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Changing Car Culture Towards Carpooling: A Case Study in Binghamton University (Part I: Analysis and Measurement of Potential)

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Abstract

Binghamton University has a parking problem fostered by the car culture adopted by students, which makes cars symbols of independence and status. To alleviate this problem, a carpooling system is identified in this paper as a possible alternative means of transportation. I argue that by analysis and estimation of the potential of carpooling at Binghamton University, the likelihood of success of a system to change car culture from one based on single-occupancy driving to one based on carpooling can be measured. An online survey was sent to undergraduate commuter students to acquire students' opinions and thoughts. Its 825 responses showed these results: that 80 percent never drive to school for reasons of convenience, accessibility, availability and riding experience; that 68 percent are dissatisfied with parking, while 1 percent report high satisfaction; that carpooling activity is currently low but has high student interest and potential; that 50 percent are comfortable with carpooling, 30 percent are neutral and 20 percent are uncomfortable; and that previous carpooling incentives have been unsuccessful for reasons of non-inventiveness, non-inclusiveness and time consumption. These results show trends in student behavior, student opinions, and student wants and needs, providing the detailed understanding needed to create a successful and effective carpooling system.

Introduction

From 2000 to 2014, the total for the national undergraduate population increased by 31 percent from 13.2 million to 17.3 million students, and it is expected to increase by 14 percent from 17.3 million to 19.8 million students between 2014 and 2025 (National Center for Education Statistics, 2014). This wide expansion and increase in population has the potential to make parking a general problem and grievance across university campuses, as rising enrollment figures may a strain on available services and resources.

Unlike the overall role change of the automobile seen on a national scale, college students are more urged to drive to destinations that they really could walk to. With parking shortages becoming more prevalent, colleges and universities conduct and undertake parking and transportation studies, in order to get a better understanding of the parking problem and how to fix it. The case study here is Binghamton University, a public university that provides undergraduate and graduate education to over 17,000 students. As a segment of its planned growth plan, Binghamton University recently formed the "20 by 2020" initiative, in which it plans to grow its

enrollment to 20,000 students (14,000 undergraduates and 6,000 graduate students) by the year 2020. This projected expansion would most likely cause an increase of influx of people into the campus, thereby heightening the demand for parking services. To prepare for the issues that may arise, other alternatives to the traditional car culture, such as carpooling, must be looked into.

Purpose of Research

In the event of a discussion of the parking grievance common to college campuses, a common reference to the book "The Uses of the University" is made. In this book, it is suggested that a university president has three main tasks to achieve: "sex for the students, athletics for the alumni, and parking," only the last of which poses as a problem (Prondzynski, 2008, p. 1). Blinded by the convenience of driving to school, students fail to view parking as the limited resource it is, and are more concerned with the luxury that is car ownership.

The purpose of this research is to estimate and analyze the potential of carpooling at Binghamton University, in order to find or create an avenue to reduce or resolve the parking problem faced at college campuses. The aim is to evaluate a prospective change in car culture from one based on single-occupancy driving towards a more carpooling-based system. Binghamton University provides public transportation options such as a bus transit system and shuttle services, within and outside of campus. These options, however, have not been able to alleviate the parking problem on campus. The continuation of this issue thus reinforces the need for this research to focus on the overall interest and willingness of students to utilize other methods or systems of travel.

Literature Review

Relevant literature was researched to understand and gain insight into the problem of parking, how it arose and the need to change the car culture to resolve this problem. The history of cars was researched to understand the transitions that have taken place in the automobile consumer world, between these times, and the evolution from the age of the automobile to one of smarter urban mobility. Carpooling was also defined and relations were made to established carpooling programs to examine their dynamics and to determine how these can best be incorporated into the goal of changing the car culture of higher education institutions.

Transitions from the Age of the Automobile to Smarter Urban Mobility

In the 1920's, nothing affected American everyday lives more than the automobile. Though invented in the 19th century, the Age of the Automobile was brought into light by Henry Ford, with the Ford Model T leading the trail. By 1920, there were eight million registered car drivers, which almost tripled to 23 million by the end of the decade. The car was a part of everyday modern life, shaping mobility and access. Between 1970 and 2000, the number of cars on the roads again tripled, symbolizing this unprecedented triumphal advance of the car (Stampfl, 2016). This car boom brought along with it many positive social effects and changes; although, with these advantages, came new drawbacks of traffic, accidents, and fatalities. The noise and pollution emitted by cars began to cause serious harm to the environment and made living in cities more difficult, and the problem of parking became an ever-present burden on drivers (Stampfl, 2016). As a result, urban inhabitants have begun to shift from automobiles to smarter means of mobility. Public transportation is becoming more apparent and useful in people's daily lives, and the car is losing its seat as the symbol of independence. The future of transportation is being shown through new services that can move people from one destination to another without the need to own a car

(Fishman, 2014). As a result of the new preference values and system values, a new form of urban mobility, where carpooling has a place, is beginning to take shape.

Millennials and the Changing Car Culture

Millennials are those born in between the years of 1977 and 2000. According to Neil Howe (2009), millennials are "the next great generation." This rising population has begun to shape a number of new ways of living. Studies show that millennials now take longer to get their licenses, drive less, and wait longer to make their first car purchase. In earlier years of automobile travel, a license meant liberation from parental control and was a ticket to the open road, but today, only half of millennials bother about getting a license at age 18 (Williamson, 2015). The times when teenagers used cars to find friends is long gone, as a result of social media, and they can now get to where they want with on-demand transport services.

Carpooling Defined

Carpooling, a type of ride-sharing, does not have a concrete definition, but the main idea can be conveyed in different ways. It can be defined as "two or more persons, not belonging to the same household, sharing a trip, or a part of it, with the passengers contributing to the driver's expenses" (Ciari, 2012). Similarly, Commuter Connections, a resource hub for local commuting programs, defines carpooling as when two or more commuters ride together in a private automobile on a continuing basis, regardless of their relationship to each other or the cost of sharing agreements.

Carpooling Systems at other Universities

University of California, Berkeley, offers a private ridesharing service for students called Zimride. This carpooling program allows students to purchase a parking permit with a level of lot access determined by the number of carpooling permits present. Two carpoolers receive the regular

lot level pass, whereas two or more carpoolers are entitled to the highest level pass. The university also creates the opportunity for students and faculty to carpool together. As an incentive, the university also offers designated carpool parking spaces throughout campus, which are given on a first-come, first serve basis, and are available to all those in the carpooling program.

Stanford University advertises their carpooling program as a great way to get to and from campus. It saves money, reduces pollution, and also enables carpooling passengers to arrive at their destinations refreshed. To be eligible for this program, carpoolers must meet some of the internal criteria set by the university, and must also live within a reasonable commute, which is in line with the goals and intent of the program. In the program, two or more eligible carpoolers sign up for a permit, become members, and then receive a carpool credit payment each month of carpool eligibility. According to the university's website, it also offers incentives such as premium reserved carpool-only parking space and a free daily parking permit per eligible carpool member each month.

Humboldt State University, based in Southern California, had a population of about 9,000 students in 2015. The university offers carpooling incentives in the form of "Preferential Parking," where students with three or more (unless two passengers is the car maximum) occupants in their car get a preferential parking pass that allows them to park in metered parking spots.

The Study Area of Binghamton University

Binghamton University is a public research university with campuses located in Binghamton and Vestal, New York. Its 887-acre campus contains 120 buildings arranged in a very centralized layout, with the primary buildings, such as the Lecture Hall, Glenn G. Bartle Library, the Union, the Engineering Building, and the Fine Arts Building, at the center. Outside of

these core facilities lie many other periphery buildings, like the Events Center, the East and West Gyms, and seven different residential communities for undergraduates and graduate students. On the southern end of campus lies the University's 190-acre Nature Preserve, which is commonly called the largest lab on campus.

Transportation within and around campus is mainly by bus service, which is student-owned and operated. Within campus, shuttles run to transport students to and from various locations. Off campus, transportation is run by Off Campus College Transport (OCCT), another bus service that transports students to local neighborhoods in the Greater Binghamton Area, as well as to other popular destinations like Walmart, Oakdale Mall, and the University Downtown Center. Students can also take Broome County Transit buses for free, which also transport students to a range of destinations in the Greater Binghamton Area. Binghamton University offers some alternative transportation options to make getting around campus quicker, easier, and more convenient. The university has a partnership with Zipcar which provides the option of car-sharing to students. It also offers a bike share program and a cab service.

Binghamton University has a variety of parking options, which are designed to support and cater to students, faculty, staff and, visitors. The campus map in Figure 1 illustrates the various

parking lots and services offered by the university, including commuter lots, 24-hour residential

lots, special 24-hour lots, disability parking spaces, and metered lots.

Figure 1. Binghamton University Campus Parking Map
Source: Binghamton University Transportation and Parking Services
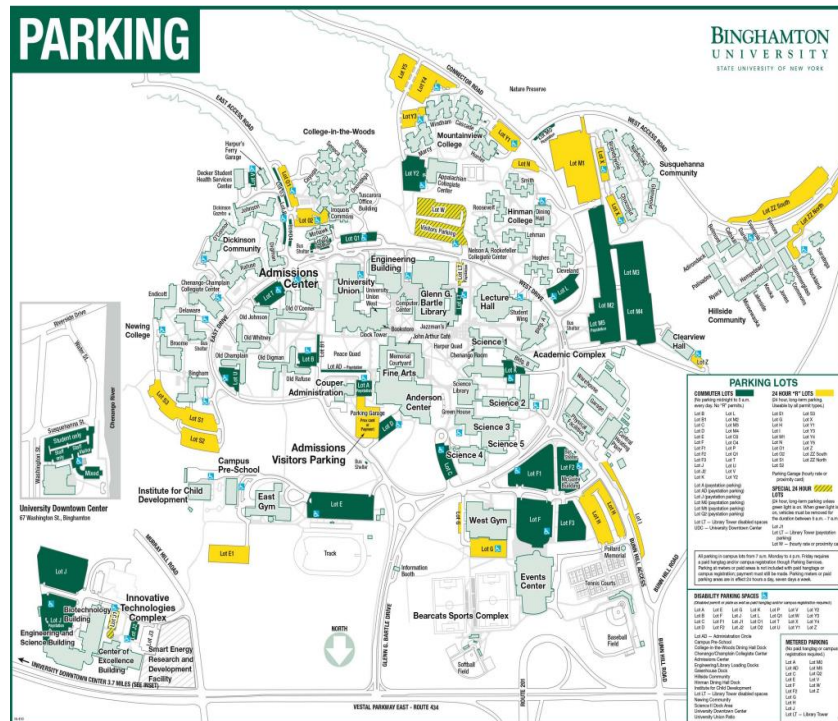
The campus layout affects parking trends, as most want to park close to their destination,

which increases the demand for parking in primarily in the central area and creates a parking

crunch. Although demand does not actually exceed supply, since many peripheral parking lots still

have many open spaces in these situations, the perceived condition is far different (Crane, 2016).

Measuring Carpool Potential - Hypothesis

To efficiently change a student body, the target population must first be well understood,

through an analysis of their opinions, concerns, and standpoints in relation to car culture. With this

understanding, it is feasible to construct both a wide and narrow view of how to cater to the needs

and wants of the people, while balancing this with a system that works for the university. A

problem of measuring carpooling potential is the fact that college students are not the most receptive to projects that wish to collect their opinions and concerns, even though the parking problem is a common complaint of the student body. Therefore, offering a possible means of solving or reducing the parking crunch should make students more willing to voice their thoughts. Other details and demographics such as travel time, income, and willingness to share a car are also necessary for the creation of a well-structured carpooling-based system that works for all, or at least for the majority.

The hypothesis is that by analyzing and identifying the viewpoints and attitudes of the student target population towards carpooling, alongside characteristics that likely influence or have an effect on these perspectives, it will be possible to measure and determine the potential success of a carpooling-based system at Binghamton University.

Methodology

Identifying Student Population Groups

To properly analyze the parking problem and construct a means of changing car culture, the major contributors to the parking problem must be identified—namely, undergraduate commuter students who attend Binghamton University but reside off-campus. This identification and grouping was begun by obtaining a list of all individuals with parking permits issued by the university. Faculty and staff were then filtered out, so only students remained. Based on parking permit type, the list was further cut down to contain only students with commuter parking permits. Then, this was filtered again based on education level to contain only undergraduate students, cutting out graduate students and other outliers. The final result was a listserv of undergraduate students with commuter parking permits, mainly students of sophomore-year standing or higher,

since students in freshmen year could only obtain a commuter parking permit if they lived in the area.

Research Methods (Qualitative and Quantitative Analysis)

For this study, a web-based survey of the selected population group was conducted in November of 2016. This survey was facilitated by the Transportation and Parking Services of Binghamton University. The survey did not ask for any private information of respondents, who were also kept anonymous. The survey was designed to measure the carpooling potential of students by estimating the overall interest and willingness of students to utilize this alternative transportation option. Survey questions based on satisfaction, drive time, comfort level with carpooling, perceived benefits, and perceived drawbacks of carpooling were asked, and different question formats such as multiple choice, rank order, and text entry were used in the survey. A mixed-analysis approach was then used, with quantitative analysis used for open-ended questions and quantitative analysis used for close-ended questions. In total, after staying active for 2 weeks, the survey obtained 825 responses.

Research Questions

After reviewing what was deemed as the necessary components of analyzing the carpooling system, the following research questions were developed:
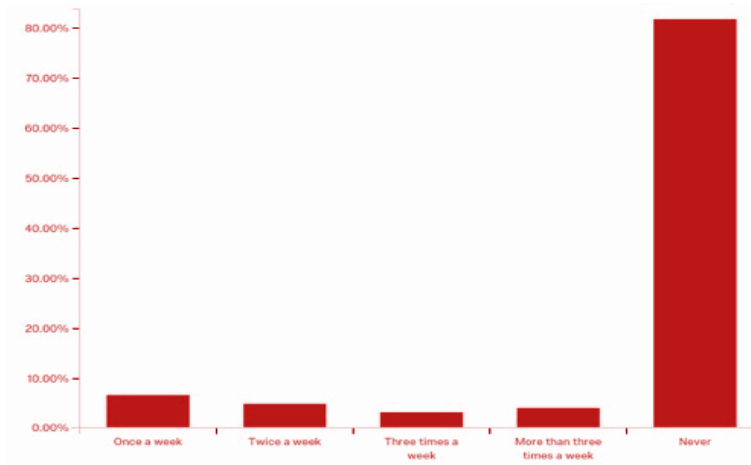
1. Why does a specific population of Binghamton University commuter students drive to school?
2. What is the current satisfaction of students with on-campus parking?
3. Would students be willing to carpool and how often would they be willing to?
4. How comfortable are students with carpooling, and what factors make them comfortable or uncomfortable?

5. Why have Binghamton University's carpooling incentives been unsuccessful?

Results

Why does a specific population of Binghamton University commuter students drive to school?

Knowledge of the current transportation situation or trends of the target population provides a base from which the carpooling system can be built upon and catered to, and serves as a platform for future growth and development. Usually, with pedestrian-oriented universities as an exception, when a campus is not carpool oriented, it is oriented towards single-occupancy driving or public transit. To have a more accurate view on which of these transportation orientations Binghamton University commuter students are inclined toward, students were asked in the survey how often they use public transportation on their commute to and from campus, which indirectly provided information on whether these students are public transit oriented or not.

Figure 2. Public Transportation Utilization on Commute to and from Campus

From a first review of the results, a strong skew in the distribution of the bar graph is evident. Over 80 percent of the commuter student respondents never use public transportation to school (Figure 2). It could be inferred that this is representative of students who drive to school every day, rarely ever using the other transportation services offered by the University. This proves that commuter students are mostly single-occupancy driving oriented, with only a few—less than 20 percent in total—taking public transportation between one and more than three times a week. The next step was to understand why this is, or for what reasons these students drive to and from campus, rather than using public transportation.

In order to facilitate a case-by-case analysis of why commuter students drive to school, students were asked to state their reason for doing this. Through this, an avenue was created to analyze the individual and distinctive thought processes involved in choosing this means of transportation. Qualitative methods were used to analyze this data, using a software called NVivo. Figure 3, a word cloud created by the NVivo software, shows the common keywords that students used to describe the reason for their choice of driving as a primary means of transportation. To analyze this, common themes will be selected and expanded upon below.

Figure 3. Word Cloud of Reasons Why Students Drive to School

Convenience

For the purpose of this analysis, slight obvious misspellings and stem words of convenient, will be included. Convenience was the most popular term from the word frequency analysis from results on the question of why students drive to school rather than use public transport. This was an expected result as convenience is a popular reason for driving. Those who mentioned convenience usually also coupled this with timing and control, and correlations are seen in the world cloud with words like "timing," "hours," and "control." Time was referred to in the sense of convenience of departure time, time saving, and making one's own schedule. As shown in the world cloud, there was also a trend on "freedom" characterized by the ability and flexibility to come and go as one pleases. Overall, students mostly responded to this plainly on its own.

Availability and Accessibility

This is mostly centered on the buses: how available they are to the students, and the feasibility of getting on the bus. This trend is descriptive of students' discontent with the availability and accessibility of buses, and how this makes them fall back to using cars. Topics that arise in this theme, as shown in the world cloud, are "seats," "full," "crowded," "unreliable," "ease," "efficient," "available," and "near." The backing trends here are unpredictability and uncertainty, as students highlight how buses are often overcrowded and, therefore, unreliable. Students also state how buses are often full by the time they arrive at their bus stop, which causes them to have to wait for the next bus and makes them late for class. There is also mention of how, for some, the far distance to the bus stops makes the buses less accessible and how certain bus stops have been removed, changed, or are unsafe.

Riding Experience

This theme is also centered around the buses, and the experience students get while riding them. Some identified word trends are "smell," "cold," "feel," and "comfort." Students highlighted how buses are sometimes hot and stuffy because they are packed. Students also raised concerns of occasional foul smells on buses and mentioned how this has been a deterrent. Some generally feel more comfortable driving themselves and consider it to be a more pleasurable experience in relation to that of riding the buses. The cold months also make the general riding experience less pleasurable as students do not want to wait in the cold (Figure 4).
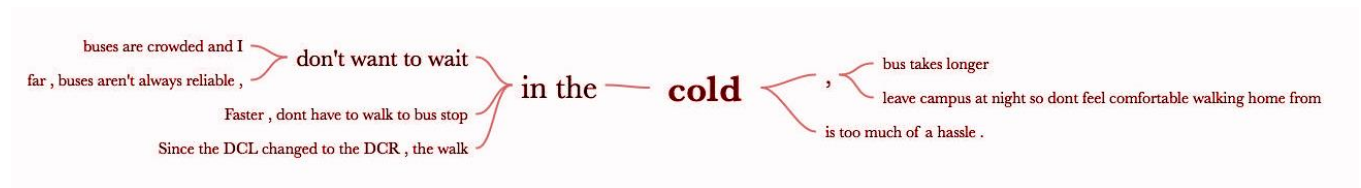
Figure 4. Word tree representation of key word "cold" in responses to why student drive to school

What is the current satisfaction of students with on campus parking?

Knowledge of current student satisfaction with parking on campus highlights the need—or lack thereof—for change. It also provides an estimation of to what extent this needs to occur.
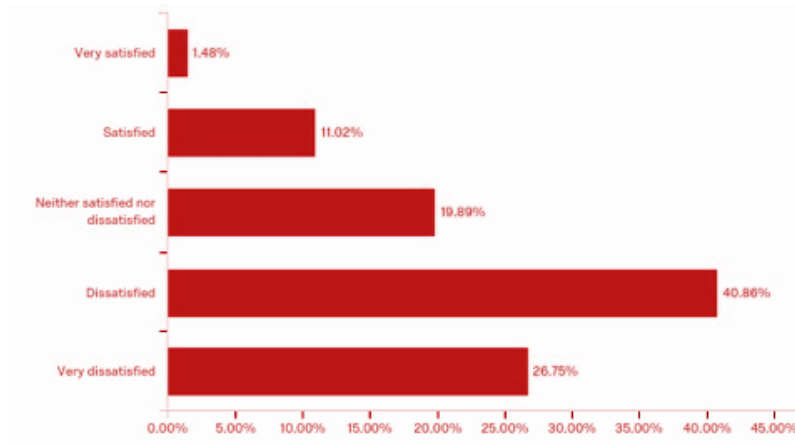
Figure 5. Student Satisfaction with Parking

Figure 5 depicts the distribution of students according to their satisfaction with on-campus parking. A fifth of the respondents, about 20 percent, were neutral with their satisfaction, neither satisfied nor dissatisfied. A plurality of students, at 41 percent, responded that they were "Dissatisfied" with parking, while another 27 percent were "Very Dissatisfied." Together, these percentages show that 68 percent of respondents, over half of the population, were not satisfied with the state of parking. Only 12 percent of students who responded were "Satisfied" with parking, with less than 2 percent saying they were "Very Satisfied." These results suggest the current state of parking on the Binghamton University campus and, from them, the conclusion can be drawn that student satisfaction is quite low.

Would students be willing to carpool and how comfortable would they be with this? What factors would make them uncomfortable?

Willingness

Willingness to carpool is a very important and underlying factor in measuring the potential effectiveness of a carpooling system on a college campus. Therefore, this study measures the disposition of students toward sharing a ride with others on their commute to and from campus. A

measure of change is a measure of the before and the after, therefore in order to measure the potential to change the car culture towards a more carpooling based system, two different approaches were made to analyze the willingness of students. The first approach was based on the current trends of popular car culture and owner behavior that millennials express, while the second approach was based on the future potential car culture.

The first approach measures how often students already share a ride with others on their way to and from campus. This is an indirect indicator of their current willingness to share a car ride, which is strongly influenced by the car culture they live in.
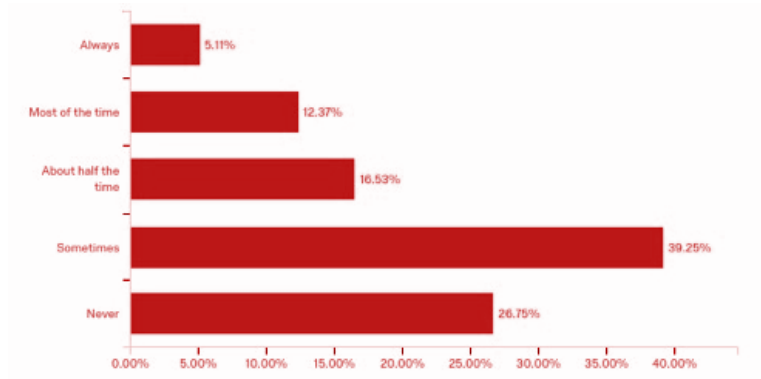

 Figure 6. Student ridesharing frequency

Figure 6 shows how often students ride with others on their commute to and from campus. The clear outlier in this distribution is the "Sometimes" variable. That is, a plurality of students (about 40 percent) only occasionally ride with others. Further, about 200 students, roughly a quarter of respondents, "Never" share a ride with others. Figure 7, a distribution of student

ridesharing frequency, shows a definite skew to the right, indicating how rarely students currently share rides with others.

Figure 7. Student ridesharing frequency

The second approach on the measure of willingness was based on future change in car culture toward a more carpooling-based system. Students were asked how often they would be willing to carpool with others in a week, as this information would serve as to forecast the potential
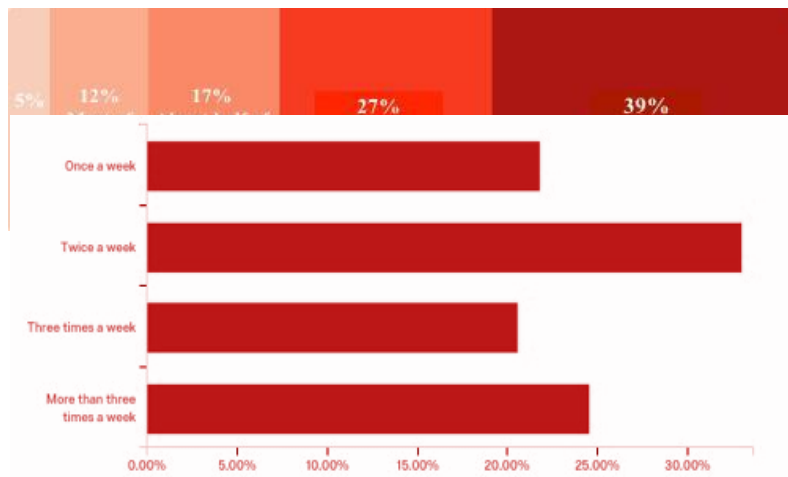

carpooling system customer pool.

Figure 8. Number of   times willing to carpool in a week

As shown in Figure 8, all respondents were willing to carpool at least once a week. These results showed positive willingness with over 30 percent of students willing to carpool twice a week, about 20 percent for three times a week and about 25 percent for more than three times a week. Contrary to the present situation described in the first approach, in which students do not share rides often, these results suggest that students would be willing to do this if such a system were created. Together, both approaches combined highlight the potential for creating a substantial change in the car culture, while also conveying a level of reliability in the student customer pool.

How comfortable are students with carpooling, and what factors make them comfortable or uncomfortable?

Comfort and willingness to carpool, as described above, work cohesively, as students would not be as willing to carpool if they were uncomfortable, and on the other hand, would be more willing to carpool if they were very comfortable. In order to measure the cohesiveness of these variables and also answer this question on comfort, students were asked in the survey to scale their level of
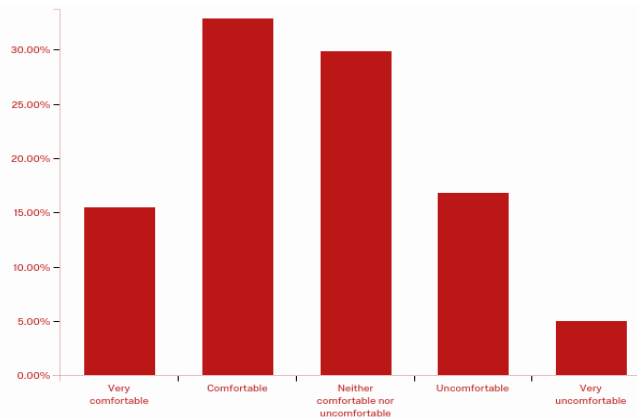

comfort with carpooling from "Very Comfortable" to "Very Uncomfortable". The results from student responses are shown in Figure 9.

Figure 9. Level of Comfort with Sharing a Ride

Over 30 percent of students, the largest share of respondents, described themselves as "Comfortable" with the carpooling, followed by students who were "Neither comfortable nor uncomfortable," a little less than 30 percent of respondents. Only a small population of about 5 percent were "Very Uncomfortable." These results suggest that the level of comfort for students regarding carpooling is moderate.

Different variables, such as specific characteristics of ride mates, could be responsible for a student's comfort, discomfort, or neutrality with sharing a ride. This was analyzed in the survey as respondents were asked to choose from a list of certain characteristics of ride mates (gender, race, nationality/originality, smoker/non-smoker, none), which would be relevant to them.
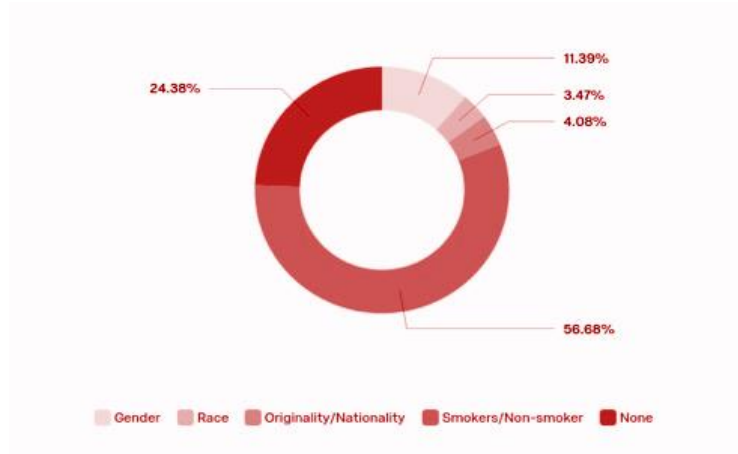
Figure 10. Relevancy of Certain Ride Mate Characteristics

According to the Figure 10, the most relevant characteristic to a student is whether their ride mate is a smoker or non-smoker. It can be inferred, from popular opinion, that the smell of smoke created from this act could create some form of discomfort for ride mates. The next most relevant characteristic is, indeed, the lack of thereof, as about 25 percent of students reported that they do not care about certain characteristics of ride mates and responded with "None." In addition, other characteristics like gender, race, and national origin remained low.

Why have Binghamton University's carpooling incentives been unsuccessful?

In early 2015, Binghamton University created a carpooling program through Enactus, which is a national organization that facilitates college campus projects through sustainable solutions. The process was as follows: students signed up for the program and were added to a list used at the entrance of campus. Upon arrival, their names were checked on the list using their ID, and students were handed a day pass voucher for a specific lot. This incentive gained attention and picked up momentum at first, but after a while, participation began to die down. In the long run, the program was deemed unsuccessful. In October 2016, the university offered a slightly different incentive: "Twenty vehicles per day that are traveling with three or more occupants will receive a free garage or paid lot pass by stopping at the Information Booth. For this incentive, the vehicle

must have a valid parking permit and all individuals in the vehicle must show their University ID."
This attempt, like the first, did not gather much momentum.

This section of this research aims to evaluate the possible reasons why these incentives were unsuccessful, through an analysis of students' opinions and thoughts. This information was gathered from an open-ended question in which students were asked to leave their general comments. The information to answer this particular research question was filtered out with these key words – "incentive(s)," "incentivizing," "incentivize" – and have been grouped based on general themes and trends in relation to the incentives.

Not Incentivizing

In this trend, students expressed how these incentives did not motivate or encourage the students to take part in carpooling. The main reason for this was the fact that this carpooling program still required students to purchase a parking pass, and at the same price, as shown in this quote from a respondent: "We all paid for either a semester or annual parking passes, so the carpooling incentives are actually sort of a slap in the face. Unless the incentive is a discount or a full refund of the parking passes on vehicles that won't be used for carpooling, I'm not interested." Students were not motivated as they had already paid a sum of money for campus parking.

Non-Inclusive

In this trend, students complained that the system did not cater to the whole student population. For example, the latter incentive for three or more people does not account for students who drive cars with a two-passenger maximum. Students who had just transferred also raised the concern of not knowing enough people yet to carpool with.

Time Consuming

In this trend, the popular student opinion was that having to come and stop at the information booth to get this incentive would be very time consuming and unnecessary. Students expressed how, if they were late for classes or were in a rush, they may not have the time to spare to do this.

Number for Incentive is Too Small

Students expressed that the limit of twenty cars per day was too negligible and marginal for a campus this size. Students would also be unaware of their eligibility or ineligibility until they had taken the time to stop at the booth, and might have to search for parking as usual. According to a respondent, "limiting this incentive to the booth will bottleneck traffic while everyone tries to get to the booth for their pass, only to find they aren't eligible." In this trend, students mainly questioned the effectiveness and comprehensiveness of making a substantial difference to the parking crunch by only offering this incentive to twenty cars.

Recommendations for Parking Incentives

Incentive Re-structure

To address the problems raised by students of incentives as non-inclusive and non-incentivizing, Binghamton University could take a step to reducing the required number of people needed in a car for it to be considered a carpool, from three or more, to two. See the response of one student:

> I was personally involved in creating the Enactus Carpooling Initiative during the 2014-2015 school year (which is the same exact program you are now offering). We utilized [the] main perk of being able to park in the Paid Lot for free for the day and found limited success. The main issue we ran into was participants having three or more students in their car...I believe that no matter how many perks/incentives you offer ultimately this program will not be successful unless the limit is lowered to two occupants of each car. It is very difficult to gather a group of 3 students together on a consistent basis.

Based on this, as well as a range of other concerns raised by students on the incentive structure, a revision of this could be substantially beneficial to both the university and students.

Discounted Parking Permits for Carpoolers

Binghamton University could also consider reducing the parking permit price for carpoolers to encourage them and to incentivize others to participate. This could address the problem of students feeling unmotivated to carpool. This comes as a result of students' awareness that they paid the same amount as others to park on campus, making carpooling just seem like getting a better parking spot. The University of Houston and The University of Southern California, for example, offer discounted parking permits to students, which serve as incentives to old and new carpooling participants.

Further Analysis of Data

Benefits and Drawbacks of Carpooling

In order to create a system that works for its consumers, one must be aware of what students feel would be a strong case for carpooling—what would make them join a carpool—and also what students feel are drawbacks—what would make them not want to join a carpool. In the survey,

students were given lists of both common benefits and common drawbacks of carpooling, and were asked to select all that apply.

Figure 11. Benefits of Carpooling to Students

As shown in Figure 11, reducing the parking crunch is something of high interest and need to the student body, as over 70 percent of respondents believed that this is a benefit to carpooling.
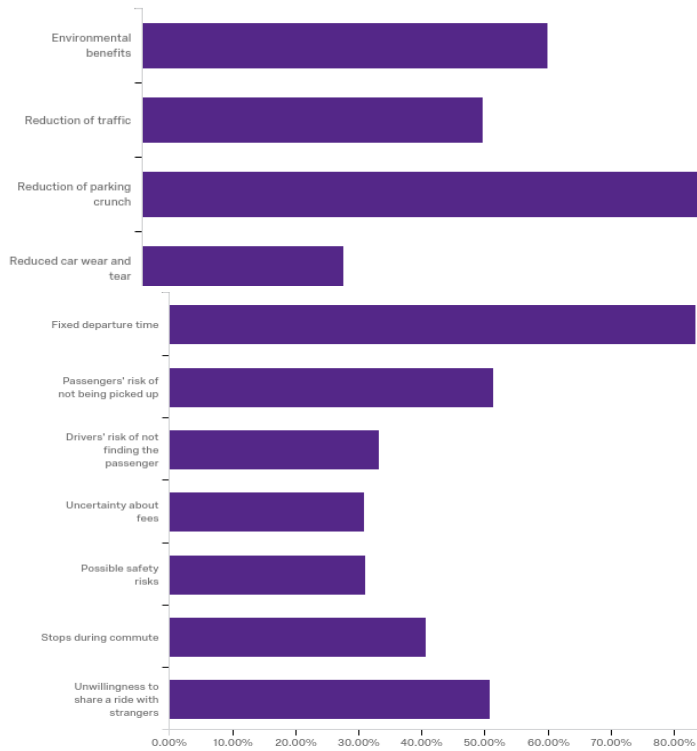
Cost efficiency and environmental benefits were also important to students. As for other categories such as reduced car wear and tear, an avenue to build relationships or make connections, the response rate was relatively low in relation to others, but still exceeded a quarter of the respondents.

Figure 12. Drawbacks of Carpooling to Students

With regard to the drawbacks of carpooling, it is easy to see in Figure 12 that the outlier in the data set was "Fixed departure time." Fixed departure allows for no flexibility in a person's routine, which could be unrealistic for a college student with a dynamic life. The other options with the next highest percentages were: "Passengers risk of not being picked up," "stops during

commute," "unwillingness to ride with strangers." These are all usual and expected carpooling drawbacks seen around the country.

Student Off-Campus Distribution

To obtain an overview of off-campus commuter student distribution, students were asked in the survey how far their commute is to and from campus. The research problem faced here was the underestimation of student distances from campus, as shown in the limited results of Figures 14 and 15. About 50 percent of students live above 3 miles away from campus.
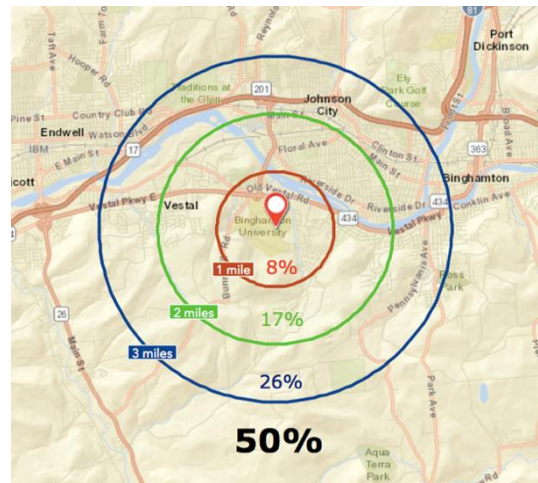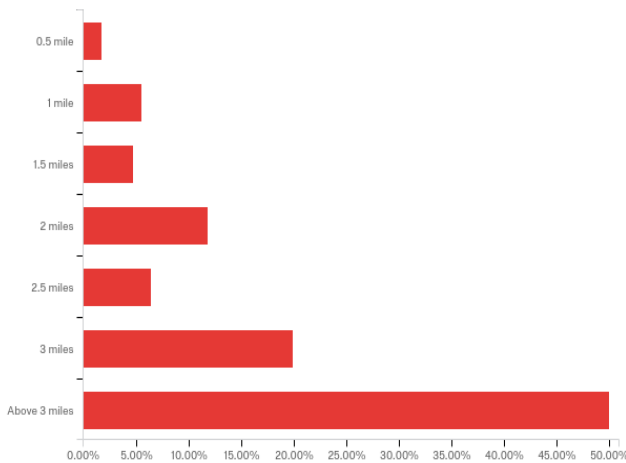
Figures 14 and 15. Student Distance from Campus by Miles
Source/Tool: ESRI Business Analyst

This information was mapped (Figure 15), creating a spatial view of the data. In phase two, this information on student distribution will be used for location and market analysis for incorporation into the creation of a potential carpooling system.

Conclusion

Overall, this study aimed to estimate the potential of carpooling and overall car culture change towards carpooling at Binghamton University. Based on student opinions and thoughts, this research analyzed why students drive to school over using other forms of transportation; the

current satisfaction of students with campus parking; their willingness to carpool; and their comfort with carpooling. Topics like carpooling incentives, benefits of carpooling, and drawbacks of carpooling were also discussed. Information obtained about student off-campus distribution would be more detailed and better understood if higher mile increments were accounted for and provided in the survey question options. This will be revised in phase two of this research.

The hypothesis of this study stated that by analyzing and identifying the viewpoints and attitudes of the student target population towards carpooling, alongside characteristics that likely influence or have an effect on this, there is a high probability that a carefully tailored carpooling system will be successful at Binghamton University. Based on this observation, the hypothesis of this study has been confirmed. By combining the obtained results, in terms of the different variables measured and analyzed, it is not difficult to see trends in student behavior, student opinions, and student wants and needs. With this detailed understanding of this specific population, there is a higher feasibility that such created carpooling system will effectively cater to the majority.

Parking problems are always going to be a topic at higher institutions, because these will continue to expand exponentially in relation to the available parking space. These can be managed and mitigated through the use of other transportation options, such as carpooling. It will take time and effort to establish a fully functional and efficient carpooling system in a university of this size, as this is a long-term goal, but with the findings from this research, Binghamton University can work its way toward helping to solve the parking problem and improving the situation in the short-term.

Next Steps in Research

The next step in this research would be to perform location analysis using the location data of survey respondents. This could then be mapped to analyze trends and patterns. Market analysis could also be executed to create an overview of potential student carpooling groups and customers in general for consideration in the carpooling system formulation. Further steps in this research also include deeper qualitative analysis using NVivo, to uncover more complex and interconnected correlations and trends.

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