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Tracking Sources of Enrollment at ETSU through the Use of GIS.

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Tracking Sources of Enrollment at ETSU Through the Use of GIS

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by

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ABSTRACT

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The objective of this research is to look at fall freshmen enrollment data for East Tennessee State University and see if patterns in the enrollment exist. This paper focuses on fall freshmen enrollment during the years 1997, 2002, and 2007 at ETSU. Once the data were gathered, they were mapped and statistically analyzed using geographic information systems (GIS) and statistical analysis software.

Many things were learned from the GIS maps created and statistical analysis. First, the maps showed that from 1997 to 2007, ETSU's enrollment became more consolidated in the East Tennessee region and moved westward into Middle and Western Tennessee. Second, the GIS maps visibly showed that most of the high schools locations were in close proximity to an interstate system. Third, when the statistical analysis was performed the factors "high school GPA" and "in-state tuition" were found to be significant to enrollment.

DEDICATION

This thesis is dedicated to the memory of my Uncle Rob Thacker. In the fall of 2009, my Uncle Rob Thacker lost his life to a long battle with cancer. He was an instrumental figure throughout my life and will be forever missed.

I would like to specifically thank Dr. Ke Chen of the Geography Department of ETSU for her assistance throughout this entire process. Dr. Chen was a contributing factor in my decision to come back to ETSU and helped guide me to the career path I have chosen. In addition, I would also like say thank you to Dr. Keith Johnson and Dr. Andrew Clark of the Technology and Geomatics Department at ETSU. Both Dr. Johnson and Dr. Clark have been very helpful and supportive throughout my graduate course work.

To my family, thank you all for being so very supportive. To my Dad, thank you for instilling the principles of hard work and determination. To my Mom, thank you for instilling the importance of education and the notion of never stop learning. To my Wife, thank you for being so very supportive of all of my decisions. You were patient and understanding throughout this process and I appreciate everything you have done for me.

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In addition, I would like to acknowledge my family and friends. Their constant support helped me push through and finish when I sometimes wanted to quit. Thank you all.

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CHAPTER 1

INTRODUCTION

The purpose of this study is to analyze the fall freshmen enrollment patterns of East Tennessee State University during the years 1997, 2002, and 2007. A need exists in the university to know and understand where its students have been coming from and what factors may affect their decisions to enroll. This study will help the university see trends and patterns, plan and execute better marketing campaigns, and save money in recruiting students. Presently, data on enrollment for the university hide potential trends and patterns because the information is on charts, text, and spreadsheets. This study will visually demonstrate to the university the enrollment patterns and possible trends of its students. In addition, this study will benefit the university in planning future enrollment process to recruit students.

In the past other institutions have successfully used Geographic Information Systems (GIS) to help them understand enrollment data. As an example, McHenry County College is an educational institution that has successfully used GIS as an aid for analyzing enrollment and recruitment information.

McHenry County College has been using GIS to aid them in their marketing campaigns to recruit students. In the past the college used a direct mail campaign that blindly sent out information about the college to addresses where no one resided. To solve the problem the college was having, they started using GIS to better market the college to prospective students.

This study will greatly add to the literature of how a university successfully used GIS to see where its enrollment comes from and what trends were found in the process. This study will provide university officials with a great insight into ETSU's enrollment and how it grew steadily from 1997 to 2007. Second, this study will visually show where ETSU's enrollment is coming

from. Through GIS, it will be possible to see where enrollment has increased and decreased, as well as where the students have been coming from, are coming from, and possibly may be coming from in the future. I feel that this study will provide greater knowledge into ETSU as a whole.

In performing this enrollment study I used ETSU's freshmen fall enrollment data from the Office of Institutional Research at ETSU for the years 1997, 2002, and 2007. GIS was used to visually demonstrate where freshmen enrollment has been coming from. The study used three types of GIS maps: one that displayed the high schools in relation to geopolitical boundaries, one that shows the spatial density of enrollment in relation to geopolitical boundaries, and one that shows freshmen enrollment numbers in 25-mile incremental distances from ETSU. The regression model was used to analyze what factors affect enrollment. For this method tables were compiled for the 3 years sets and run in the statistical analysis software SPSS. The results of this study will help predict the future of ETSU's enrollment. I believe that the study will help ETSU better market and target enrollment. Having a better knowledge of where to allocate funds for recruiting students will not only help the university grow but also save money. Staying ahead of other universities will enable ETSU to set itself apart in the region.

CHAPTER 2

REVIEW OF LITERATURE

In general, the decisions for an individual student to enroll in a specific university are influenced by three groups of factors related to university characteristics, socioeconomic factors and spatial factors. In the following section, I will review how these factors may influence how a student chooses a university.

University Factors

University factors that may influence an individual student's decision to enroll include its quality, price, financial aid, and facilities. The quality of an institution and the students it recruits may be a very important driver towards the enrollment decisions of students (Toutkoushian, 2001). Colleges are competing with one another for reputation of quality and rankings for popularity (Long, 2004). Growing evidence suggest that college enrollment decisions are closely related with attending a college with a good reputation and where the highest possible returns exist (Long, 2004). The desire to attend a school that can offer a good education and more possible opportunities after graduation is driving enrollment decisions. The result of the increase in the quality of students is that it is easier to recruit high ability students (Toutkoushian, 2001). College quality is found to be an important factor for students who are high-ability. Long (2004) finds that this is the case because ability and college quality are complements. Institutions that are not as selective as others on the quality of their students receive less interest from high ability students (Toutkoushian, 2001). The more selective an institution is on the quality of the students who attend, the greater interest they can receive (Toutkoushian, 2001). The returns of a higher education have become closely tied to the type of school attended (Long, 2004). When selecting a college, parents and students look for a college that will give the greatest opportunities for

employment after graduation (Leppel, 1993). The quality of the education they receive may determine what types of opportunities they are offered after they graduate. Students are attending the best colleges to get the highest rate of return. By receiving an education from a quality institution a student will be more likely to obtain a more desirable standard of living (Long, 2004).

Higher quality of education is usually associated with higher tuition price (Long, 2004). Long (2004) finds that higher tuition levels increase the likelihood of enrollment at certain schools. Institutions that are synonymous with quality often cost much more because of the extra expenses and programs they offer their students (Long, 2004). The increase in student related expenses often attracts students of high ability. It is found that when there is an increase of $1,000 in instructional expenditures there is an increase in the likelihood of someone choosing a particular college (Long, 2004). However, institutional tuition costs play an intricate role in the decision between colleges; a higher tuition charged by a college can negatively influence enrollment decisions (Long, 2004). If the college is too expensive the person may not be able to enroll there due to the cost. When an extra thousand dollars is added to the tuition or room and board, there is a decreased likelihood of a student enrolling (Avery & Hoxby, 2003). Heller (1999) argues that when there is a price increase on tuition there is a drop in enrollment. Furthermore, McPherson and Schapiro (1991) suggest that there is a positive correlation between enrollment and net cost that has come about from the strong demand among middle and upper-income students for higher education. This high demand among these two groups has caused colleges and universities to raise their prices, which has in turn affected the enrollment of lower-income students (McPherson & Schapiro, 1991).

While higher tuition price may deter some students from lower-middle classes, financial aid has a positive effect on the decision to enroll (McPherson & Schapiro, 1991; Van Der Klaauw, 2002). Low income students have an increase in the likelihood to enroll when they have access to grants (Avery & Hoxby, 2003). Heller (1999) and Avery and Hoxby (2003) find that an increase in scholarship grant spending corresponds to an increase in enrollment. The enrollment decisions of students respond positively when the cost of college is reduced and financial aid is increased (Avery & Hoxby, 2003; McPherson & Scharpiro, 1991). While people from the upper class are barely influenced by financial aid, it could be crucial for students from the lower class (Van Der Klaauw, 2002). The amount of aid they receive determines whether they will be able to go to school (Van Der Klaauw, 2002). In McPherson and Scharpiro's study they find an increase in enrollment occurs among lower and middle class students when financial aid is offered (McPherson & Scharpiro, 1991). Toutkoushian's (1999) study of New Hampshire seniors finds that income did not play as crucial a role in the decisions of lower income students to enroll in college, due in part to the financial aid offered to lower-income students. Long (2004) and Avery and Hoxby (2003) agree that with the increase in aid the price of going to college becomes less of an issue.

Another university factor that is often overlooked and underestimated when looking at an individual student's enrollment consideration is the facilities and grounds of a university. The aesthetic appearance of university buildings can have a heavy influence on potential students' decisions to enroll. The appearance and quality of the facilities of an institution signal to students how much the university cares for students (Cassidy, 2007). If a university looks dreadful in physical shape and has poor or insufficient facilities, a prospective student would have a feeling that the university does not care for them, and may not consider applying to the school. Some of

the facilities that are considered very important in students' decisions are library, residence halls, classroom buildings, and sophisticated academic technology (Cassidy, 2007). These are the places on campus where students spend much of their time. Cassidy's study finds that 26% of students will rule out a university if their facilities are inadequate (Cassidy, 2007). Besides libraries and residence hall, Cassidy (2007) also finds that, 73% of the students from his survey report that facilities relating to their majors are very important. Other facilities on campus with some dramatic effects on students' decisions are the recreation facilities of the university. Cassidy 2007 finds that 32% of students consider the recreational facility as either "important" to "very important" in their decision process.

Social and Family Factors

In addition to university factors, another important group of factors could be generalized as social factors including influence from friends and peers, university-high school network, and family.

The decision to enroll in college can be heavily weighted by the influence of a group, such as friends or schoolmates. These groups can be made up of friends, people who go to the same high school, live in the same area, are in the same socioeconomic class, and have the same beliefs. Perna and Titus (2005) find in their study that the enrollment decisions of the previous graduating class can have a great impact on the following class's decisions to enroll. They also find that a student's decision to enroll in college is positively influenced by the decisions of friends who decide to go to college. There is a positive correlation between the decision to enroll in college and friends' decisions to enroll (Perna & Titus, 2005). If a student's friends go to a school, he or she may decide to attend the same school, as the individual feels a connection to that institution (Goenner & Pauls, 2006). In a survey conducted by Leppel (1993), between 20%

and 30% of students say they were influenced to go to a school because people they already knew went there. Another group influence factor when high school graduates select a university is the student body of the institution. The student body of a university is the outward appearance of a university and can be the first impression a person gets when he or she visits the campus. Prospective students may look at the student body of a university to see if they identify with the students of that school. Prospective students want to find a university where they fit in and share common traits with the students at the school. Toutkoushian (2001) finds that if a prospective student is able to identify with the student population of the institution then he or she will be more likely to attend. Toutkoushian (2001) study also shows that students desire to attend a university where the average student body closely matches their own ability.

An influential aspect that affects an individual student's enrollment decision for a university is a feeder network. A feeder network occurs when a college continually receives students from a particular high school year after year (Wolniak & Emberg, 2007). These feeder networks play an intricate role in the enrollment decision (Wolniak & Emberg, 2007). The relationship a college has with particular high schools year after year is noted by the college admissions department (Wolniak & Emberg, 2007). They become aware of the schools they heavily recruit from and know what type of students they get from that school (Wolniak & Emberg, 2007). A feeder network begins to develop if there is a continued enrollment of students from a high school in a college year after year (Leppel, 1993). Feeder networks may have a positive impact for high schools and colleges. The more the connection between the schools the more likely the students from that high school will enroll there (Wolniak & Engberg, 2007). Students from such high schools in a feeder network are more likely to attend a university where predecessors attend (Goenner & Pauls, 2006). This feeder network effect is called the

bandwagon effect (Leppel, 1993). When a high school does not historically have a feeder legacy with certain colleges, its students are less likely to enroll at those colleges and will have fewer options for where to enroll (Person & Rosenbaum, 2006; Wolniak & Engberg, 2007). High schools without a feeder network with a college will also have a difficulty expanding their numbers of college bound students (Wolniak & Engberg, 2007).

Parental involvement and family background plays an intricate role in the decision of college enrollment. Perna and Titus (2005) find that when parents are more involved in their children's college decisions, there is a greater chance the child will enroll in college. Parental involvement with their children greatly affects their children's decisions. Frenette (2004) and Leppel (1993) also find that students whose parents possess a college degree are more likely to go to college than students whose parents did not attend. Toutkoushian (2001) finds that the demand for higher education rises when at least one of the student's parents has a higher education degree. In comparison, a student whose parents did not go to college is more likely to go to a school of lower stature and less likely to go to a school that is out-of-state.

The decision to attend a particular college or university can be greatly affected by the parents and siblings of an individual. When a parent or a sibling attended an institution it may push a student to go to the institution he or she attended (Avery & Hoxby, 2003). Avery and Hoxby (2003) find that having a strong family alumnus influence at a university may give a person a tie to that institution. The student may have a feeling of allegiance to the institution due to familiarity. The student may feel he or she must attend a school he or she really does not want to go to because his or her parents went there. Even if parents do not pressure their children to go to their school, the student may feel compelled to go there because that is where the parents

attended. The student may feel that this is a necessary choice to avoid disappointing his or her parents.

Family income also matters regarding students' university choices (Toutkoushian, 2001). Higher family income has a positive effect on the probability of enrolling at a college, as he or she is less influenced by the cost of tuition (Frenette 2002, 2004; Long, 2004; Toutkoushian, 2001). Low-income students are sensitive to price when it comes to their decisions between colleges. They are more restricted in the schools where they can enroll (Long, 2004; Toutkoushian, 2001).

Geographic Factors

The major geographic factor that influences a student's college enrollment is the distance between the college and the high school he or she attended. In general, as distance increases, the probability of enrolling in the school decreases. There are multiple reasons. First, as distance increases the amount of information available decreases (Goenner & Pauls, 2006; Leppel, 1993). Also, when there is greater distance there is less likelihood of a recruiter or catalogs about that school reaching the public (Leppel, 1993). Consequently, if students do not have information available about a university, their likelihood of enrolling at that institution decreases (Leppel, 1993). Second, financial cost is increased with distance (Frenette, 2002; Goenner & Pauls, 2006; Leppel, 1993). By choosing to attend a school within commuting distance, students may live at home and save money on rent, travel, and other related costs (Frenette, 2002). The people who are most affected financially by distance are individuals from lower-income families (Frenette, 2002, 2004). Studies have shown that individuals from disadvantaged economic backgrounds are more likely to go to a college that is affordable and close to where they live (Long, 2004). Third, when there is more distance between a university

and potential students, more competitors emerge (Leppel, 1993; Long, 2004). If a university is isolated and does not have competing colleges close by, potential students within close proximity are more likely to enroll in this institution (Goenner & Pauls, 2006). Otherwise, competing universities located near each other provide more selections to students, and the chance of one student enrolling in a particular one decreases (Goenner & Pauls, 2006). Fourth, distance in terms of travel, in and of itself, is a great deterrent to enrollment. When there is a great distance to travel to school, there is much time allotted for travel. Studies find that when it takes less time to travel to a school, there is an increase in the odds of enrollment (Leppel, 1993). In particular, Frenette (2004) finds that students who live beyond commuting distance to a university are less likely to enroll straight out of high school if at all. Furthermore, feeder networks are harder to develop with added distance. Leppel (1993) finds that when there is an increase in distance between a high school and an institution there is less likelihood of recruiting multiple students from that high school.

However, the influence of distance on an individual student's enrollment decision is not agreed universally. Long (2004) argues that, with the advances in transportation and communication, the distance between an institution and a student is no longer as important a factor as it used to be. However, he does agree that distance still plays a decisive role on the enrollment decisions of lower class people.

Use of GIS in University Recruitment

Geographic Information Systems (GIS) has been proved an effective tool for universities admissions departments to evaluate their enrollment and help in their recruitment process. A GIS system is able to capture, store, analyze, and display geographically referenced information according to its location (USGS, 2007). Through mapping, GIS visually displays where its

students come from. Thus it enables a university to identify the areas where enrollment is lower and better target that location with recruitment campaigns (Read, Higgs, & Taylor, 2005). Over time, GIS will better assist a university in tracking the tempro-spatial pattern of admissions stream and better predict trends in the future (Herries & Marble, 1997).

As universities are not mobile, it is important for them to recognize the changing enrollment and to make the necessary changes to survive (Marble et al., 1995). From earlier simple student distribution maps for marketers to a more analytical view to monitor student recruitment and retention (Marble et al., 1995; Read et al., 2005), the evolving function of GIS has displayed its power in the university recruitment process.

There are at least three ways that GIS technology can be effectively used in the improvement of college admissions (Marble et al., 1995). First, GIS can be used to visually and statistically show historical patterns (Marble et al., 1995). Universities can use GIS technology to process large amounts of data and present the data in an appealing, easily accessible map format (Warren, 2007). Another intricate aspect of GIS is that it gives universities the ability to locate patterns that may not be easily revealed by charts, graphs, and tabular reports (Mora, 2003; Read et al., 2005).

Second, GIS can help colleges and universities develop plans to target market those areas or individuals. GIS maps are easily created as soon as boundary and population layers have been downloaded, showing the areas of highest population where recruitment can be made (Read et al., 2005). When historic data are incorporated into GIS, possible year-to-year trends can be uncovered (Read et al., 2005). Universities that use GIS's abilities will be able to see where the other schools are and where they are recruiting. Just looking at the numbers of students enrolled in a university does not provide an analytical result (Zhou & Wu, 2003). As an example, areas

where there is less population and greater distance from the university can be expected to provide less enrollment to a university than those that have more population and are closer (Zhou & Wu, 2003).

Third, GIS provides admissions the ability to retarget recruitment resources with the real-time or near real-time information of the admissions stream (Marble et al., 1995). GIS aids universities in making decisions with regards to planning and implementation of recruitment strategies and tactics (Mora, 2003). Universities that are able to change their focus quickly will have an advantage in the future (Herries & Marble, 1997).

For instance, GIS is used in the undergraduate admissions of Ohio State University's Columbus campus. The university administration established goals to the undergraduate admissions to be answered in the areas of quantity, quality, and diversity (Mora, 2003). The infrastructure of Ohio States' GIS is made up of both internal and external data sources. The internal information source comes from the undergraduate admissions database, which has multi-year data on those who applied, prospective students, those who were admitted, paid fees, and enrolled (Mora, 2003). The external information comes from demographic data from Claritas, a leader in precision marketing with the use of geodemographic; Ohio Department of Education which provides enrollment statistics from public high schools; national testing services (ACT and SAT) which gives names and test scores of potential students as well as addresses of high schools in the United States; Geographic Data Technologies which makes geocoding services available; and ESRI which sells GIS software, base map data, and digital mapping software (Mora, 2003). With these data, Ohio State has been using GIS technology in planning and evaluating current and potential geographic markets for enrollment. The university realized that many times patterns get hidden in text, tables, and charts (Mora, 2003). A key feature of GIS is

its ability to display multiple layers visually at once on map. This ability to examine multiple types of information at the same time makes finding patterns easier and is quite useful.

Another example of a university using GIS in marketing is McHenry County College in the state of Illinois. McHenry County College has been using GIS to streamline its marketing. Historically the college has used a direct mail campaign to send prospective students information on the college. The problem the college had using this method was that it was sending information to every registered postal address whether someone lived there or not. Because McHenry College did not know where they were sending their information it resulted in a huge waste of paper and postage. The college decided that it needed to target its prospective students better. To better accomplish their marketing to prospective and potential students McHenry County College enlisted the help of a technology firm TETRAD to geocode their two types of databases: prospect and enrollment (Romeo, 2005). TETRAD geocoded all of McHenry County College students addresses into the two separate areas of currently enrolled students and prospective students based on information from the U.S. Census and Claritas. The firm also helped the college create thematic maps to illustrate where their enrollment was in the area (Romeo, 2005). With GIS, McHenry County College is now able to have better marketing campaigns to reach their students and it has resulted in greater enrollment yield (Romeo, 2005). Because of GIS, McHenry County College now knows where its information is being mailed and they have saved over $100,000 in printing and mailing (Romeo, 2005). GIS has also helped McHenry College steadily increase their enrollment.

Besides visualization, GIS is a powerful tool in modeling enrollment patterns**,** Zhou and Wu (2003) analyzed enrollment patterns within Ohio's state university system. Using 2003 Ohio Board of Regents enrollment data, they employed two methods, market penetration index (MPI)

and gravity model, to investigate the attraction of public universities in Ohio. In Zhou and Wu's study, the market penetration index presumes that each university proportional share of the OHIO student enrollment will be found operating in each of the 88 counties in OHIO (Zhou & Wu, 2003). It is defined by a formula where *I* represents a state university, *J* represents a county, *N* is the total of universities, *M* is the total counties (88), and *Xij* is the number of students from the county *J* enrolled at university *I* (Zhou & Wu, 2003).

MPI formula is listed as in Equation 1.

$$MPI = \frac{X_{i,j} | \sum_{i=1}^{n} X_{i,j}}{\sum_{j=1}^{m} X_{i,j} | \sum_{i=1}^{n} \sum_{j=1}^{m} X_{i,j}} \quad \textbf{.....Equation 1}$$

To further analyze the impact of distance in students' choices for higher education, Zhou and Wu also employed the gravity model to examine why some counties in Ohio have fewer enrollees than would be expected given their population and distance to the university. The gravity model formula is made up of *Pi* importance of the location of origin (County), *Pj* is the location of the destination (university), *Di,j* is the distance between the locations of the county and the university, *K* is a proportional constant. In the formula the calculated *Ti,j* represents the interaction of the counties and the universities (Zhou & Wu, 2003).

Gravity Model is presented in Equation 2.

$$T_{i'j} = k \frac{P_i^{\lambda} P_j^{\alpha}}{d_{i,j}^{\beta}} \quad \textbf{.....Equation 2}$$

CHAPTER 3

DATA AND METHODOLOGY

East Tennessee State University (ETSU) was founded in 1911 as East Tennessee State Normal School in Johnson City, Tennessee. The school has had several different names but in 1963 the college was changed to a university and its name was changed to East Tennessee State University. ETSU is a public 4-year university and is part of the Tennessee Board of Regents (TBR) system which governs six state universities and 13 community colleges. The university is located off Interstate 26 at the foot of the Appalachian Mountains. Though the university is located in an urban area, the surrounding areas are mostly rural. Enrollment at the university has continued to grow over the years and is steadily increasing every year. During 2004 to 2008, ETSU's average undergraduate student enrollment was around 11,000 to 12,000. ETSU's student population is made up of many different types of people.

Data

Freshmen enrollment data in the fall semesters of 1997, 2002, and 2007 at ETSU were collected from East Tennessee State University's Office of Institutional Research. These data contain individual student's gender, race, GPA, major, high school, city, and state. From 1997 to 2002, there was a decrease in the number of freshmen students enrolling at ETSU. During that time frame the number of freshmen students that enrolled at ETSU dropped from 1,424 students to 1,408 students. From 2002 to 2007 the number of freshmen students who chose to enroll at ETSU increased from 1,408 students to 1,816 students.

To present the spatial distribution of these students enrolled at ETSU, the geographic coordinates of the high schools were located from Google Earth. This information was then integrated into GIS system. Figure 1 below presents the location of high schools where ETSU

recruited students. Figure 1 shows that the majority of the high schools that have provided students to ETSU are located in Tennessee, North Carolina, and Virginia. In particular, a majority of students seem to be coming from the Shenandoah Valley in Virginia and the Tennessee Valley in East Tennessee. Figure 1 also shows that a possible pattern exists between enrollment and urban areas. It seems that many of the high schools where ETSU's enrollment is coming from are located in larger urban areas such as Washington, DC; Atlanta, GA; Nashville, TN; Columbia, SC; Knoxville, TN; Chattanooga, TN; Memphis, TN; Denver, CO; and Richmond, VA.

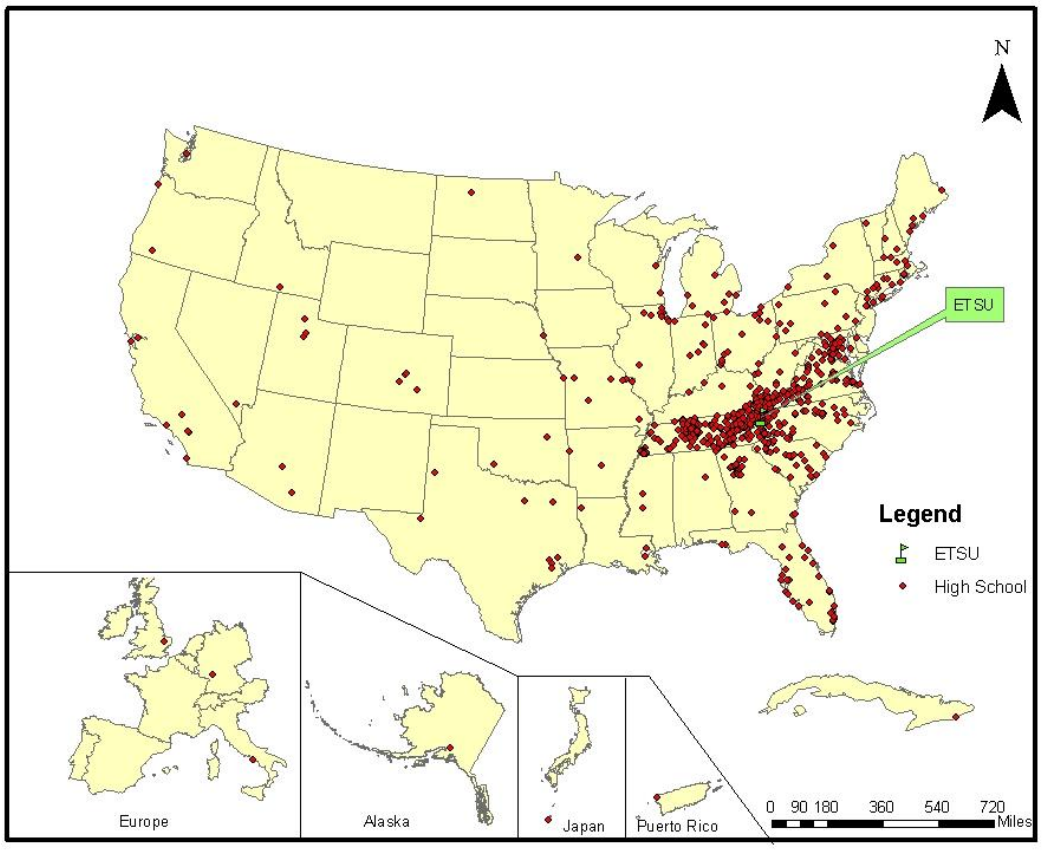

Figure 1: Sources of Fall Freshmen Enrollment at ETSU, 1997, 2002, and 2007

Figure 2 below, shows the same information as Figure 1 but with an interstate layer added to demonstrate the location of the high schools in reference to an interstate. Looking at Figure 2 it seems that the majority of the high schools seem to be located in close proximity to an interstate system. After the interstate layer is overlaid upon the high school location map and a 10-mile buffer is created a possible pattern seems to emerge. This is especially true for high schools located near Interstate highways 40, 81, 26, 85, 75, 95, and 24.

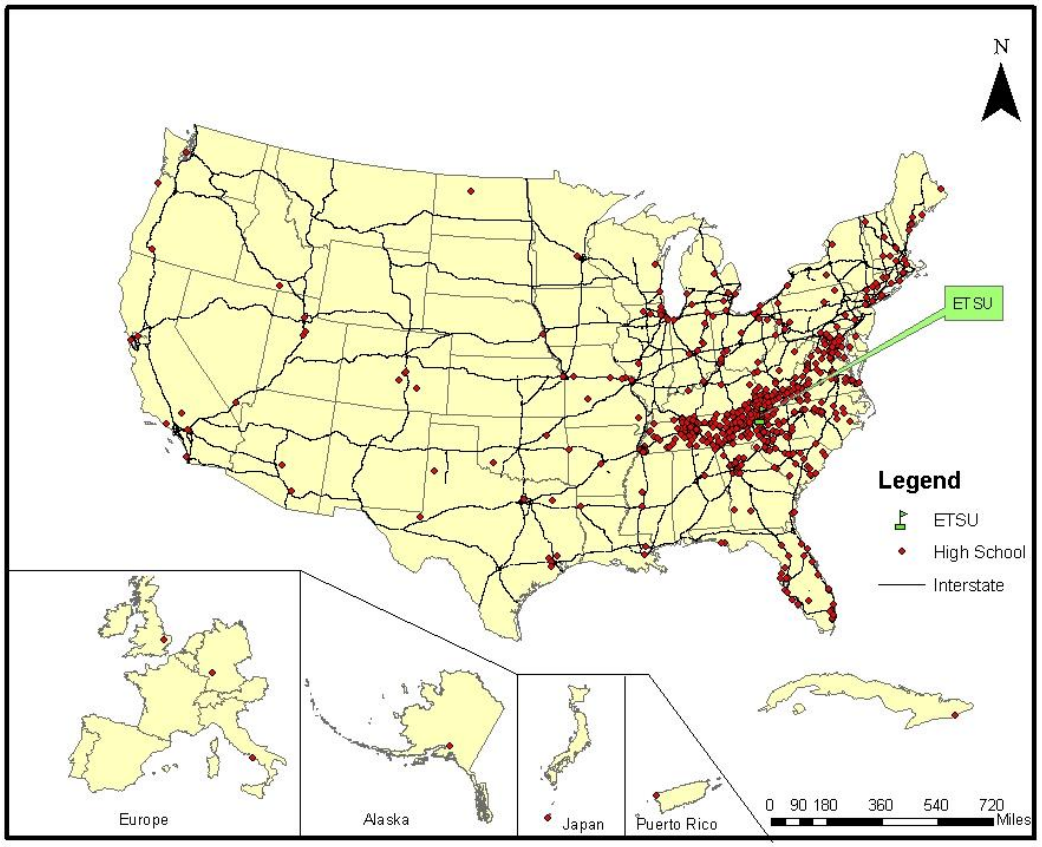

Figure 2: Sources of Fall Freshmen Enrollment at ETSU, 1997, 2002, and 2007 with Interstates

Three kernel density maps (Figures 3-5) were created to illustrate the spatial density of ETSU's freshmen enrollment for 1997, 2002, and 2007 in the continental United States. The kernel density maps show the number of freshmen enrollment per square kilometer.

The 1997 kernel density map (Figure 3) below shows that the largest volume of students came from the East Tennessee region of the Tri-Cities and Southwest Virginia. The map also shows a higher density of enrollment in the areas of Knoxville, Nashville, Chattanooga, Washington, DC, west central Virginia, northwest South Carolina, and western North Carolina.

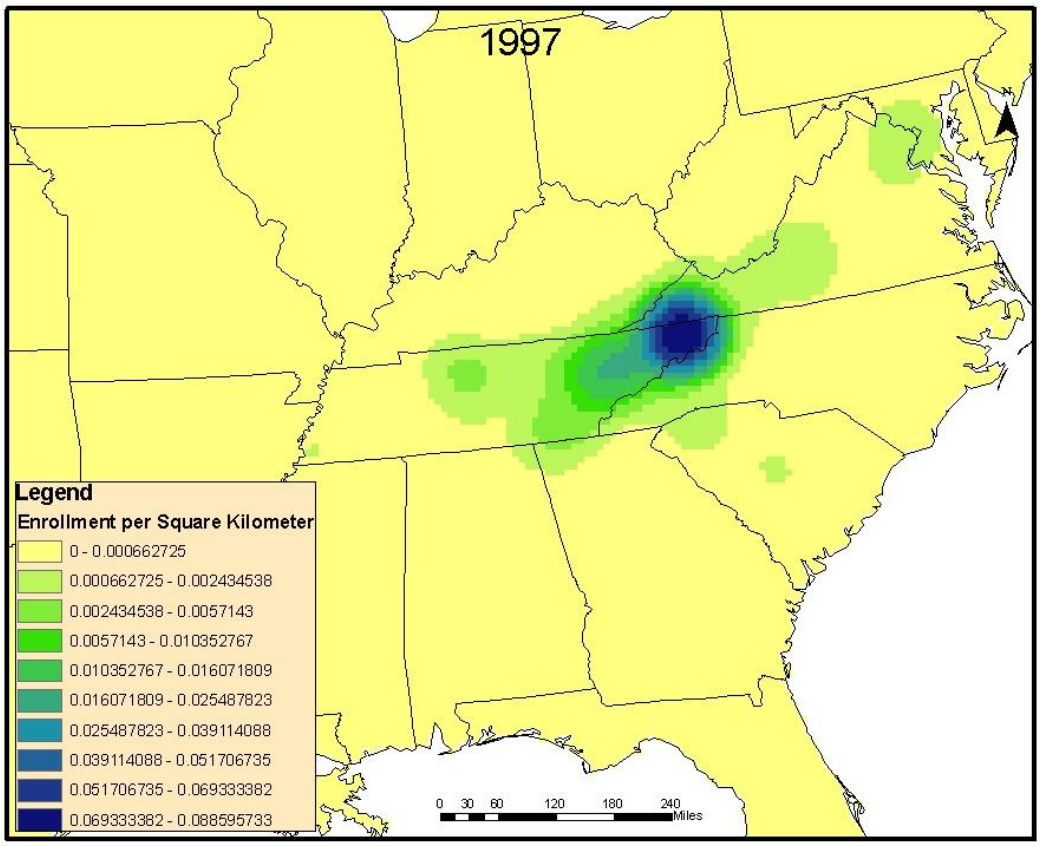

Figure 3: Kernel Density Map of Fall Freshmen Enrollment at ETSU, 1997

The 2002 kernel density map (Figure 4) below shared similar traits with the 1997 map but there were some differences. It seems that there was a second large concentration of students from Knoxville as well as around Tri-city region in the 2002 map. It also shows that enrollment increased in central Tennessee around Nashville, west Tennessee around Memphis, and in northern Georgia. Also, it seems that enrollment decreased in the areas of Washington, DC and

west central Virginia. It seems that enrollment for the 2002 year became more concentrated in Tennessee.

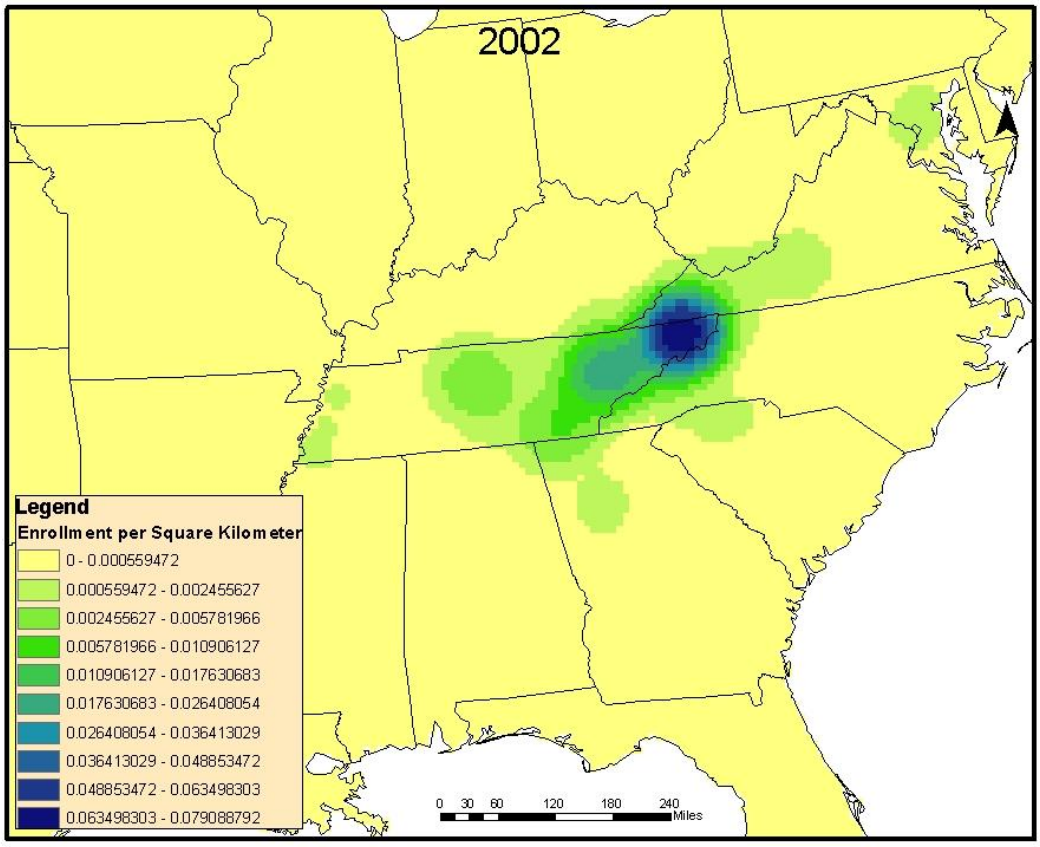

Figure 4: Kernel Density Map of Fall Freshmen Enrollment at ETSU, 2002

The 2007 kernel density map (Figure 5) below shows some changes in the state of Tennessee compared to maps in 1997 and 2002. Enrollment remained the heaviest in East Tennessee. It also increased in the central and west Tennessee areas, west central Virginia, northern Georgia, and west North Carolina.

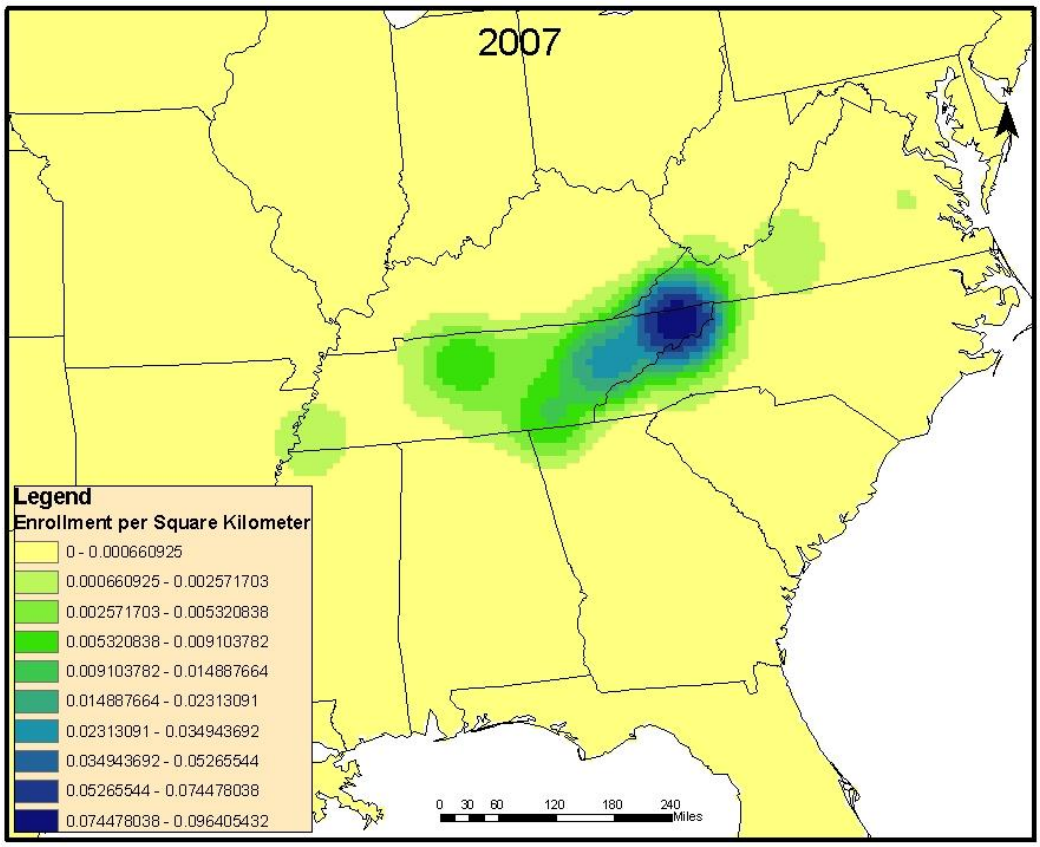

Figure 5: Kernel Density Map of Fall Freshmen Enrollment at ETSU, 2007

To show what ETSU's fall freshmen enrollment looked like by distance, three geographic sources of enrollment maps (Figures 6-8) were created. These maps illustrate ETSU's freshmen enrollment in 25-mile intervals for 1997, 2002, and 2007 from the university's location out to 200 miles. The maps give a visual indication of freshmen enrollment at ETSU in relation to the distance to campus.

The 1997 geographic sources of fall freshmen enrollment at ETSU map (Figure 6) below shows that the largest portion of freshmen ETSU recruited in 1997 came from within 25 miles of the university. In addition, the map also shows that the majority of students who are coming to

ETSU are from within 125 miles of the university. From that distance in 1997, ETSU recruited 1,136 freshmen.

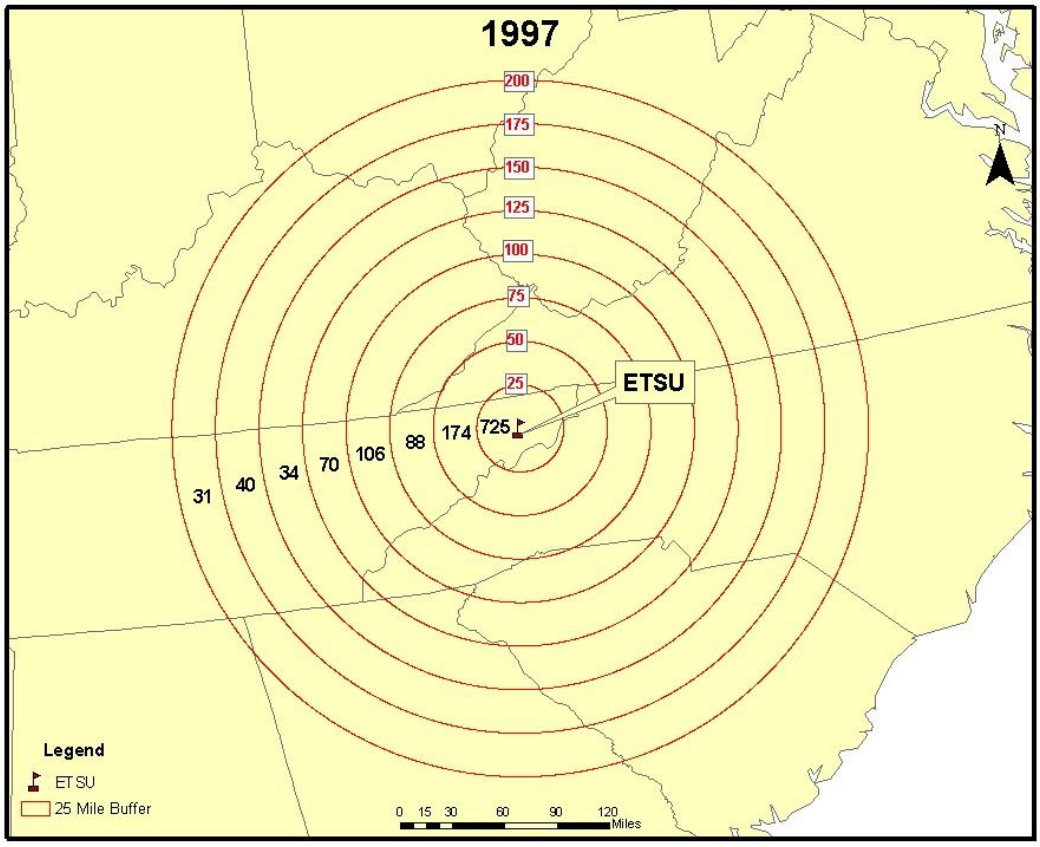

Figure 6: 1997 Geographic Sources of Fall Freshmen Enrollment at ETSU

The 2002 geographic sources of fall freshmen enrollment at ETSU map (Figure 7) below shows that the largest portion of freshmen ETSU recruited in 2002 came from within 25 miles of the university. This is similar to the results from the 1997 geographic sources of fall freshmen enrollment at ETSU map. Though similar to the 1997 map, in 2002 the number of freshmen ETSU recruited decreased from the university out to 75 miles and showed an increase from 75 miles to 150 miles. In addition, like the 1997 map, the 2002 map also shows that the majority of

freshmen are coming to ETSU from within 125 miles of the university. From the university out to 125 miles, ETSU recruited 1,125 freshmen.

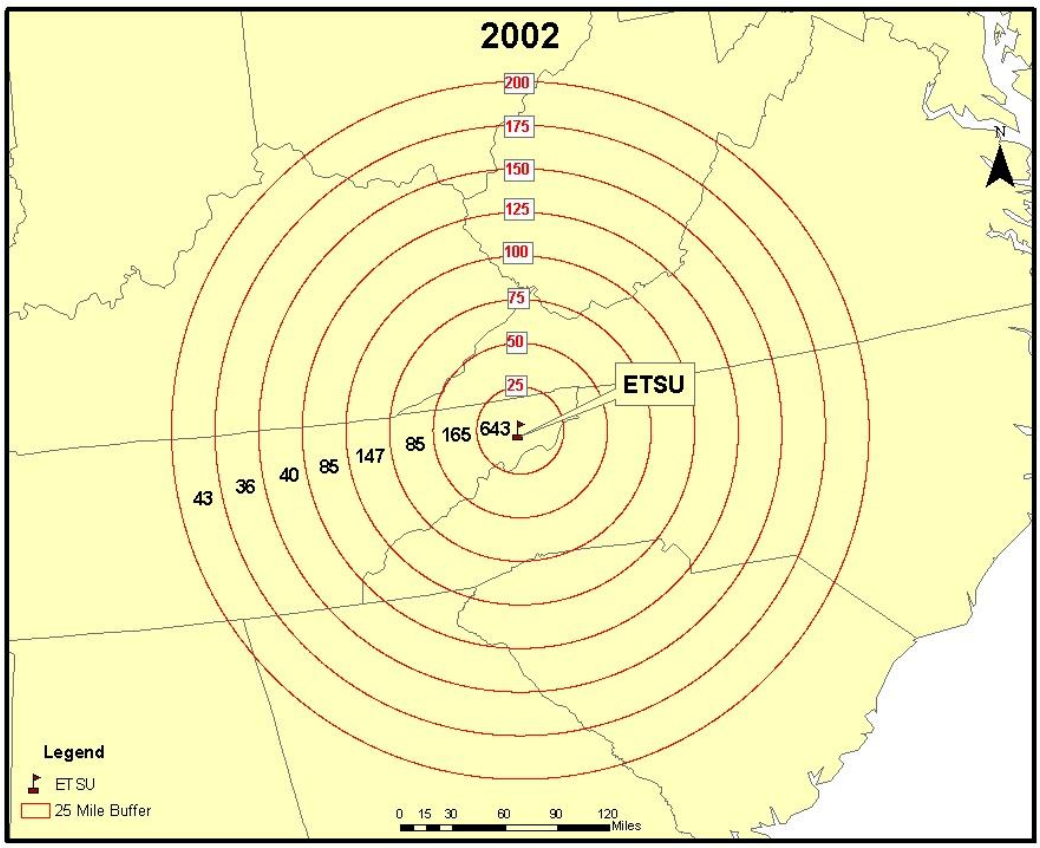

Figure 7: 2002 Geographic Sources of Fall Freshmen Enrollment at ETSU

The 2007 geographic sources of fall freshmen enrollment at ETSU map (Figure 8) below shows similar findings to the 1997 and 2002 maps. Like the results from 1997 and 2002 the largest portion of freshmen ETSU recruited in 2007 came from within 25 miles of the university. In addition, the 2007 map shows that ETSU's freshmen enrollment increased in all 25 mile zones out to 200 miles. The 2007 map also shows that, as in 1997 and 2002, the majority of freshmen are coming to ETSU from within 125 miles of the university. In 2007, 1,406 freshmen were

recruited in the area from the university out to 125 miles. That was an increase of almost 275 more than 1997 and 2002.

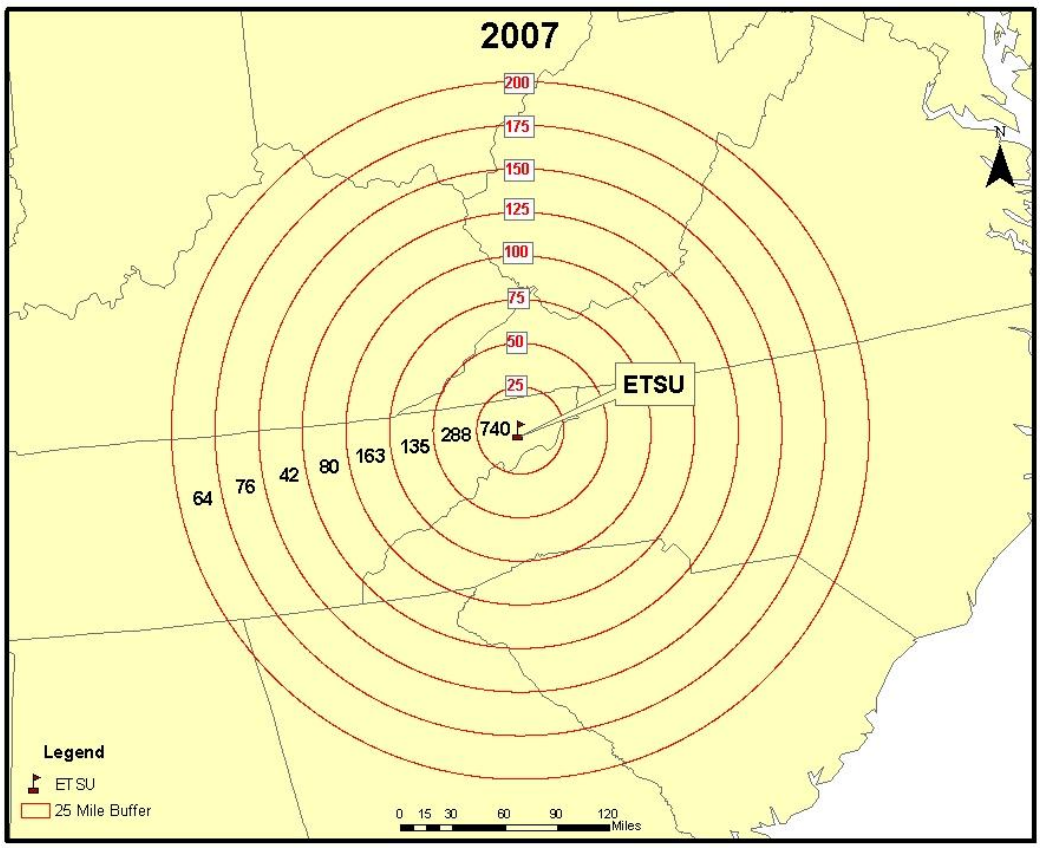

Figure 8: 2007 Geographic Sources of Fall Freshmen Enrollment at ETSU

Data in Table 1 below provide a breakdown of ETSU's freshmen enrollment for the years 1997, 2002, and 2007 by gender and race. When looking at male enrollment it shows that male freshmen enrollment has increased each year and that there was a large increase from 1997 to 2007. During the 10-year span male freshmen enrollment increased from 601 to 796, an increase of 32.4%. Unlike the male freshmen enrollment, female freshmen enrollment at ETSU experienced both a decrease and an increase in enrollment. The decrease occurred from 1997 to

2002 and during that time period female freshmen enrollment went from 823 in 1997 to 795 in 2002. Female freshmen enrollments increase occurred from 2002 to 2007. From 2002 to 2007, female freshmen enrollment increased from 795 in 2002 to 1020 in 2007. Overall, when looking at female freshmen enrollment from 1997 to 2007 there was an increase of 197 females who enrolled at ETSU.

Table 1
ETSU Fall Freshmen Enrollment during 1997, 2002, and 2007 by Gender and Race

	1997	2002	2007
# of enrollment	1424	1408	1816
By male	601	613	796
By female	823	795	1020
F- Asian (1)	12	8	16
F- Alaskan (2)	0	0	8
F- Black (3)	38	37	71
F- Hispanic (4)	5	9	16
F- White (5)	758	727	889
F- Unknown (6)	4	10	20
F- Native (7)	5	2	0
F- Nonresident (9)	1	2	0
M- Asian (1)	11	7	15
M- Alaskan (2)	0	0	3
M- Black (3)	37	38	35
M- Hispanic (4)	2	7	13
M- White (5)	537	549	717
M- Unknown (6)	13	10	13
M- Native (7)	0	2	0
M- Nonresident (9)	1	0	0

Regarding race, some interesting things can be found. First, from 2002 to 2007 the number of male and female white freshmen enrolling at ETSU increased by almost 300. Second, the number of female black freshmen enrolling at ETSU increased by almost double from 37 in 2002 to 71 in 2007; while the number of male black freshmen stayed the same. In addition, the

total number of black freshmen enrolling as a whole went up by 30 from 2002 to 2007. Third, the number of Alaskan freshmen increased from 0 in 1997 and 2002 to 11 in 2007.

Table 2 below shows a breakdown of where ETSU's fall freshmen enrollment has been coming from by state and country for 1997, 2002, and 2007. Some interesting things can be learned when Table 2 is examined. For example, the states other than Tennessee that have historically provided the most freshmen students to ETSU have been North Carolina and Virginia. Outside Tennessee they provide the greatest number of freshmen students to the university. The table also shows that South Carolina once was a great provider of freshmen enrollment to ETSU but since 1997 enrollment has been declining. In addition the table also demonstrates that freshmen enrollment changes from year-to-year in each state. When the table is examined the only states outside of Tennessee that continue to provide a great number of freshmen annually to ETSU are North Carolina and Virginia.

Table 2
ETSU Fall Freshmen Enrollment during 1997, 2002, and 2007 by State and Country

State	1997	2002	2007	State	1997	2002	2007
AK	0	1	0	NE	0	0	2
AL	0	0	1	NH	1	0	2
AR	1	0	1	NJ	0	2	1
AZ	1	0	1	NV	0	1	0
CA	4	1	2	NY	7	2	0
CO	2	1	1	OH	5	4	4
CT	2	0	5	OK	1	0	1
DE	1	0	0	OR	2	0	0
FL	9	10	11	PA	3	3	3
GA	11	12	9	RI	1	1	0
ID	0	0	1	SC	24	16	5
IL	3	6	2	TN	1165	1210	1501
IN	2	2	5	TX	1	3	4
KS	0	1	0	UT	1	0	2
KY	6	6	4	VA	107	69	134
LA	2	0	1	VT	0	1	0
MA	1	2	2	WA	0	1	0
MD	7	8	6	WI	0	1	1
ME	4	1	2	WV	6	2	2
MI	1	4	1	Cuba	0	0	2
MN	0	0	1	England	1	0	0
MO	3	1	3	Germany	1	0	0
MS	1	1	0	Italy	1	0	0
NC	35	34	91	Japan	1	0	0
ND	0	0	1	Puerto Rico	0	1	0

Table 3 below shows the number high schools by distance that provide students to ETSU during fall freshmen enrollment 1997, 2002, and 2007. Looking at the numbers from each year everything stays somewhat similar except for in the distances of 250 miles, 500 miles, and within the United States during the year 2002. This year showed a major decrease in the number of high schools providing enrollment. There were differences between 1997 and 2007 from these distances but nothing like the dramatic decrease in 2002.

Table 3
High Schools Providing ETSU Fall Freshmen Enrollment in 1997, 2002, and 2007 by Distance

By distance	1997	2002	2007
Within 10 miles	6	6	8
Within 25 miles	24	22	23
Within 50 miles	53	48	54
Within 100 miles	110	108	114
Within 250 miles	219	211	231
Within 500 miles	280	267	293
Within the United States	317	290	334

Table 4 below shows the total number of high schools in Tennessee, North Carolina, and Virginia whose students were able to receive in-state tuition at ETSU during the years 1997, 2002, and 2007. The table shows that during 1997 and 2002 the only high schools that were eligible to receive in-state tuition were high schools located in Tennessee. During 1997 and 2002 when Virginia and North Carolina were not eligible for in-state tuition, the number of high schools in Tennessee ETSU recruited from was 127 and 134. In 2007 the number of high schools ETSU recruited from in Tennessee went up to 179, a dramatic increase from 1997 and 2002. However, in 2006 ETSU determined that high schools located in three counties in Virginia and five counties in North Carolina that were on the border of Tennessee were eligible for in-state tuition at ETSU. In 2007, five schools in North Carolina and eight in Virginia were considered eligible for in-state tuition which brought the total number of in-state tuition high schools in 2007 to 192.

Table 4
High Schools Receiving In-State Tuition during 1997, 2002, and 2007 by State

	1997	2002	2007
NC	0	0	5
TN	127	134	179
VA	0	0	8
Total#	127	134	192

Table 5 below shows the number and percentage of freshmen who came to ETSU from high schools in the border counties of North Carolina and Virginia during 1997, 2002, and 2007. The percentages of freshmen attending ETSU from the border counties was obtained by comparing the number of freshmen who enrolled at ETSU from the border counties to the total freshmen who enrolled from the corresponding state. When viewing the table it can be seen that during the years 1997 and 2002 the border counties of both North Carolina and Virginia were only supplying about 25% of North Carolina and Virginia's total number of freshmen who enrolled at ETSU. However, when the data for the year 2007 are viewed, a drastic change has occurred. The table showed that by 2007 the percentage of freshmen coming to ETSU from the border counties of both North Carolina and Virginia had more than doubled. In 2007, students from high schools in the border counties of North Carolina accounted for 67% of North Carolina's freshmen who enrolled at ETSU. In Virginia, by 2007, 41% of the freshmen from Virginia who came to ETSU were from high schools in border counties.

Table 5
Totals and Percentages of ETSU Freshmen Enrollment from Border Counties of North Carolina and Virginia to the Total from the Corresponding State during 1997, 2002, and 2007

	1997	2002	2007
Total Students from North Carolina	35	34	91
Students from NC Border Counties	9	9	61
Total Percent from NC Border Counties	25.7%	26.5%	67%
Total Students from Virginia	107	69	134
Students from VA Border Counties	22	11	55
Total Percent from VA Border Counties	20.6%	15.9%	41%

Table 6 below shows ETSU's fall freshmen enrollment for each of the study years by distance every 25 miles from the university out to 200 miles. The table also shows the percentages of freshmen enrollment for the 25-mile intervals over the total freshmen enrollment for the corresponding year. When viewing Table 6 it becomes apparent that for 1997, 2002, and 2007 the majority of ETSU's freshmen came from the 0 to 25 mile interval. Each year showed that this interval produced the largest percentage of freshmen who enrolled at ETSU. The table also shows that for each study year the majority of freshmen who enrolled at the university came from within 125 miles of ETSU. One last thing that this table shows is that there was a decrease in enrollment during 2002 from the university out to 75 miles and an increase in enrollment from 75.1 to 150 miles.

Table 6
Totals and Percentages of ETSU Fall Freshmen Enrollment in 1997, 2002, and 2007 by Distance

Distance (miles)	1997	Percentage of: 1424 (%)	2002	Percentage of: 1408 (%)	2007	Percentage of: 1816 (%)
0-25	725	50.9	643	45.7	740	40.7
25.1-50	174	12.2	165	11.7	288	15.9
50.1-75	88	6.2	85	6.0	135	7.4
75.1-100	106	7.4	147	10.4	163	9.0
100.1-125	70	4.9	85	6.0	80	4.4
125.1-150	34	2.4	40	2.8	42	2.3
150.1-175	40	2.8	36	2.6	76	4.2
175.1-200	31	2.2	43	3.1	64	3.5
Over 200.1	156	11	164	11.7	228	12.6

Methodology

Regression Model:

Enrollment at ETSU varies annually and high schools that supplied students previously to ETSU may change. A Regression Model has been used for this reason to locate what independent variables influence the enrollment. The regression formula is expressed as:

$$y = b0 + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\textbf{Equation 3}$$

The number of students who enroll at ETSU per high school is the dependent variable (*Y*). Independent variables for the regression formula are: the linear distance of the high school to ETSU (X1) and mean high school GPA (X2). The dummy variables are: tuition "in-state" (X3), 5 mile distance to an interstate (X4), and 10 mile distance to an interstate (X5).

The X1 variable is the linear distance of the High School to ETSU. I hypothesize that the closer the distance is from a high school to ETSU, the more likely a student will decide to enroll. The X2 variable that represents Mean High School GPA will show whether the student's high school GPA has an impact on the decision to enroll. I hypothesize that students with moderate GPAs will be more likely to enroll at ETSU because ETSU belongs to the Tennessee Board of Regents which tells the university that they must accept students with lower GPAs. The X3 variable that represents In-State tuition will demonstrate whether obtaining in-state tuition to ETSU poses an impact on enrollment from high schools. For the in-state tuition variable a "1" describes the schools that receive in-state state tuition and a "0" describes schools that do not receive in-state tuition. I hypothesize that students who are able to receive in-state tuition will be more likely to enroll at ETSU than students attending high schools that are considered out-of-state.

The X4 variable that represents five-mile distance to an interstate will show whether a school's location within five miles of an interstate system is important in terms of the decision to enroll at ETSU. For this variable schools located within five miles of an interstate are given a "1" and schools are given a "0" if they are not within five miles of an interstate. I hypothesize that students from high schools located within five miles of an interstate will be more likely to enroll at ETSU than those from a school that is not located within five miles of an interstate. The X5 variable that represents 10-mile distance to an interstate system will show if a school's location

within a distance of 10 miles to an interstate system is important in terms of the decision to enroll at ETSU. For this variable schools that are located within 10 miles of an interstate are given a "1" and schools not within 10 miles of an interstate are given a "0." I hypothesize that students from high schools located within 10 miles of an interstate will be more likely to enroll at ETSU than those from a high school that is located farther than ten miles from an interstate.

CHAPTER 4

RESULTS

Regression results for the data in 1997 are presented in Table 7 below. Three independent variables were found to have a significant impact and two independent variables were not found to have a significant impact upon the dependent variable. The three independent variables that were found to have significant results were GPA, in-state tuition, and 10-mile distance to an interstate. These three variables were all found to have a positive effect on the decisions of students to come to ETSU. The two independent variables that were found not be significant to the dependent variable were linear distance to ETSU and five-mile distance to an interstate.

When the results of the 1997 regression model were compared to my initial hypotheses, independent variables GPA, in-state tuition, and high schools within a 10-mile distance of an interstate supported what I had hypothesized and independent variables linear distance of the high school to ETSU and high schools within five miles of an interstate did not support my hypotheses. The reason I feel that the 1997 GPA variable confirms my hypothesis is due to ETSU's lower admission requirements for high school GPA. I believe that because the Tennessee Board of Regents sets a lower high school GPA requirement for the institutions it governs it provides students with average GPAs a college that will accept them. The reason the 1997 in-state tuition variable confirms my hypothesis I feel is a result of the lower cost of in-state tuition. I believe that because in-state tuition costs less, students who live in the state of Tennessee or are considered in-state will come to ETSU because they will pay less in tuition. I believe the reason the 1997 high schools within a 10-mile distance of an interstate variable supported my hypothesis was due to a fluke in the statistics. It is impossible to determine whether or not living close to an interstate will affect a student's decision to enroll at any college

much less attending ETSU. Going to a high school that is close to an interstate offers a student the opportunity to go to any college and it is impossible and improbable to say that just because a student lives close to an interstate he or she will enroll at ETSU.

The reason the 1997 linear distance variable did not support my hypothesis I feel was the result of distance not being a deterrent in travel. I believe that because interstate systems provide students the ability to travel farther and faster and ETSU's location close to Interstate 26, distance did not affect their college choice in 1997. I feel the reason the 1997 high schools within a five-mile distance of an interstate variable did not support my hypothesis is because living within five miles of an interstate is not a factor that would make a student want to enroll at ETSU. To say that all students all across the country would attend ETSU if they lived within five miles of an interstate is impossible. Interstates offer a person the ability to travel to locations farther and faster, which means that they can attend universities all across the country and not just ETSU.

Table 7
Regression Model 1997

ANALYSIS OF VARIANCE

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5917.780	5	1183.556	19.506	.000[a]
	Residual	39317.645	648	60.675		
	Total	45235.425	653			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.362[a]	.131	.124	7.789

Table 7 (continued)

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.501	.737		-2.036	.042
	X1-Distance	-.001	.001	-.052	-1.383	.167
	X2-GPA	1.283	.200	.238	6.419	.000
	X3-InstateTuition	3.608	.668	.206	5.402	.000
	X4-Buffer5mile	-1.300	.898	-.077	-1.448	.148
	X5-Buffer10mile	2.198	1.003	.118	2.191	.029

Regression results for the data in 2002 are presented in Table 8 below. Two independent variables were found to have significant results and three independent variables were not found to have a significant impact upon the dependent variable. The two independent variables that had significant results with the dependent variable were GPA and in-state tuition. These variables were all found to have a significant relationship to the decisions of students to come to ETSU. The three independent variables that were found not to have a significant relationship to the dependent variable were linear distance to ETSU, five-mile distance to an interstate, and 10-mile distance to an interstate.

When the results of the 2002 regression model were compared to my initial hypotheses they were similar to my hypotheses for 1997. There was, however, one variable that was not similar and that variable was high schools within a 10-mile distance of an interstate. I feel that the 2002 high schools within a 10-mile distance of an interstate variable did not support my hypothesis due to the statistics self-correcting. Unlike in 1997, I believe that by 2002, whatever had caused the statistics to indicate that it was significant had corrected itself.

Table 8
Regression Model 2002

ANALYSIS OF VARIANCE

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6316.619	5	1263.324	24.592	.000[a]
	Residual	33288.091	648	51.371		
	Total	39604.709	653			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.399[a]	.159	.153	7.167

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.352	.662		-2.041	.042
	X1-Distance	.000	.001	-.029	-.779	.436
	X2-GPA	1.265	.182	.259	6.945	.000
	X3-InstateTuition	3.670	.620	.224	5.919	.000
	X4-Buffer5mile	-1.106	.826	-.070	-1.338	.181
	X5-Buffer10mile	1.739	.921	.100	1.889	.059

Regression results for the data in 2007 are presented in Table 9. Two independent variables were found to have significant results to the dependent variable and three independent variables were not found to have a significant impact upon the dependent variable. The two independent variables that had significant results with the dependent variable were GPA and in-

state tuition. These variables were found to have a relationship to the decisions of students to come to ETSU. The three independent variables that were found not to be significant to the dependent variable were linear distance to ETSU, five-mile distance to an interstate, and 10-mile distance to an interstate.

When the results of the 2007 regression model were compared to my initial hypotheses they were the same as my hypotheses of 2002. The 2007 regression model results had the same results as the 2002 regression model.

Table 9
Regression Model 2007

ANALYSIS OF VARIANCE

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7894.899	5	1578.980	22.915	.000[a]
	Residual	44650.508	648	68.905		
	Total	52545.407	653			

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.388[a]	.150	.144	8.301

Table 9 (continued)

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.037	.786		-1.319	.188
	X1-Distance	-.001	.001	-.048	-1.276	.202
	X2-GPA	1.018	.221	.188	4.603	.000
	X3-InstateTuition	4.319	.774	.232	5.578	.000
	X4-Buffer5mile	-1.158	.960	-.064	-1.206	.228
	X5-Buffer10mile	2.049	1.065	.102	1.924	.055

When looking at the data for all 3 years side by side, similarities and differences exist. The only year out of the three that had differences was 1997. In 1997, 3 independent variables were found to be significant to the dependent variable, while in 2002 and 2007 only two independent variables were found to be significant to the dependent variable. The independent variable that was found to have a relationship to the dependent variable in 1997 but not in 2002 or 2007 was the independent variable: high schools within 10-miles of an interstate. In 1997 high schools within 10-miles of an interstate was found to be a significant factor to the dependent variable but not in 2002 and 2007. Aside from the one difference, all 3 years of data had the same two independent variables that were not significant factors to the dependent variable and the same two that were found to be significant factors to the dependent variable. The two independent variables that were found to be significant to the dependent variable were GPA and In-state Tuition. The two independent variables that were not found to be significant factors were: linear distance of the high school to ETSU and five-mile distance to an interstate.

When the results of my study were compared with others, there were similarities in the results of two of the five independent variables. My results indicate that while distance was not found to be a significant factor in the regression model, the data and GIS maps show that it is definitely significant to freshmen enrollment. The results for distance were similar to what Leppel (1993) and Frennette (2004) said. They said that increased distance plays a role in whether someone enrolls at a university or not. The results from my study concur with this idea. The data and maps show that the majority of freshmen ETSU recruits are coming from within 25 miles of the university. The data and maps also show that enrollment begins to drop off when distance is increased from the university. In addition, when reviewing the GIS maps that show the number of freshmen who enroll at ETSU for every 25-mile interval, one can see that distance is an important factor on ETSU's freshmen enrollment.

In comparison, the results on distance were contradictory to what Long (2004) said. Long (2004) said that because of the advances in transportation and communication, the distance between a university and a student is no longer an issue. The data and maps of my study clearly reject this idea because they show that as distance is increased, enrollment decreases.

Results from the second independent variable, the in-state tuition variable, bear similarities and differences when compared to what others have written. The results from my study show that in-state tuition is a significant factor. These results share similarities to those of Heller (1999) and Avery and Hoxby (2003). Heller (1999) and Avery and Hoxby (2003) say that the cost of tuition has a great impact on the decision to enroll at a university or not. In addition, Long (2004) states that institutional costs play an intricate role in the decisions to enroll in colleges and high tuition has a negative impact on enrollment. One can infer that being able to obtain cheaper tuition or in-state tuition would increase the chance for enrollment.

Even with the similarities there are those that believe tuition does not play a key role in enrollment. Toutkoushian (1999), Van Der Klaauw (2002), Long (2004), and Avery and Hoxby (2003) all find that it is access to grants and financial aid and not cheaper tuition that is a bigger influence on enrollment. They find that the high cost of tuition is not a deterrent to students because financial aid can outweigh that high cost.

CHAPTER 5

CONCLUSION

Having knowledge of where and why students enroll at a university is very important. It is imperative for universities to know where their enrollment is coming from and what factors are influencing students' decisions. Having knowledge of these factors allows a university to better allocate funds to recruit students and compete with other universities. The purpose of this research was to establish whether patterns and forces exist that influence ETSU's fall freshmen enrollment. This was done using fall semester freshmen enrollment data from East Tennessee State University's Office of Institutional Research. Enrollment data for the 1997, 2002, and 2007 fall freshmen enrollments were organized into a large database. Geographic Information Systems (GIS) software was used to visually display the locations of the high schools where freshmen enrollment was coming from. GIS was used to create sources of enrollment, kernel density, and geographic sources of enrollment maps that would visually show the locations of the high schools and the patterns of enrollment. In addition, SPSS statistical software was used to create a regression model. The regression model gave information to the significant results for the data.

When viewing the maps generated in GIS, three patterns can be detected. First, a pattern seems to exist between the location of the high schools ETSU recruits from and the high school's proximity to an interstate. Second, a large portion of ETSU's freshmen enrollment is coming from within 25 miles of the university and the majority is coming from with 125 miles of the university. Third, when the kernel density maps for each of the years 1997, 2002, and 2007 are analyzed, a pattern seems to be emerging that enrollment is becoming more centralized in East Tennessee and is moving westward throughout the state. This shows that the majority of ETSU's freshmen are coming from within Tennessee. It is also evident from viewing the kernel density

maps that freshmen enrollment from areas of Western North Carolina and Southwest Virginia has become greater. This can be directly attributed to the ability of students in those regions to receive in-state tuition, a right granted by the Tennessee Board of Regents in 2006.

When the fall freshmen enrollment data for 1997, 2002, and 2007 were analyzed for the total freshmen enrollment from both North Carolina and Virginia, it was found that by 2007 the high schools within the border counties of each of those states provided a good portion of the freshmen who came to ETSU. When 1997 and 2002 were viewed, the number of freshmen from the border counties of both Virginia and North Carolina barely accounted for 25% of the state total freshmen who came to ETSU. However, by 2007 the number freshmen who came to ETSU from the border counties in each state had changed quite a bit. In North Carolina in 2007 the high schools located in the border counties provided 61 of 91 freshmen who enrolled at ETSU accounting for 67%. In Virginia in 2007 the high schools located in the border counties provided 55 of 134 freshmen who enrolled at ETSU accounting for 41%.

The results from the regression model indicate that the variables that have a significant relationship to the enrollment at ETSU are: in-state tuition, mean high school GPA, and 10-mile distance to an interstate. These variables were shown to have a significant relationship to the dependent variable. However, I believe that even though the 10-mile distance to an interstate variable was found to be significant to the dependent variable, it does not actually have an effect on the decision of students to enroll at ETSU. The factors that were not shown to have a significant relationship to enrollment in the regression model were five-mile distance to an interstate and linear distance to ETSU.

Analyzing this research I believe that in the future ETSU is likely to see changes in the University's admissions requirements. I predict that ETSU's current admissions requirements will likely change in the future because of the Tennessee Board of Regents (TBR) changing the admission guidelines. The Tennessee Board of Regents dictates what ETSU and the other universities within the TBR will and will not accept for admission to their institutions. As concern for the quality of education becomes more prominent nationally the, TBR is very likely to raise the requirements for admission to ETSU and the university will see a decrease in the number of students applying due to an inability to meet the higher requirements.

From this research, I hope that I have given East Tennessee State University a better understanding of where freshmen enrollment has been coming from over the past years and where it possibly may be moving toward in the future. In doing this study I hope that this study gives ETSU an ability to make better, more informed enrollment decisions. In addition, I feel that this study will enable the university to better plan for recruitment and allocate money towards enrollment and thus recruit more students.

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