# Interdisciplinary Necessity: Employing GIScience to build more effective business decisions and business curricula.


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## Abstract

Geographically weighted regression, geospatial market segmentation, and geospatial science are well established tools in academic research. This project builds on that literature and transports the methodology to a business context. Although businesses have used spatial methodology, it is under utilized in commerce and especially in business school curricula. This project demonstrates spatial statistical methods, and their application to business.


## Introduction

This research first advocates for the integration of location intelligence into higher education business curricula. This may be best achieved through the addition of GIScience to market research and analytics classes. Through the execution of regression models, run on both statistical and GIS software, it is revealed that the GIS software tells a more detailed story of an underlying modifiable areal unit problem - a problem that would not have surfaced without the integration of location intelligence. By integrating GIScience, business schools create well-rounded students better equipped to offer increased value to employers. In turn, companies investing in spatial analysis aid the development of their employees, allowing them to better understand target markets, make more well-informed decisions, and improve the organization's bottom-line. Utilizing GIScience, businesses and their employees have power to analyze their brand, and competitors on a larger scale. This project exhibits this through examination of locational expansion. By integrating spatially-based trade area techniques, specialized data is produced to aid in the decisions surrounding geographic expansion.

## Methodology

This piece integrates a variety of methodology from two senior theses. This includes:

**Secondary Research:** Competitive Analysis of GIS Software Industry, company case studies of Walgreens and General Motors, History of GIS in Higher Education, Relevant Business Models

**IRB Approved Interviews:** Industry Thought Leaders – GIS, Grads, and Globalization

**SPSS Work:**

- Linear Regression – This is a statistical test that predicts the value of one variable based on the values of predictor variables
- Chi-Square - This is a statistical test used to determining if what you have observed is what you expected.

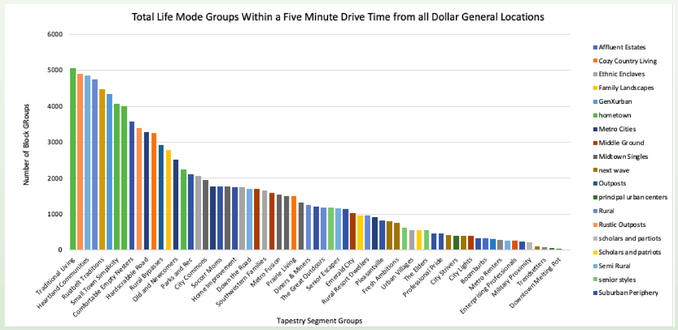
**GIS Work:**

- Drive Time - This is a spatial test that determines the area around a store within an x minute drive.
- Theissen Polygons - This is an equal competition analysis. Determining in distance where consumers are most likely to travel to.
- Block Groups - Like zip codes and counties, block groups is a set of data used by the Census Bureau to control block numbering.
- Geographically Weighted Regression (GWR) - This is a spatial statistical test that predicts the value of one variable based on the values of predictor variables.


## Acknowledgements

A special thanks goes to faculty advisors Julio Rivera and Greg Barron.


**Figure 1.** Tapestry Analysis: Drive Times
What Falls Within a Five Minute Drive Time From Dollar General?




**Target Tapestry Segments**
- Hometown LifeMode
- Southern Satellites
- Heartland Communities
- Rooted Rural
- Hardscrabble Road


**Figure 2.** Analyzing Potential DG Distribution Centers (Kelso, WA)

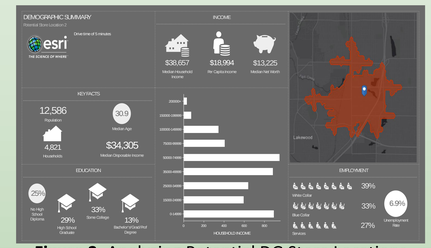



**Figure 3.** Analyzing Potential DG Store Locations (Lakewood, WA)

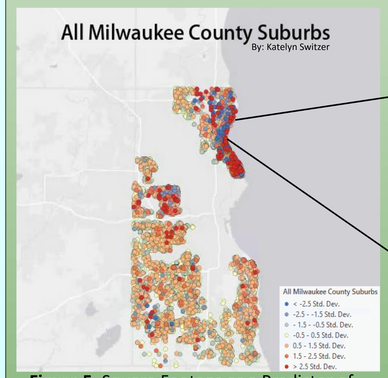



**Figure 5.** Square Footage as a Predictor of Housing Sold Price (GWR Analysis)

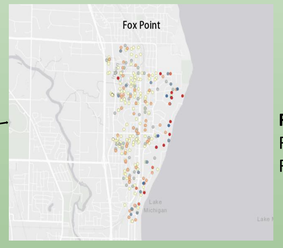



**Figure 6.** Fox Point Feature

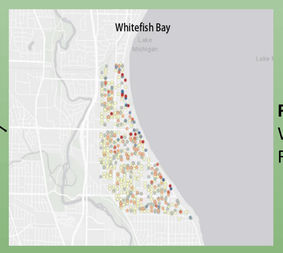



**Figure 7.** Whitefish Bay Feature

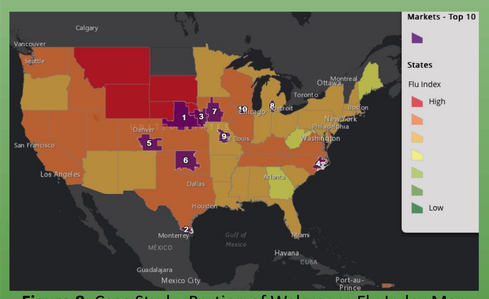



**Figure 8.** Case Study: Portion of Walgreens Flu Index Map via walgreens.maps.arcgis.com. 11 October 2018.


**Figure 9.** Insights Gathered From Senior Level Business Professionals

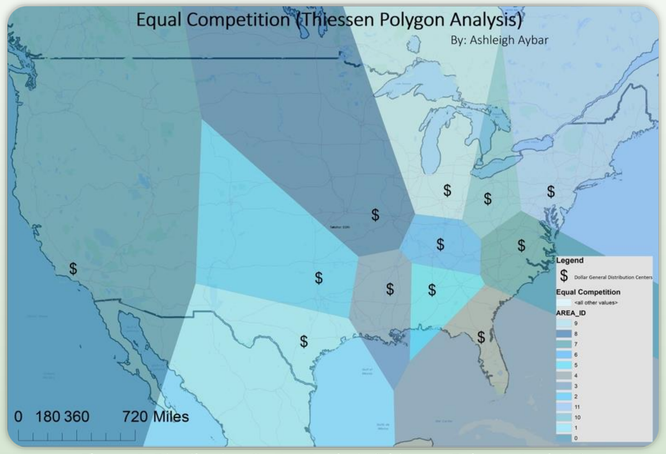



**Figure 4.** Distribution Center Analysis (Thiessen Polygon Analysis)

## Discussion

Location intelligence, through the usage of GIS software, is benefiting businesses across the globe. In the case of Dollar General, holes in the store and distribution center disbursement were revealed when a spatial approach was taken. The target market was determined and the tools utilized aided in the decision of potential locations for Dollar General. Through these analyses it was determined that Dollar General has low impact within the Northwestern states like Washington and Oregon. It was clear that this was a distribution center problem as well. With lack of distribution centers, in order for Dollar General to expand they first needed to expand their DC first. Once expansion for DC's was analyzed, store expansion could be analyzed and new sites could be selected. This research is important because without the knowledge of GIS, location intelligence, companies would be using their best judgement to determine where to expand. With these methods, companies can not only be accurate in their site selection, but they are able to analyze how those communities are changing and determine success of locations based on the surrounding environment.

Due to case studies such as this, it is imperative that business students begin integrating location intelligence into their analytical work. This includes utilizing GIS to strengthen their work in statistics, identifying previously unforeseen patterns in their data and revealing the occasional Modifiable Areal Unit Problem (MAUP). Allowing for a deeper understanding of data, knowledge of location intelligence software sets business students apart from their peers upon graduation. This fact is validated by interviews with senior level employees who have integrated location intelligence into their business strategy. A key insights gained from discussions is that those with GIS experience are especially talented at connecting data that does not seem connected; this is critical in a globalized world.

This piece proves that, while undervalued, location intelligence adds innumerous benefits to business today. Due to this, it is crucial that the field be integrated into higher education business curricula. Until a true integration occurs, business students are urged to engage in alternative methods of study.

## Software Sources

Statistical Package for Social Sciences (SPSS), Esri's ArcGIS Pro/Business Analyst/Business Analyst Online