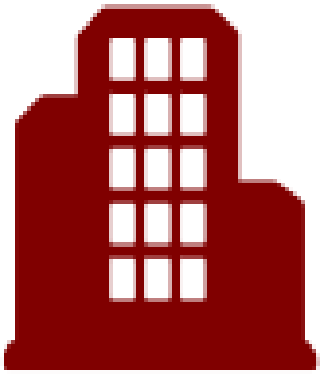
Supply and Demand of Apartment Complexes in San Marcos, Texas



BOBCAT COMMUNITY CONSULTANTS

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Introduction

1.1 Summary

To make a holistic and inclusive community, the City of San Marcos constantly engages with the general public to create a vision for future development. The city has been home to Texas State University since the turn of the 20th century in 1899. Over 120 years later the community has maintained a unique identity of being a place for youth and retirement age residents. With new developers seeking to engage with growing trends of rent-by-the bed complexes, is that balance of being an age inclusive community drifting down the San Marcos River?

The implementation of a GIS would provide the City of San Marcos and local law enforcement agencies with a needs assessment for new rent-by-bed apartment complexes. Because of the possible abundance of student housing could negatively affect the community in the sense of traffic issues, infrastructure and gentrification. A key part of this goal is to provide city officials with updated data from apartment complexes throughout the city. The city currently has a Multifamily Status Report last updated in June 2019 with a list total of 50 apartments. Bobcat Community Consultants (BCC) will update the list to the true value of 104 apartments, consisting of rent-by-bed and traditional apartments. With this information BCC will determine the need for new rent-by-bed complexes in San Marcos, Texas.

1.2 Purpose

A GIS is being used to identify the supply and demand of rent-by-bed apartments to student ratio in San Marcos, Texas. The results of this project will serve the City of San Marcos in determining whether they should or should not grant more residential permits for student housing. This study will use hot spot analysis to identify clusters of apartments along with census block data in order to analyze the needs assessment. Our variables for the analysis are bedrooms per complex and age group 17-30 from the census block data. The age group has been chosen to more accurately represent the individuals renting student housing. Using a statistical regression, the study will show if any relation is present between apartment bedrooms and age groups which will help identify the supply and demand. The findings will be presented in standard map form and a story map in ArcGIS Online showing the change of supply and demand throughout the years, which can be used by the City of San Marcos to aid them in development planning.

1.3 Scope

The project will focus on supply and demand for student housing apartments, in San Marcos, Texas, from 2012 through 2025. Up until 2019, we will process and analyze each year’s data individually, perform spatial analysis and create a story map to present the results of rent-by-bed apartments to student ratio. From 2020-2025 the analysis will be a prediction of future trends based on forecasted data provided by the City of San Marcos. In addition to a supply and demand analysis, we will digitize the city's growth of apartments, both traditional and student housing, from 2000 through 2020.

Literature Review

1.1 GIS in Urban and Real Estate Planning

The main components of urban planning are visualization and management of data. GIS is a vital resource for urban planning in this aspect. Using the correct data, GIS spatial analysis tools help model real world environments for a better understanding of the demand for resources in population, economic and environmental change for the future. GIS map overlay analysis is one tool that can be used to determine and estimate the major problem areas within the scope of research. (A Go Yeh, 877-888)

GIS is an important tool for planning. However, the spatial representation GIS uses does not meet all the needs of in the planning environment. This mainly has to do with the difference of how space is modeled in GIS and the actual representation of space in the real world of planning. Space in GIS is absolute, while planning in the real world is relational. It may be possible for these two ideas of space to be solved. GIS could be more consistent with specific planning through a blend of these comprehensions of space as proximal. (Couclelis, 9-19)

2.1 Supply and Demand Spatial Analysis

Geographical Information System (GIS) is a powerful tool for storing and manipulating spatial information. This data is organized and visualized with different layers. The GIS data visualized helps professionals understand the market from a different perspective for a better understanding of the source material through analysis of relationships between supply and demand. Census data is a good source to represent clustered data, when looking at relationships between supply and demand of the current market. This data can have problematic and systematic issues with measurement and location. This research provides several methods to alleviate problems areas created with GIS when analysis of aggregating census data is used. (Clapp & Rodríguez, 35-56)

Data

The data needed to complete our supply and demand analysis is identifying the total occupational capacity of the currently built apartments then comparing them to the potential age group of that would need to rent while attending school. In order to collect all of the apartment rates and number of units available to students and San Marcos residents, our team had to conduct a marketing survey. The market Survey involved the group researching and calling apartment complexes. In order to make an accurate estimation of the demand for apartments the group will collect data from the census bureau population count in San Marcos estimating the need for apartments from age groups 18-30. The remaining information regarding transportation was provided by Texas State concerning the Bobcat shuttle service and previously collected data on apartments from the city of San Marcos is also included in our analysis.

Master Data List

Entity	Attributes	Spatial Object	Status	Source
San Marcos Apartment Data	Project name, Status, Location, Units, Bedrooms, Construction Value, Occupancy Rate, Double Occupancy/RBB, Traditional/Individual Lease, ACT Allies	Polygons + Shapefiles	Incomplete	Team collection
San Marcos Apartment Data 2012	TBA	Polygons + Shapefiles	Available	City of San Marcos
Multi Family Project Status Report-June 2019	Project Name, Status, Location, Units, Bedrooms, Construction Value, Developer	Polygons + Shapefiles	Available	City of San Marcos
Bus Route Into	Bus routes followed by Texas State	Shapefiles	TBD	Texas State University
Population Data	Demographics, block data	Shapefiles + Polygons	Available	Census Bureau

Methodology

4.1 Overview

The data and results will be used to prove our hypothesis that San Marcos is overpopulated with student housing complexes. To prove our hypothesis correct, research needs to determine which apartments are meant for students, and what is the total supply of apartments in San Marcos. On the other side of the equation, to gage demand or areas in need of more apartment complexes the team will be conducting spatial patterns and clustering analysis. To determine demand for individual leases, our team will compare census data of college age group population living in San Marcos.

4.2 Preprocessing

The city of San Marcos has a short inventory of apartments, The Multi-Project Status Report, constructed until 2019, this report was the base for our group's structure to get the total number of units that are available in San Marcos. Regarding acquisition and preparation, our group created an excel data sheet with apartments not mentioned in the Multi-Project Status Report. The attributes collected by the group, for the apartment complexes, include number of units, bedrooms, year built, ACT affiliates, cost of rent, rent-by-bed or individual lease, and address. Once the tables have been formatted, they will be imported into ArcGIS and geocoded to a coordinate system to ensure consistency and accuracy for all analysis outputs. We will be using State Plane Texas Central coordinate system. Using GIS data from the city of San Marcos, we will use the city limits boundary as the border of our study area. This will allow us to start geocoding apartment locations and georeferencing roads, which will support the digitizing our maps in ArcGIS. More preparation of data will be needed to support the demand portion of the analysis. We will be using US Census block data, from the years 2012 through 2019, to gather information for our demand segment of the analysis. Block data will be used to more accurately represent the locations of the apartments.

4.3 Analysis

The analysis portion will discuss the processes and analysis used to achieve the statistical outcomes desired for interpretation. To better understand this portion, we must briefly revisit the desired outcome of the project. We are identifying the supply and demand of rent-by-bed apartments to the number of students who need housing.

The analysis starts with digitizing apartments from the year 2000 and projecting until the year 2025. This will assist the COSM to recognize city growth. The first spatial analysis tool we will be using Hot-Spot Analysis; Nearest Neighbor Index along with Getis-Ord* Analysis. This tool helps to identify clusters of high and low significance. The statistical results for our analysis will serve as our basis to identify the supply and demand. For example, if there's a p-value greater than .05 then there's low clustering meaning there's "less supply" of apartments. Some of the variables in mind will be age group and number of unit and/or bedrooms. We will be using the age group of 17-30 since those ages are more likely to be students renting student housing.

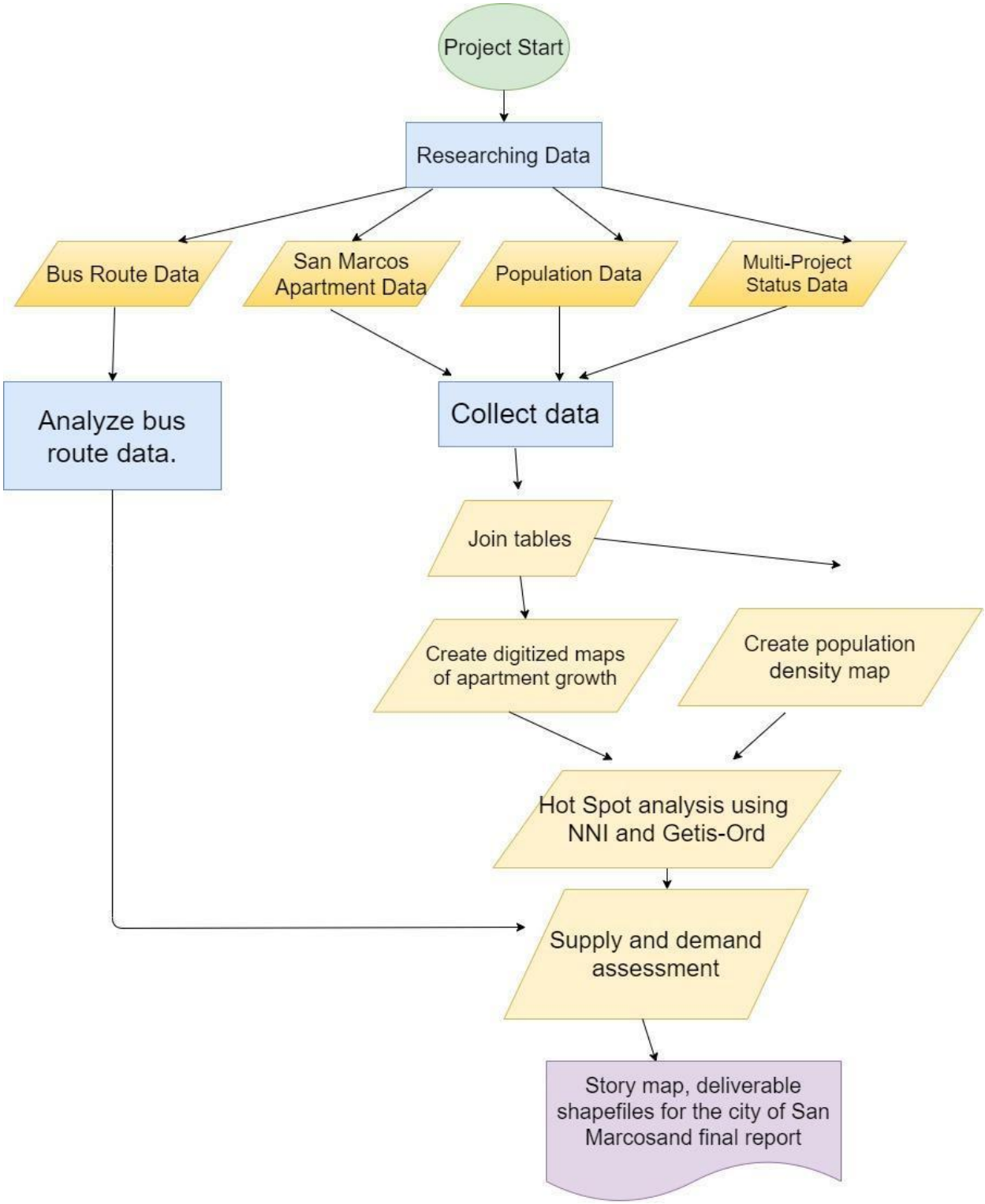
4.4 Statistical Analysis

The demand for student-housing can be determined by the amount of people within the age group between 17 - 30 in the city of San Marcos study area. Since the city is increasing in population by 1.79% every year, based on the last ten years of growth, the college age group should be growing at the same rate. The supply of the apartments will be determined by the number of units and leases available. We will be able to determine the demand of apartment complexes by comparing the student population to the number of complexes in San Marcos.

4.5 Visualizing the Data

We will display GIS data by presenting different spatial patterns in these rent by the bed apartments opposed to the traditional style apartment. We will be doing this with an ESRI story map displaying different maps, showing the correlation. Then to show the spatial distribution will have a map showing where the apartments are clustered in the San Marcos Area. Then to show the percentage of the population that is college age and the percentage of apartments that are rented by the bed, represented in pie charts. We will also provide an affordability map, showing where the apartments are currently priced per unit.

4.6 Flowchart



Budget

System Management		
Project Manager (10 hrs./week for 12 weeks)		
	Total Hours	120
	Hourly Pay	$60.00
	Sub-total	$7,200
GIS Analyst (10 hrs./week for 12 weeks * 4 consultants)		
	Total Hours	480
	Hourly Pay	$30
	Sub-total	$14,400
Total		$ 21,600
Equipment		
Workstation	$110/workstation * 5 workstations	$550
Maintenance	$150/workstation * 5 workstations	$750
Data		$43.20
Depreciation	$150,000 value of equipment/48 equip life in months * 3 months equipment in use	$9,375
ArcGIS	$4,800/year (Standard w/ all extensions) $4,800/12 * 2 months	$800
Adobe Illustrator	$50/ month * 1 month	$50
Total		$11,618.20
Grand Total Cost*	*does not include overhead costs	
$33,125		

Timetable

Task:	Week 1-2 Jan. 27 – Feb. 10	Week 3-4 Feb. 10-24	Week 5-6 Feb. 24 – Mar. 9	Week 7-8 Mar. 9 - 23	Week 9-10 Mar. 23 - Apr. 6	Week 11-12 Apr. 6 – Apr. 20	Week 13-14 Apr. 20 - May 4	Week 15 May 4
Data Collection				**Target Finish: Mar. 9**				
Proposal Preparation			**Target Finish: Feb 24**					
Proposal Presentation			**Feb. 26**					
Data Preparation				**Target Finish: Mar. 23**				
Data Analysis						**Target Finish: Apr. 6**		
Progress Update					**Mar. 25**			
Data Interpretation							**Target Finish: Apr 27**	
Final Presentation								**May 2**

Final Deliverables

▪ What will the client receive at the end of the semester?

▪ You must include the following:

• Detailed Final Report

• Professional Poster for display in the Geography Department

• CD containing:

o All data (Metadata, Report, Poster, PowerPoint Presentation Instructions on how to use the CD)

▪ Readme file

• Any additional items your client asked for in the RFP

• Note that testing will be conducted to ensure no corruption will occur and that all data is usable

Conclusion

Bobcat Community Consulting will create an ESRI story map showing a timeline of the City of San Marcos beginning from 2000 and plan on providing future predictions for the cities supply and demand of apartment complexes. In this story map we will display GIS data by presenting different spatial patterns of where most of these rent by the bed apartments are opposed to the traditional style apartment. We will also study the trend in student population growth in San Marcos to see whether the student population is growing as rapidly as these apartments. Finally, we will analyze the correlation between the student population growth and the amount of rent by the bed apartments available to assess the need of apartment complexes in San Marcos.

References

ACT-Ally. "ACT Members and Affiliates." *Department of Housing and Residential Life : Texas State University*, Texas State University, 5 Sept. 2019, www.reslife.txstate.edu/OffCampusLiving/ACT/ACT-Ally.html.

Clapp, John & Rodríguez, Mauricio. (1998). Using a GIS for Real Estate Market Analysis: The Problem of Spatially Aggregated Data. Journal of Real Estate Research. 16. 35-56.

Couclelis, H. Requirements for planning-relevant GIS: A spatial perspective. *Papers in Regional Science* 70, 9–19 (1991). https://doi.org/10.1007/BF01463440

"Geography 4422/5408 Projects." *GeoSites - Dept. of Geography Course and Project Serv*"Multifamily Reports."

"Hot Spot Detection." *Search the Website*, 2019, www.mailman.columbia.edu/research/populationhealth-methods/hot-spot-detection.

Kashef, M. Residential developments in small-town America: assessment and regulations. *City Territ Archit* 4, 14 (2017). https://doi.org/10.1186/s40410-017-0070-4

Multifamily Reports | City of San Marcos, TX, 2019, www.sanmarcostx.gov/1311/Multifamily Reports.*er*, sites.geo.txstate.edu/.

"Texas State Master Plan." *Texas State Master Plan*, gato-docs.its.txstate.edu/jcr:4d245c84-3419-4593-b840-80e6d7d9df60/UNIV_Master%20Plan_Final_8_23_web.pdf.

"Vision San Marcos Comprehensive Plan." *User*, Made with FlippingBook Online Newsletter, 2019, user-3vpeqil.cld.bz/Vision-San-Marcos-Comprehensive-Plan/44/.

Yeh, A G-O. *Urban Planning & GIS*. www.geos.ed.ac.uk/~gisteac/gis_book_abridged/files/ch62.pdf.