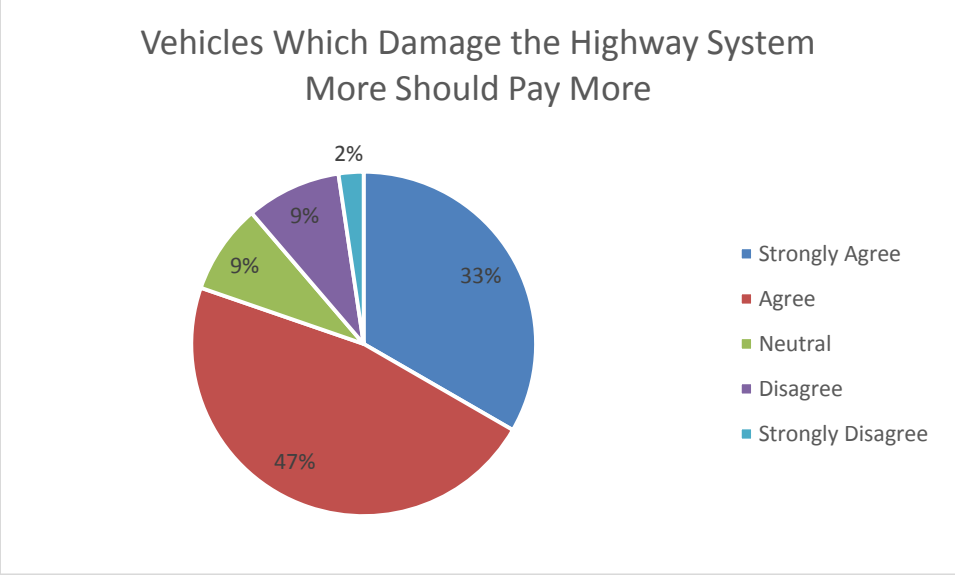

Highway System is in Poor Condition
2%
7%
33%
31%
27%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

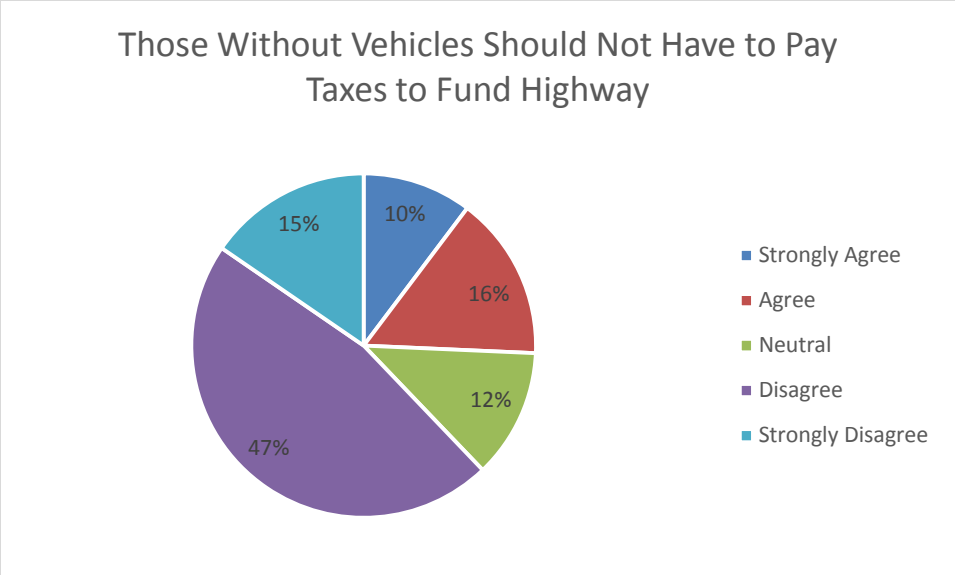

Quality of Highway System is Important
0%
1%
10%
32%
57%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

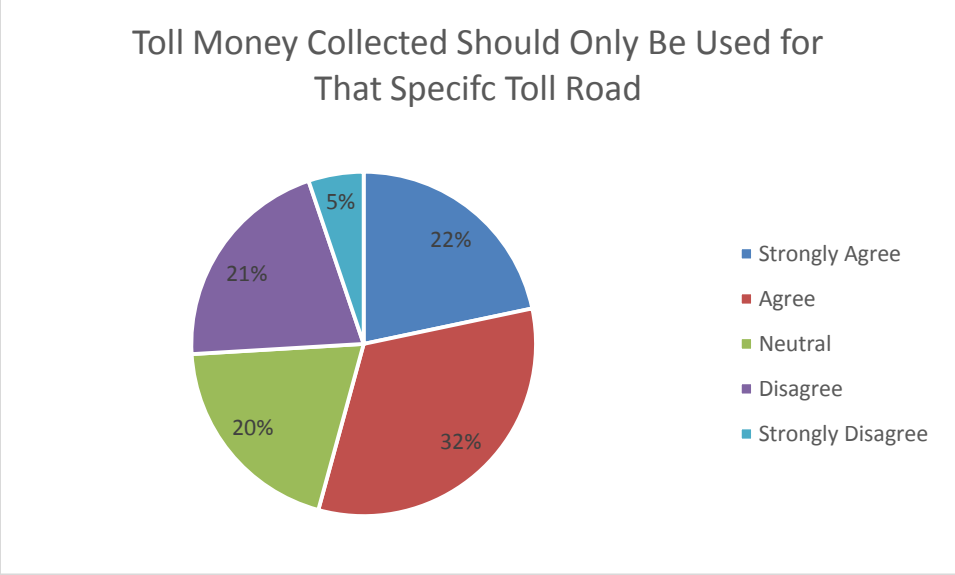

Low Quality Highways Costs Me Time and Money
2%
7%
21%
24%
46%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

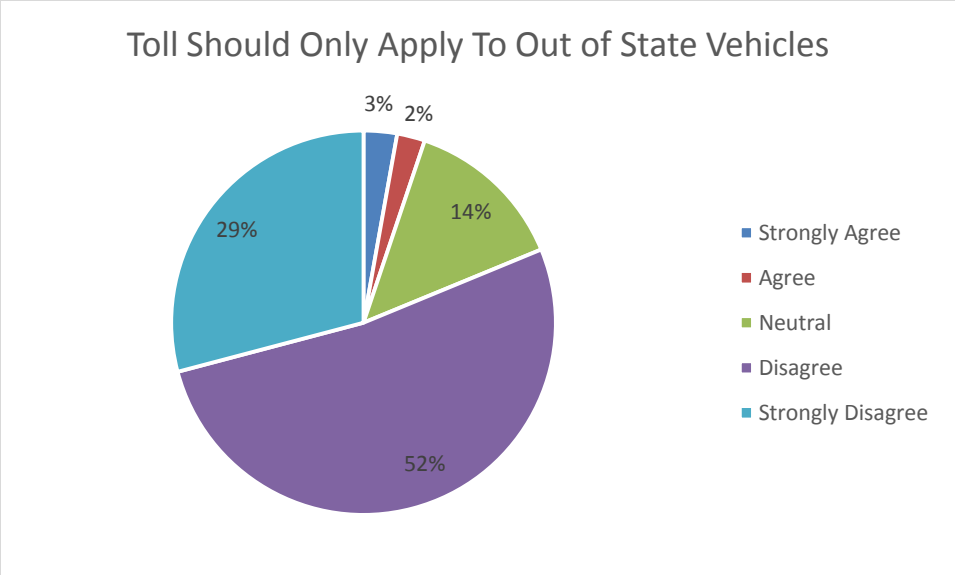

Gas Tax Should Be Indexed to the Price of Gas
17%
13%
26%
29%
15%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

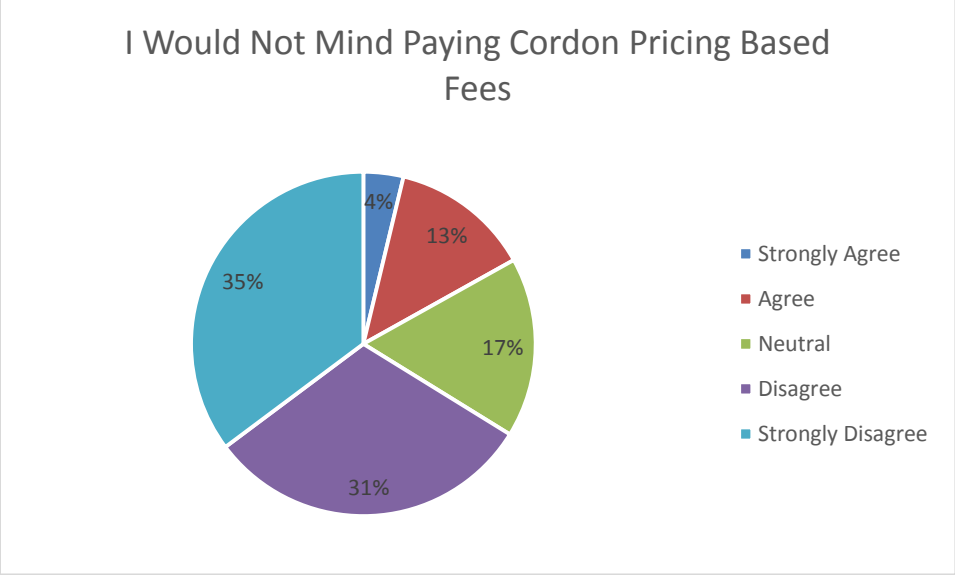

Fuel Efficient/Electric Vehicles Should Pay Less to Fund the Highway System
6%
9%
10%
39%
36%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

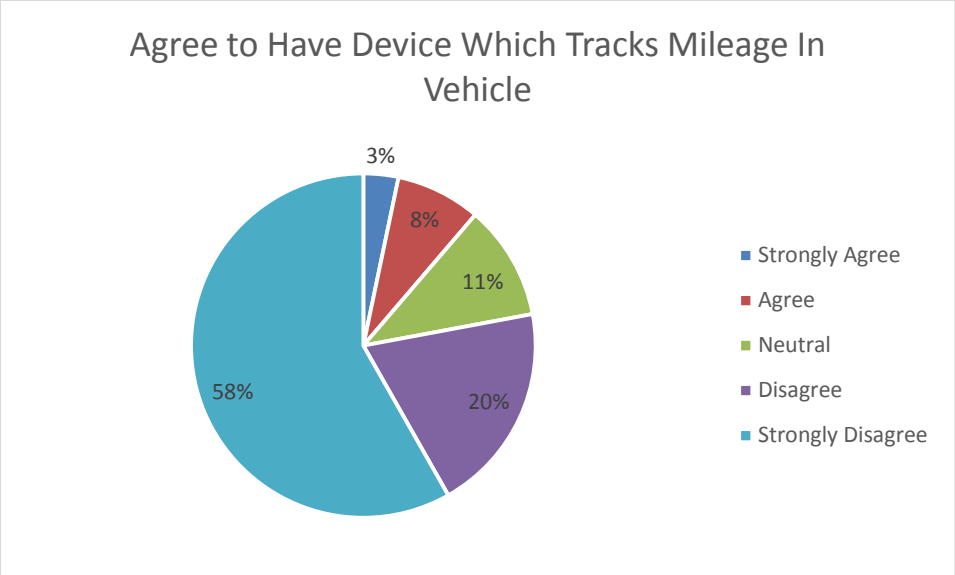

Vehicles Which Damage the Highway System More Should Pay More
2%
9%
9%
33%
47%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

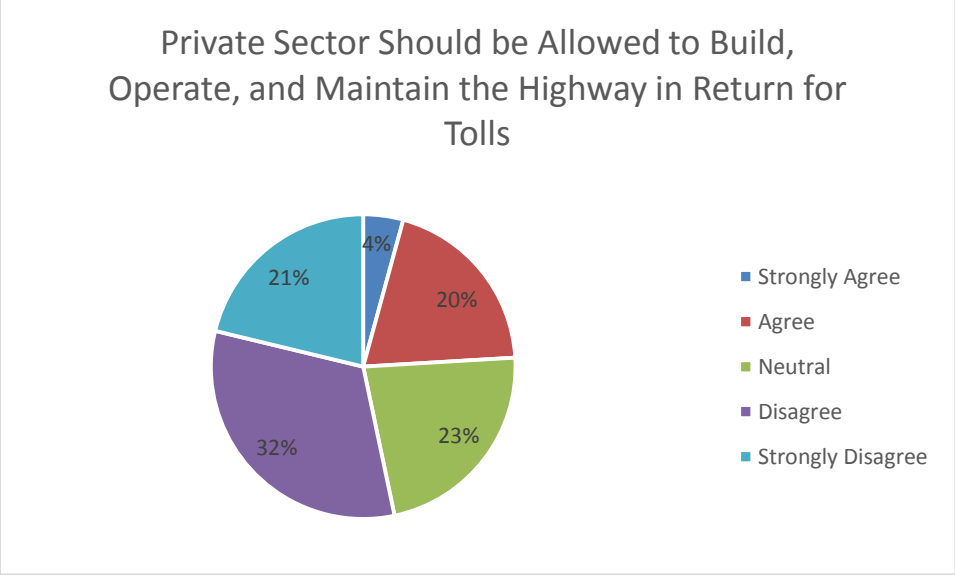

Those Without Vehicles Should Not Have to Pay Taxes to Fund Highway
10%
16%
12%
47%
15%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

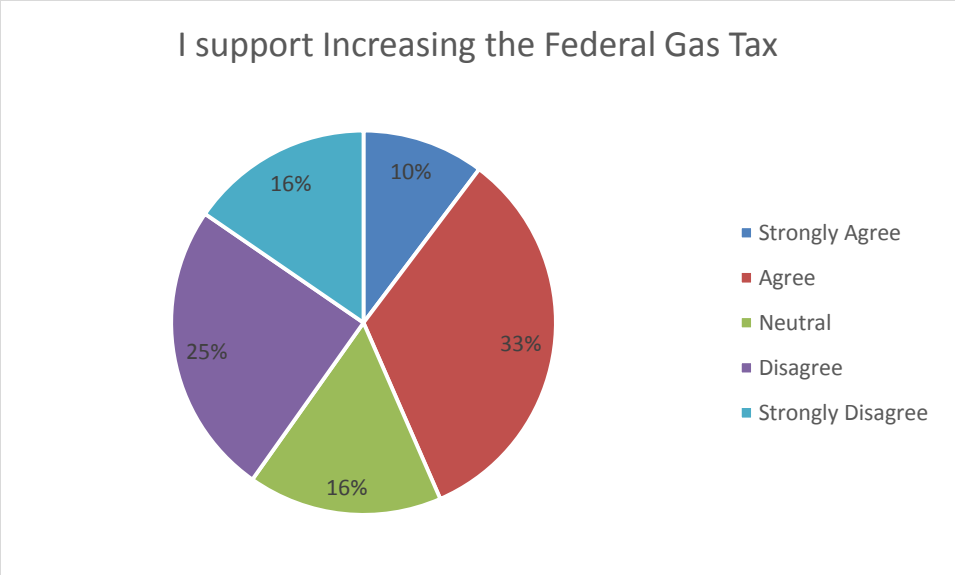

Toll Money Collected Should Only Be Used for That Specifc Toll Road
22%
32%
20%
21%
5%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

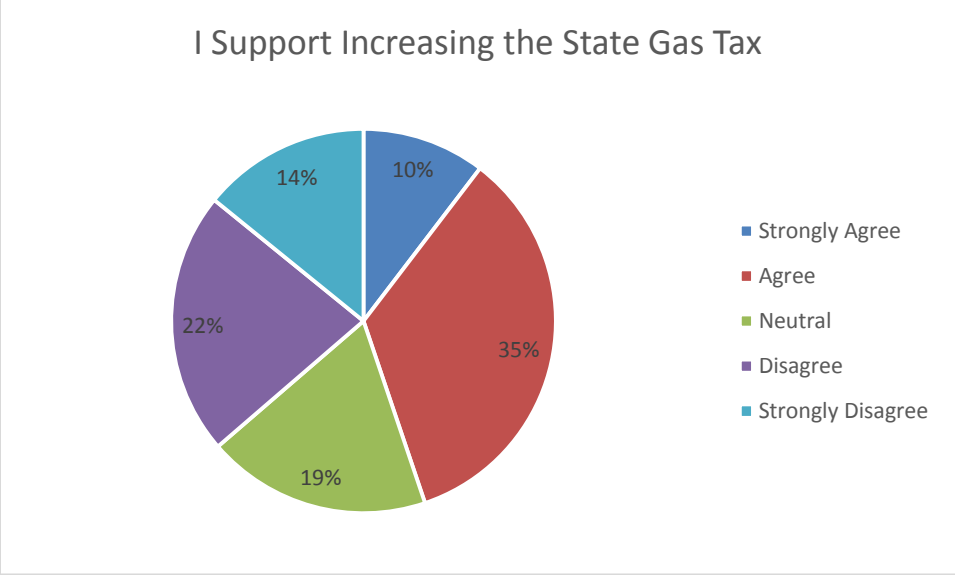

Toll Should Only Apply To Out of State Vehicles
3%
2%
14%
29%
52%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

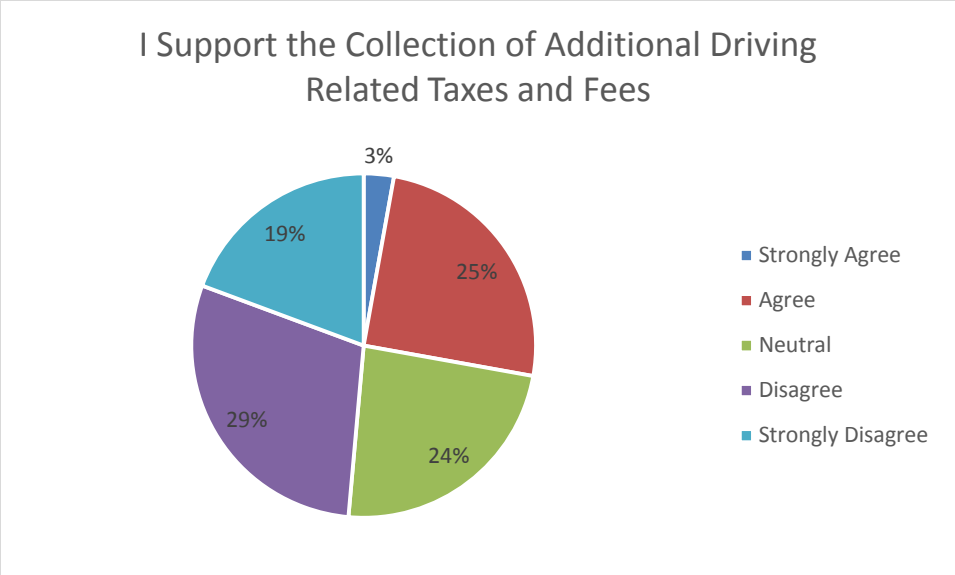

I Would Not Mind Paying Cordon Pricing Based Fees
4%
13%
35%
17%
31%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

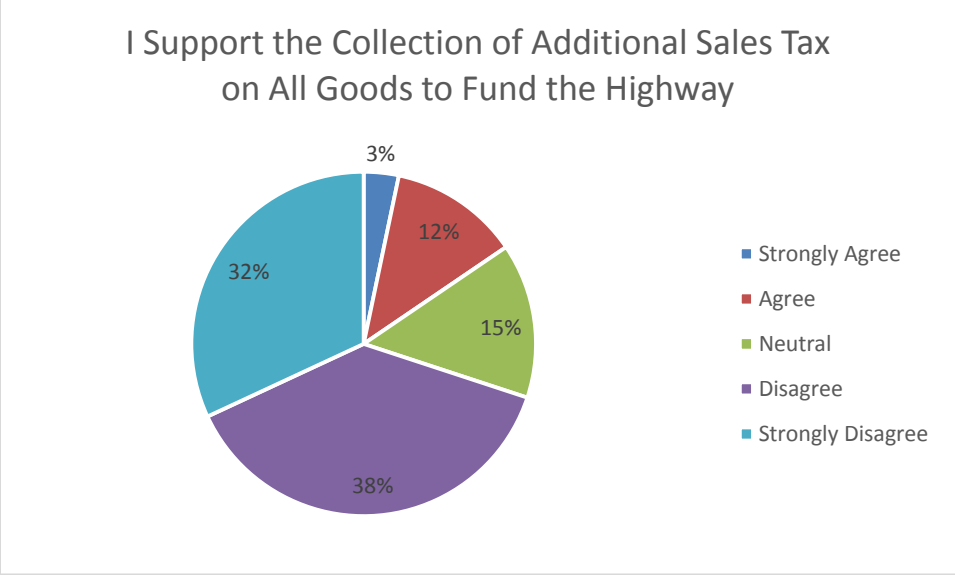

Agree to Have Device Which Tracks Mileage In Vehicle
3%
8%
11%
20%
58%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

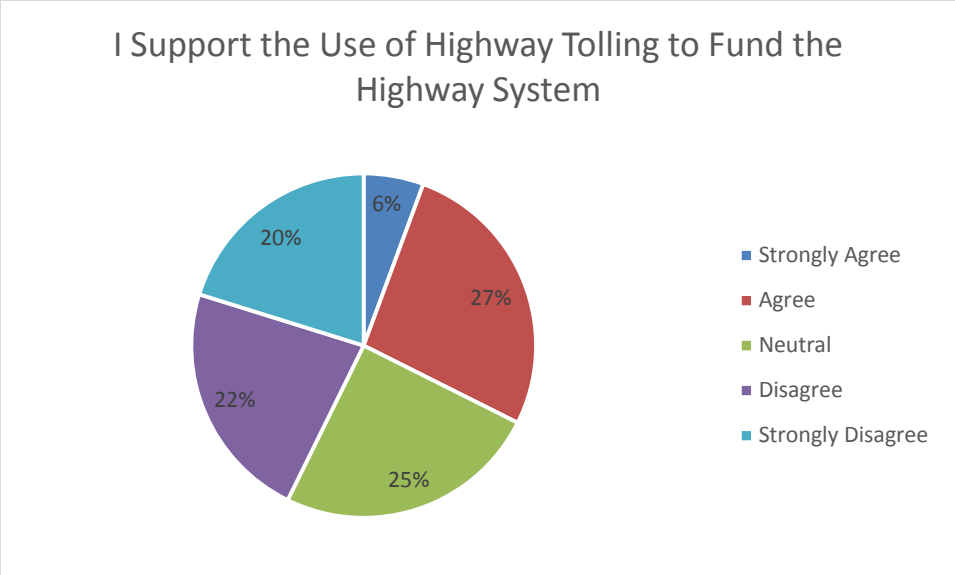

Private Sector Should be Allowed to Build, Operate, and Maintain the Highway in Return for Tolls
4%
20%
23%
32%
21%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

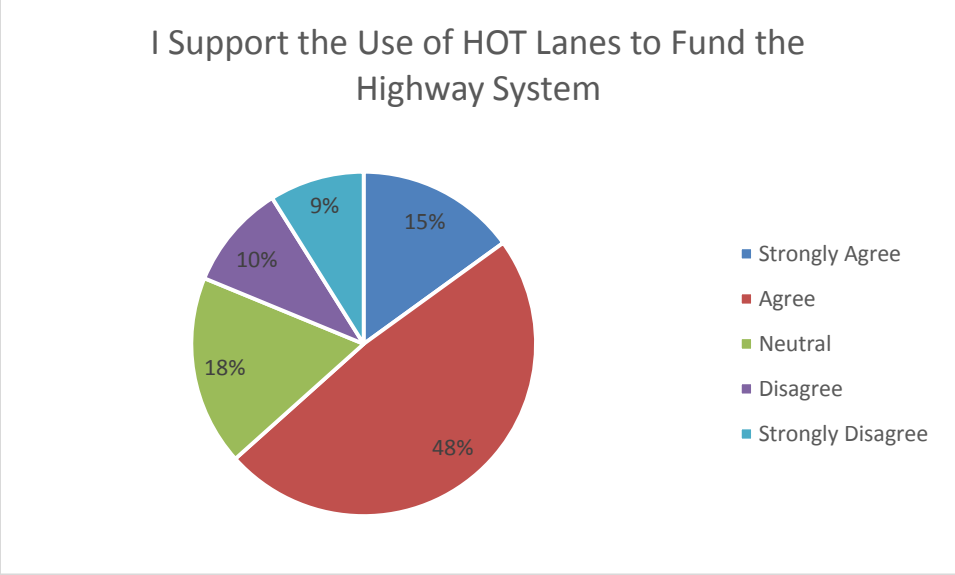

I support Increasing the Federal Gas Tax
10%
33%
16%
25%
16%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

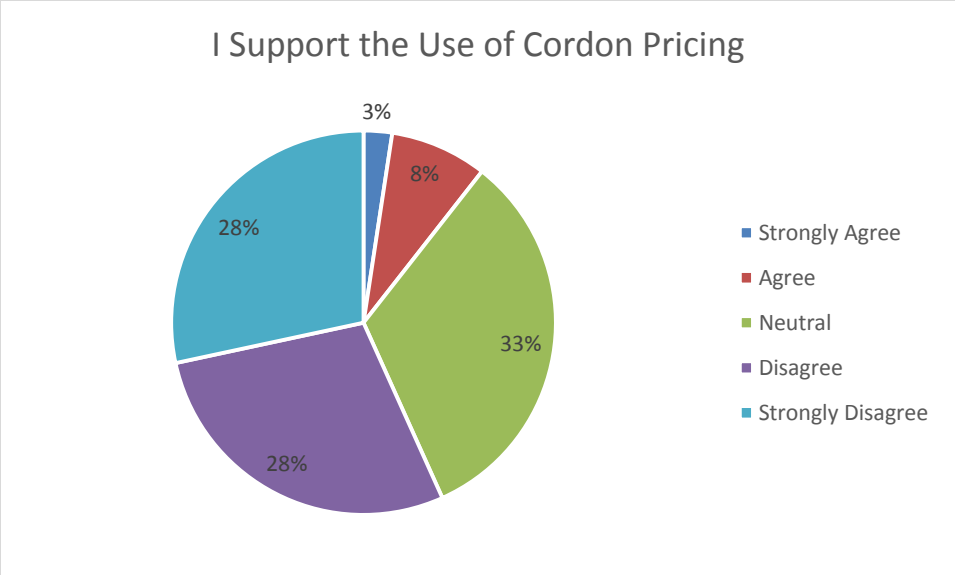

I Support Increasing the State Gas Tax
10%
35%
19%
22%
14%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

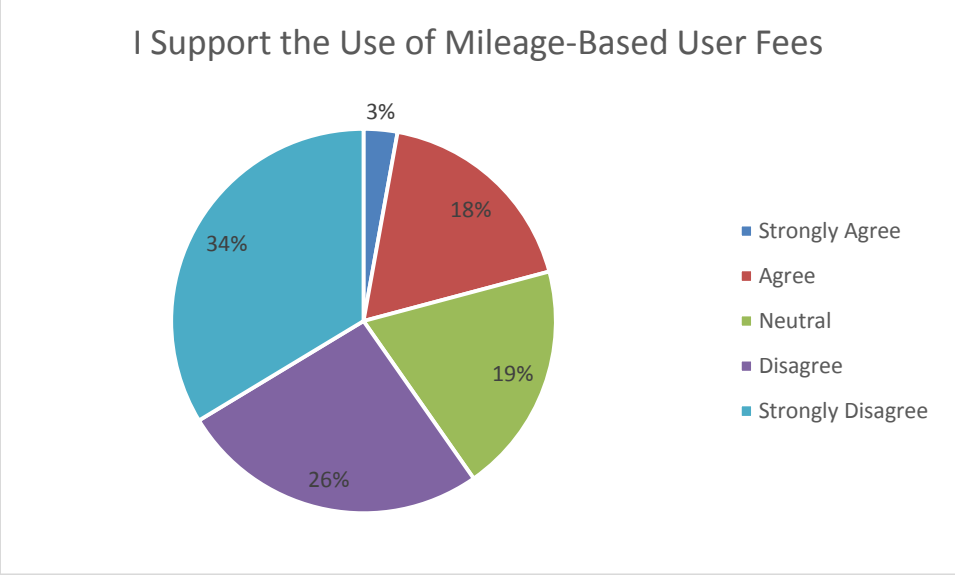

I Support the Collection of Additional Driving Related Taxes and Fees
3%
25%
24%
29%
19%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Collection of Additional Sales Tax on All Goods to Fund the Highway
3%
12%
15%
38%
32%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of Highway Tolling to Fund the Highway System
6%
27%
25%
22%
20%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of HOT Lanes to Fund the Highway System
15%
48%
18%
10%
9%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

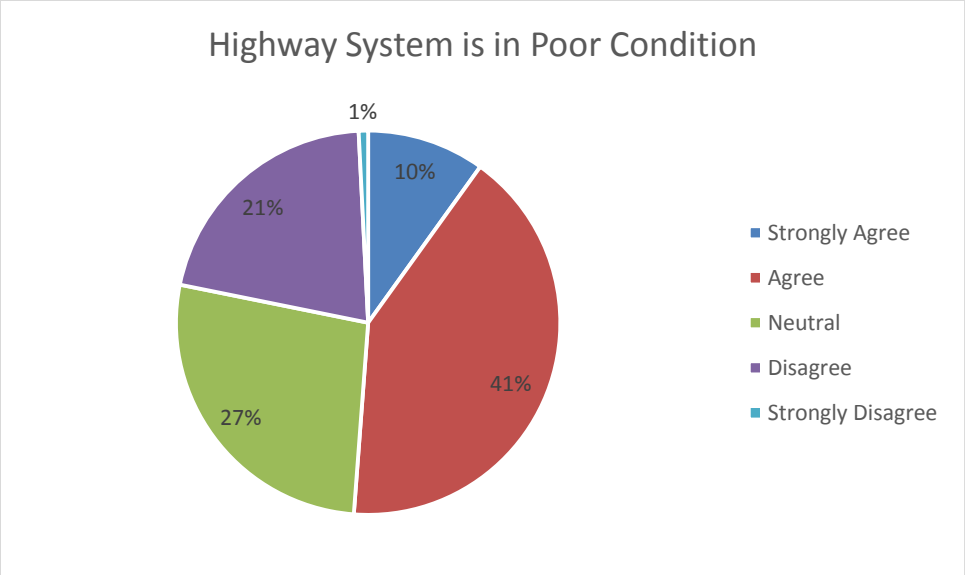

I Support the Use of Cordon Pricing
3%
8%
28%
33%
28%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

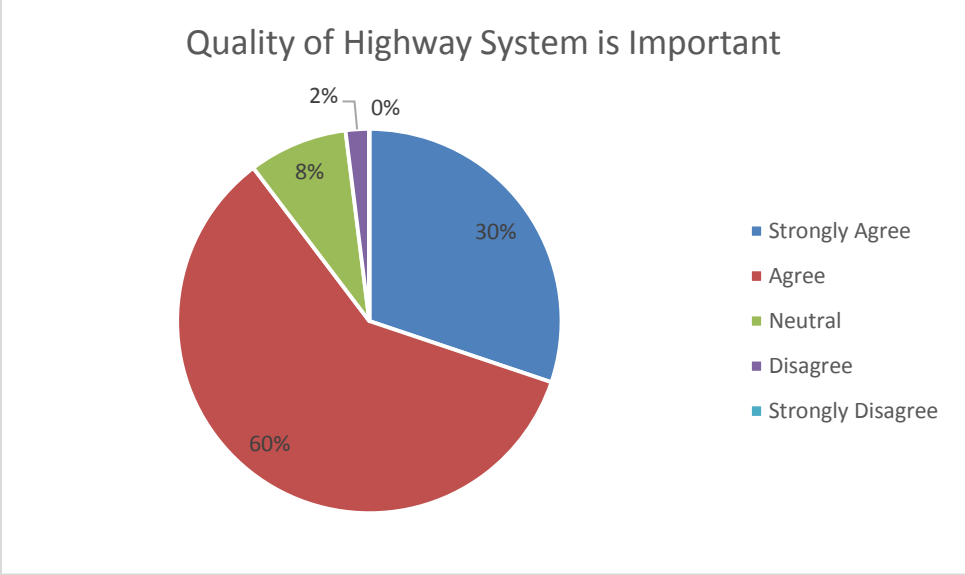

I Support the Use of Mileage-Based User Fees
3%
18%
34%
19%
26%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

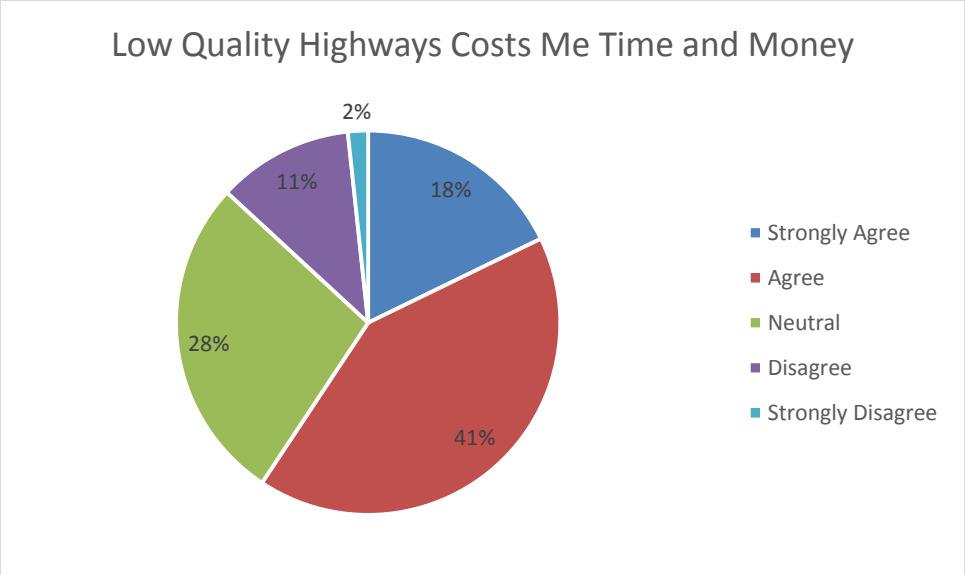
Appendix H: The State of Wyoming

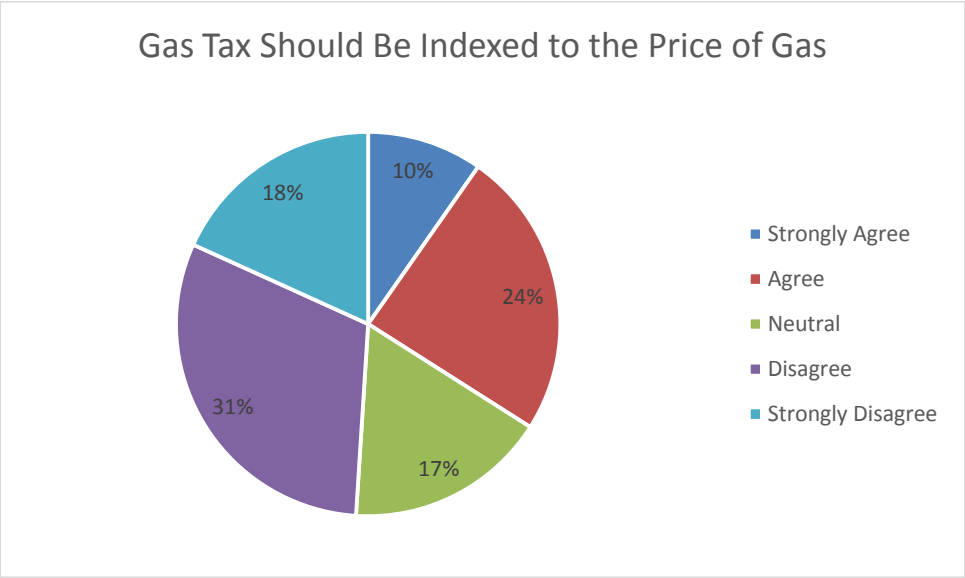
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
Our Nation's Highway System is in Poor Condition	51.00	+/- 6.00	Between 45 and 57
The Quality of the Highway System is important to me	90.00	+/- 4.00	Between 86 and 94
A low quality highway system costs me time and money.	59.00	+/- 6.00	Between 53 and 65
Gas tax should be **indexed** to the price of gas and change (increase or decrease) as gas prices change (increase or decrease).	34.00	+/- 6.00	Between 28 and 40
Those driving fuel efficient or electric vehicles should pay less to fund the highway system.	13.00	+/- 4.00	Between 9 and 17
Vehicles that cause more wear and tear on the highways should pay more to fund the highway system.	80.00	+/- 5.00	Between 75 and 85
People who do not own vehicles should not pay taxes to fund the highway system.	24.00	+/- 5.00	Between 19 and 29
Toll money collected should only be used for that specific toll road; **not** for other roads in the state.	57.00	+/- 6.00	Between 51 and 63
States should only charge a toll for out of state vehicles passing through; **not** for in-state vehicles.	11.00	+/- 4.00	Between 7 and 15
I would **not** mind having to pay a fee to enter a city center by my vehicle during certain hours (e.g., peak hours) and on certain days of the week (i.e., week days) (as discussed in the blue Information Sheet under "Cordon Pricing").	17.00	+/- 5.00	Between 12 and 22

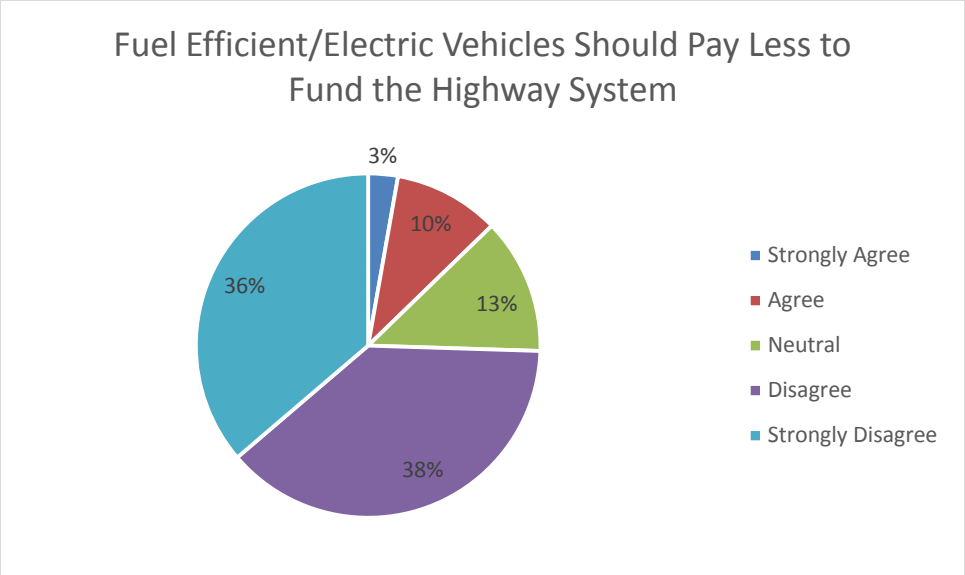
Question	Question's Response Rate Percentage (%)	Error of Estimation Percentage (%)	Confidence Interval Percentage (%)
I feel comfortable with having a device in my vehicle that can track when and where I am driving for the purpose of determining the fees I owe (as discussed in the blue Information Sheet under "Mileage-Based User Fees").	9.00	+/- 4.00	Between 5 and 13
The private sector should be allowed to build, operate, and maintain the highway system; and collect tolls/user fees in return.	23.00	+/- 5.00	Between 18 and 28
I support **increasing the federal gas tax** that is collected at the time of purchase to fund the highway system.	44.00	+/- 6.00	Between 38 and 50
I support **increasing the state gas tax** that is collected at the time of purchase to fund the highway system.	52.00	+/- 6.00	Between 46 and 58
I support the **collection of additional taxes and fees on other driving-related items** to fund the highway system.	24.00	+/- 5.00	Between 19 and 29
I support the **collection of additional sales tax on all goods** to fund the highway system.	13.00	+/- 4.00	Between 9 and 17
I support the **use of highway tolling** to fund the highway system.	41.00	+/- 6.00	Between 35 and 47
I support the **use of High Occupancy Toll (HOT) Lanes** to fund the highway system.	49.00	+/- 6.00	Between 43 and 55
I support the **use of Cordon Pricing** to fund the highway system.	11.00	+/- 4.00	Between 7 and 15
I support the **use of Mileage-Based User Fees** to fund the highway system.	19.00	+/- 5.00	Between 14 and 24

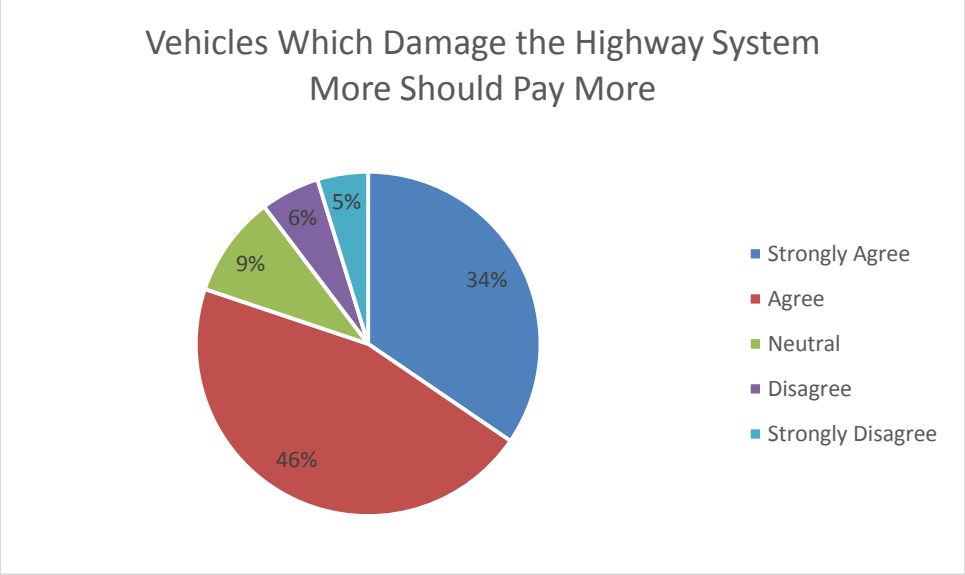

Highway System is in Poor Condition
1%
10%
21%
41%
27%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

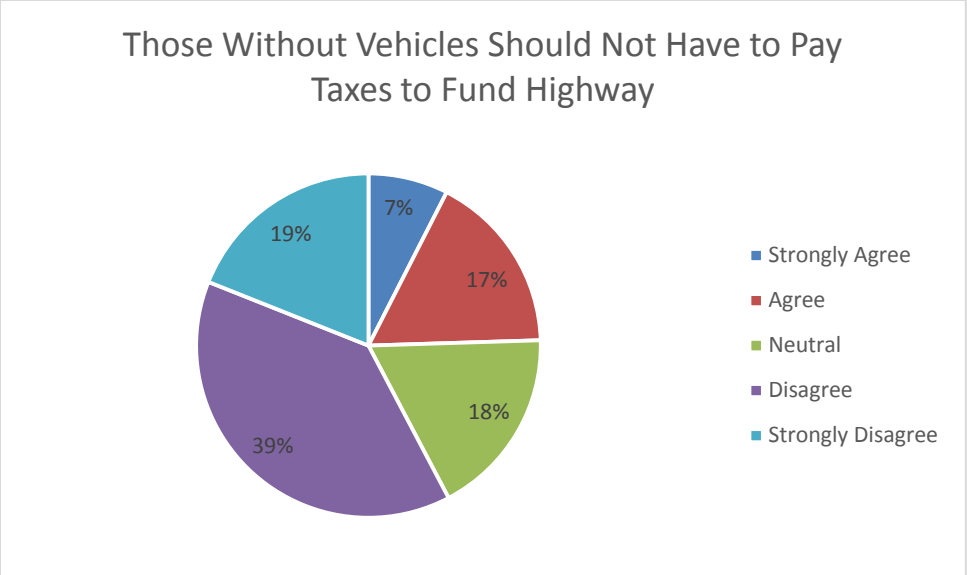

Quality of Highway System is Important
2%
0%
8%
30%
60%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

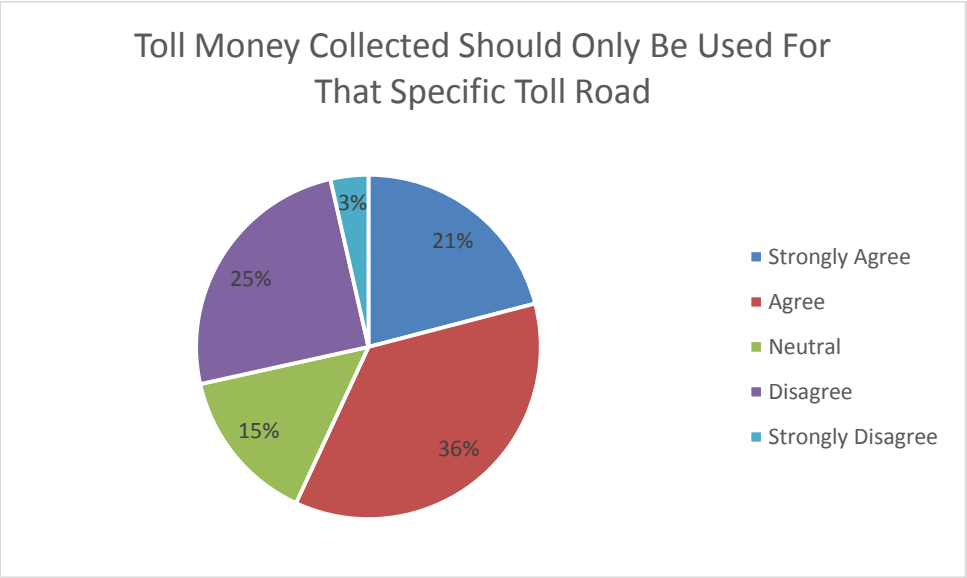

Low Quality Highways Costs Me Time and Money
2%
11%
18%
28%
41%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

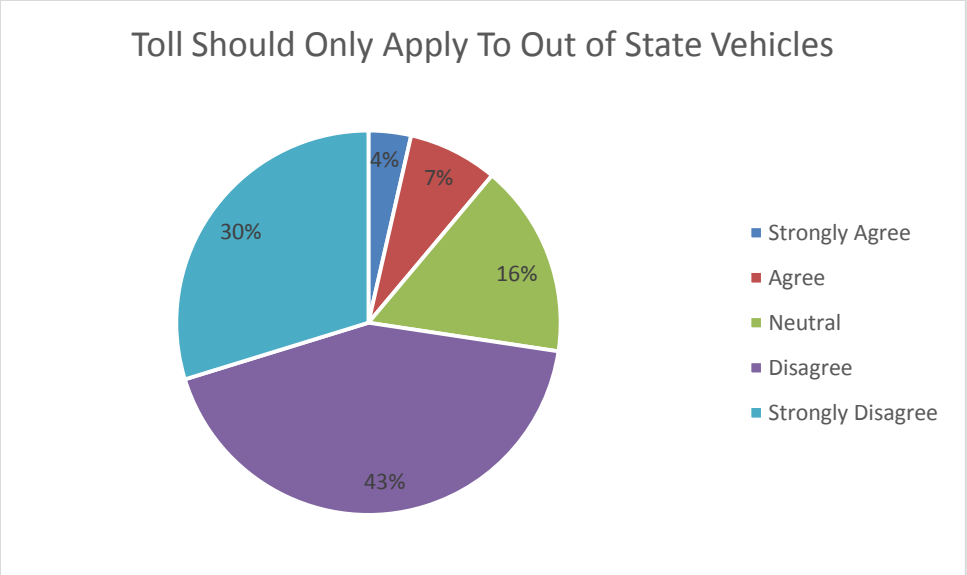

Gas Tax Should Be Indexed to the Price of Gas
10%
18%
24%
31%
17%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

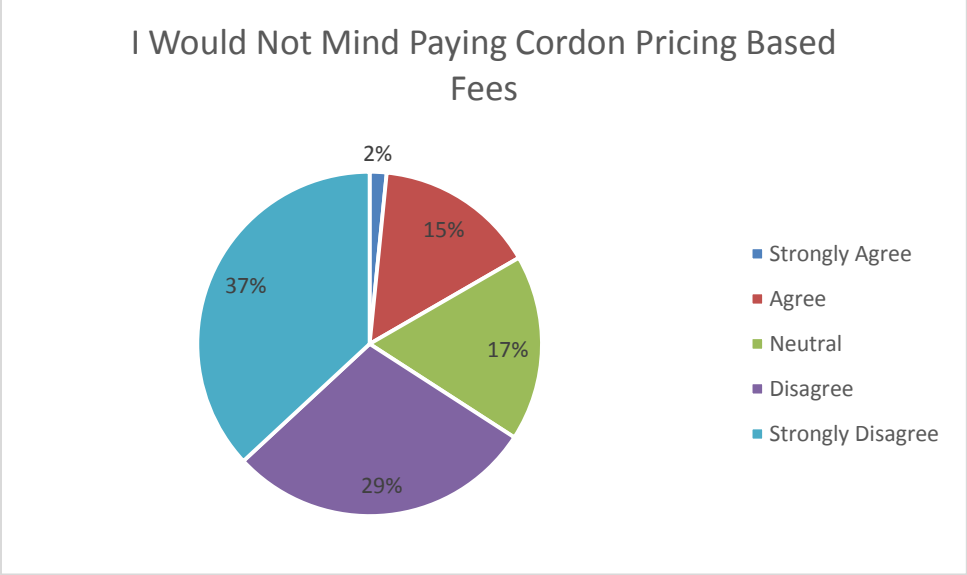

Fuel Efficient/Electric Vehicles Should Pay Less to Fund the Highway System
3%
10%
13%
36%
38%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

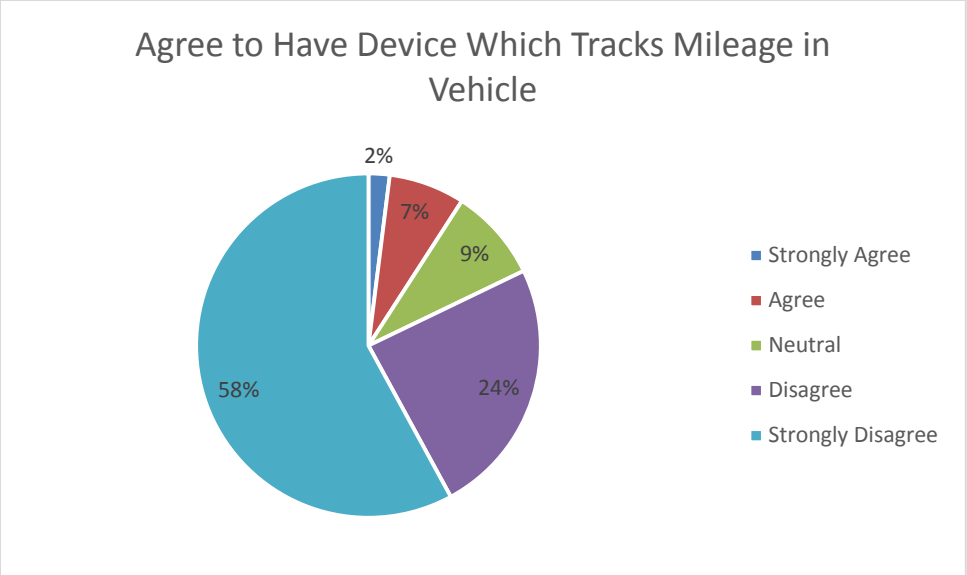

Vehicles Which Damage the Highway System More Should Pay More
5%
6%
9%
34%
46%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

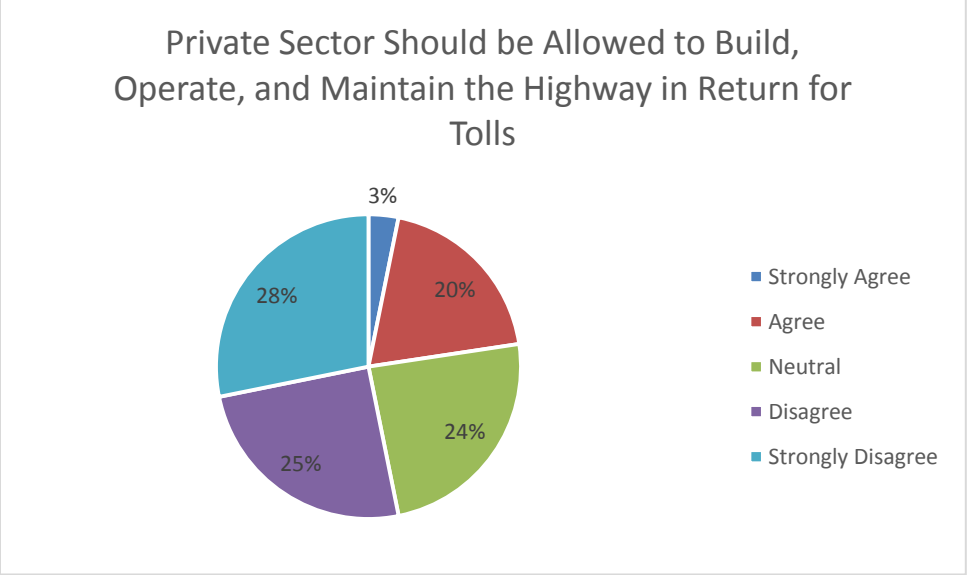

Those Without Vehicles Should Not Have to Pay Taxes to Fund Highway
7%
17%
18%
39%
19%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

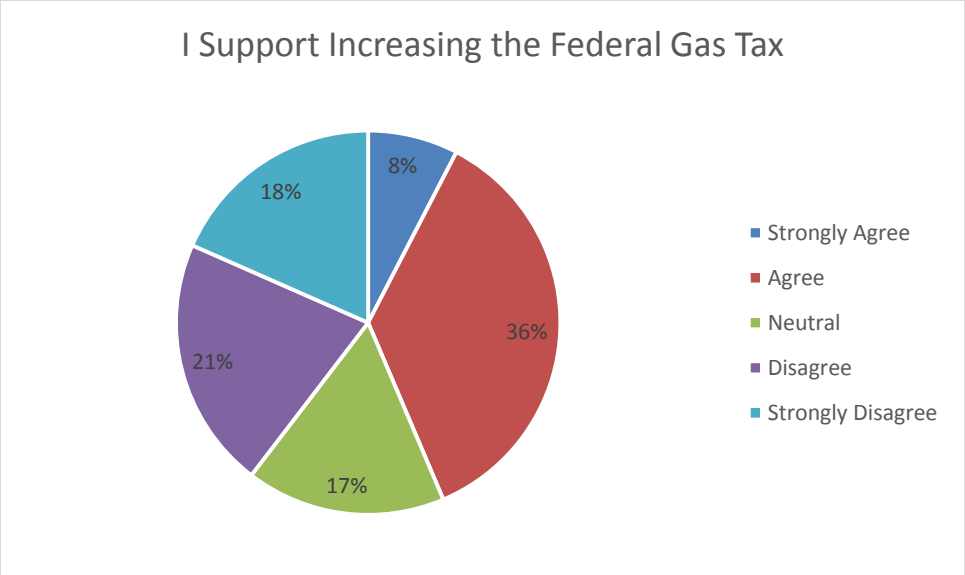

Toll Money Collected Should Only Be Used For That Specific Toll Road
21%
36%
15%
25%
3%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

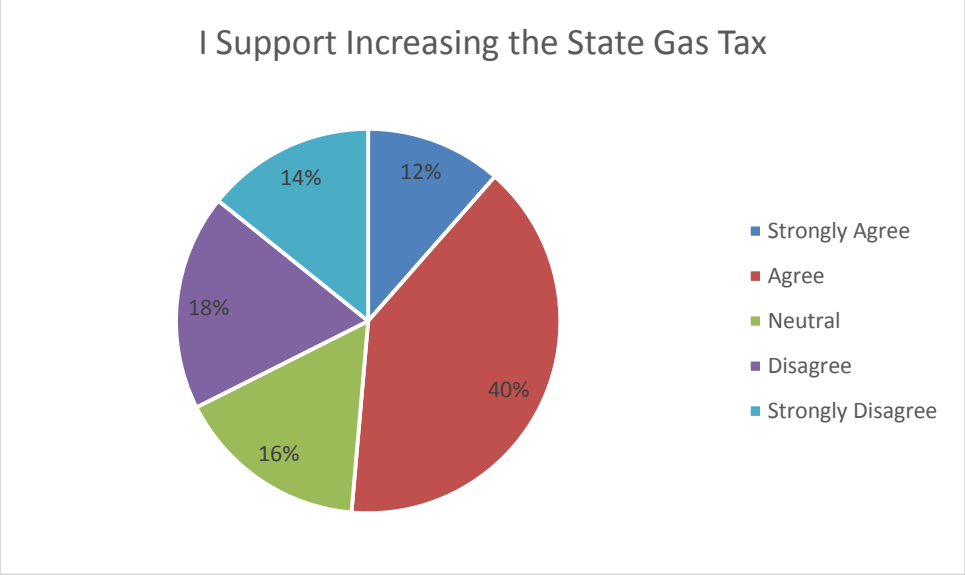

Toll Should Only Apply To Out of State Vehicles
4%
7%
16%
43%
30%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

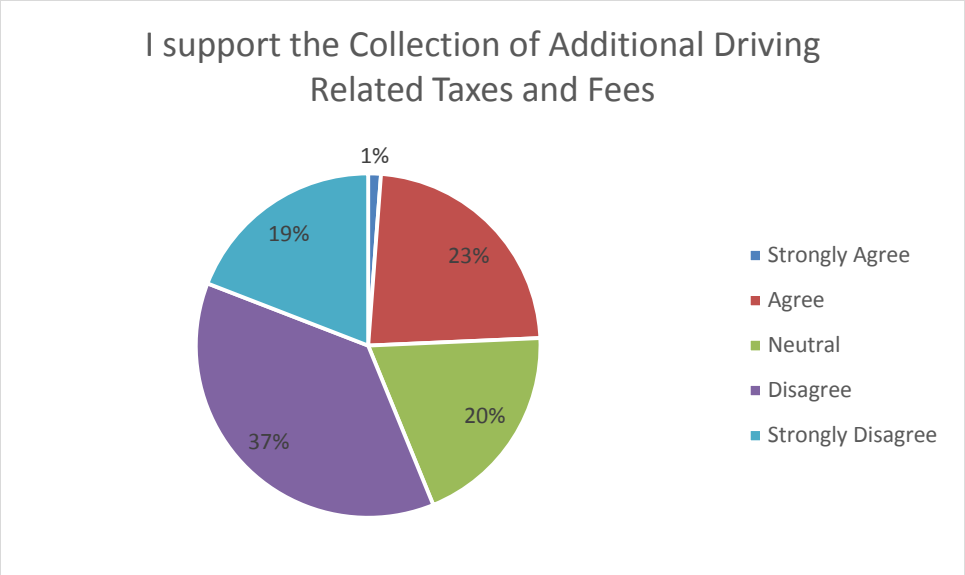

I Would Not Mind Paying Cordon Pricing Based Fees
2%
15%
17%
29%
37%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

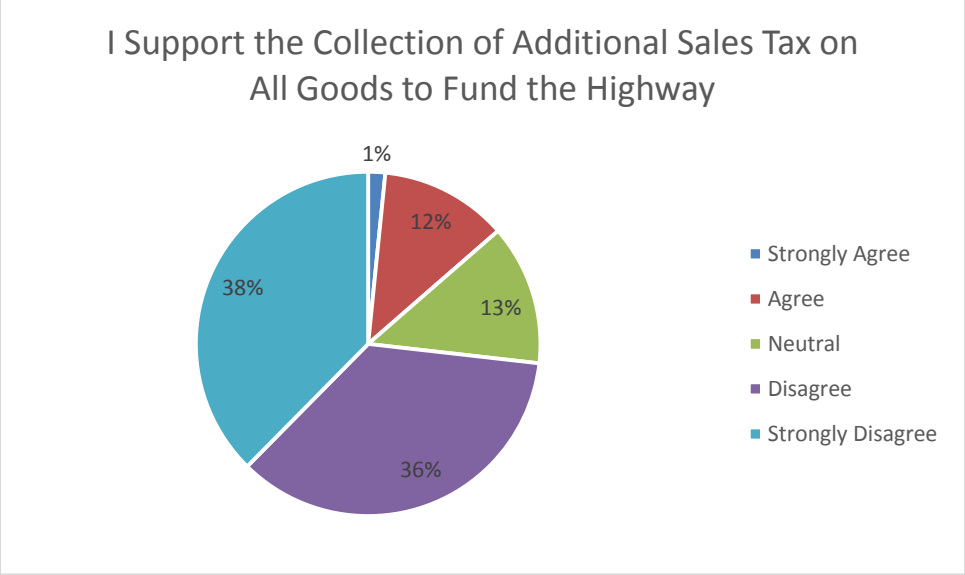

Agree to Have Device Which Tracks Mileage in Vehicle
2%
7%
9%
24%
58%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

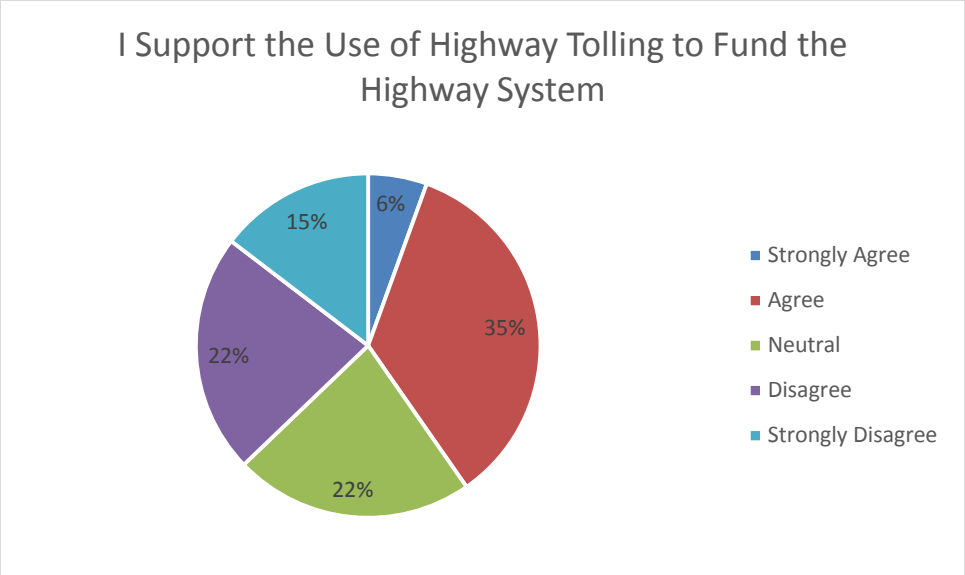

Private Sector Should be Allowed to Build, Operate, and Maintain the Highway in Return for Tolls
3%
20%
24%
25%
28%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

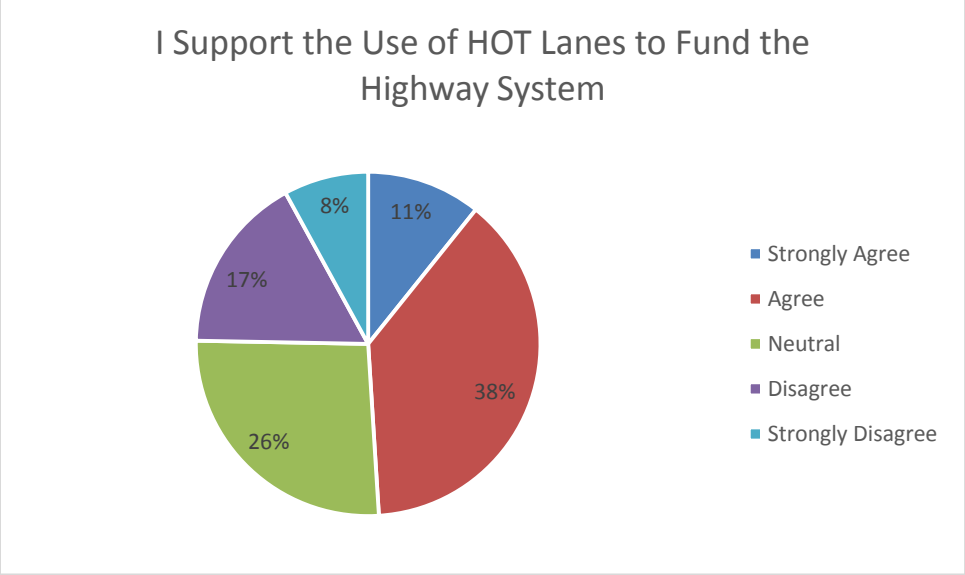

I Support Increasing the Federal Gas Tax
8%
36%
17%
21%
18%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

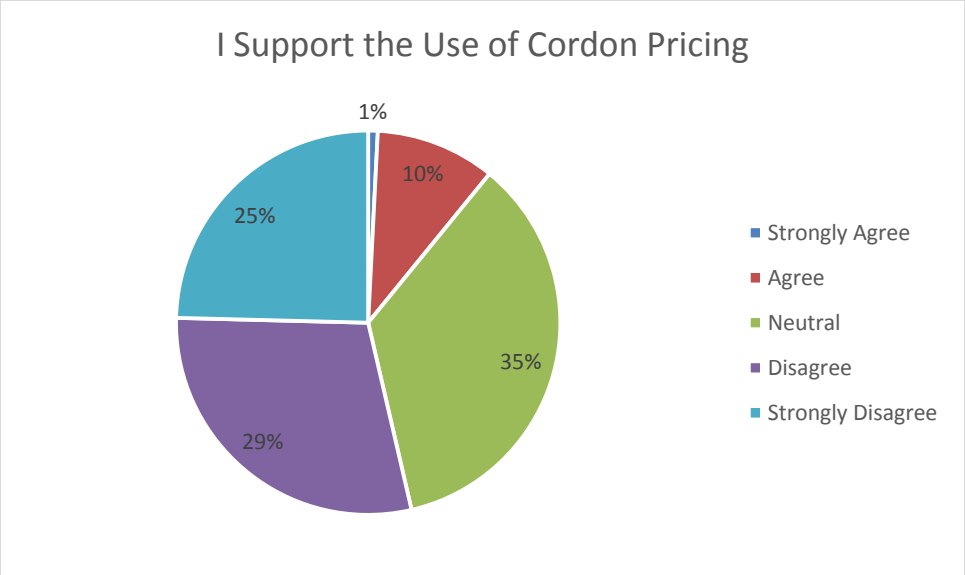

I Support Increasing the State Gas Tax
12%
40%
16%
18%
14%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

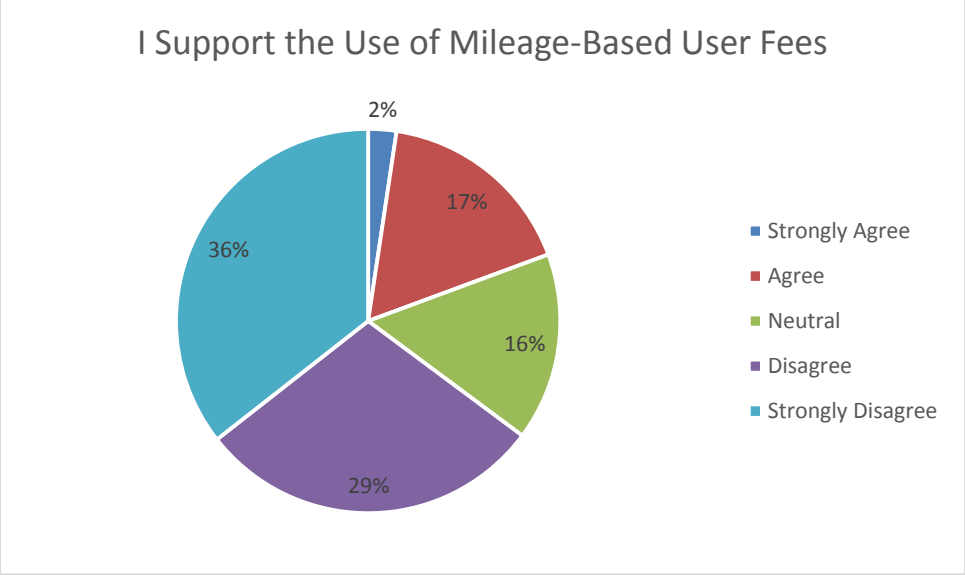

I support the Collection of Additional Driving Related Taxes and Fees
1%
23%
20%
37%
19%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Collection of Additional Sales Tax on All Goods to Fund the Highway
1%
12%
13%
36%
38%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of Highway Tolling to Fund the Highway System
6%
35%
22%
22%
15%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of HOT Lanes to Fund the Highway System
11%
38%
26%
17%
8%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of Cordon Pricing
1%
10%
25%
35%
29%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree


I Support the Use of Mileage-Based User Fees
2%
17%
36%
16%
29%
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree