Using GIS as a Marketing Decision Support System to Help Amari Studios Locate New Customers and Effectively Direct Marketing and Advertising Efforts

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Abstract

Amari Studios is a small yet very successful company. Currently the company gains customers through word of mouth advertising, website promotion, and limited radio advertising. This has worked well for Amari Studios and has allowed it to establish itself in the Sioux Falls, South Dakota USA market. However, management believes it is ready to increase business by enlarging its client base. Before Amari Studios begins searching for new customers, it must define its customer profile and then geographically locate those consumer groups. A customer profile defines the demographic and socioeconomic characteristics of a business's target customer segment (Sliwinski, 2002). For a business to grow, a business needs to know what type of customer it serves and where to find more of them. This project analyzed the city's census data to locate census blocks containing high percentages of potential customers best-fitting Amari Studios customer profile. These criteria were integrated into a GIS model. Once identified, a subset of 100 of the best "ideal" census block addresses along with another 100 addresses from another census block not selected as "ideal" were used in a direct mailing marketing campaign to determine the level of customer interest and validate the GIS model.

Introduction

Amari Studios is a guitar instruction business located in southeastern Sioux Falls, South Dakota. Historically, the business has been very successful and is one of the leading guitar lesson studios in southeastern South Dakota. This success has increased the company's desire to enlarge its client base and increase business.

The company is small (several employees), young, and is in its entrepreneurial stages and has yet to develop a consistent and focused marketing/advertising campaign.

As a result, understanding the demographic and socioeconomic characteristics of a market is an essential part of marketing and advertising for long term development and stability. Aaker, Kumar, and Day (2001) state obtaining information on consumer needs and gathering marketing intelligence is of the utmost importance if a company wishes to satisfy customer needs effectively. Demand for Amari Studios business services in the Sioux Falls area continues to grow. However, market intelligence is needed to effectively expand the customer base. With proper access to data, GIS technology can be used to quickly and effectively breakdown and analyze a market. Hess, Rubin, and

West (2004) believe GIS provides value for marketing decision making through two mechanisms: (1) GIS provides a way to analyze internal or external marketing intelligence data in a format particularly suited to marketing decision making departments; and (2) GIS provides the ability to integrate both internal and external marketing intelligence data to greatly improve the effectiveness of these marketing decisions. GIS not only increases market consciousness, but facilitates decisions based on newly acquired market information.

Market research is a critical part of a marketing intelligence system. It improves management decision making by providing relevant, accurate, and timely (RAT) information (Marketing Research, 2010). Every decision possesses unique needs for information, and relevant strategies can be developed based on the information gathered though marketing research in action (Aaker et al., 2001).

The goal of this research was to analyze demographics to locate census blocks having the highest concentration/ percentage of Amari Studios' defined target market. Hess et al. (2004) explains how important it is for a business to have a marketing information system (MKIS) in place and how GIS can be used as an MKIS to fundamentally alter the cost and effectiveness of marketing decision making. An analysis of US census data, Amari Studios' customer data, and other scholarly material revealed there is substantial business potential in Amari Studios' current service area and that they may be able to reduce costs and reach a more ideal customer base by targeting those that live outside their current service area.

Study Area

This market research study examined the the Sioux Falls, SD area (Sioux Falls and Brandon, SD – and the census blocks located in between the two cities). The entire area is located in Minnehaha and Lincoln Counties. The areas analyzed contain 133,717 people with 126,282 coming from Minnehaha County and 7,435 coming from Lincoln County. The area covers approximately 72 sq miles (Figure 1).

Additionally, to narrow the analysis, Amari Studios' service area was established and further analyzed. The service area covers approximately 50 sq miles, contains approximately 82,000 people. This area contains 80% of Amari Studios' current client base.
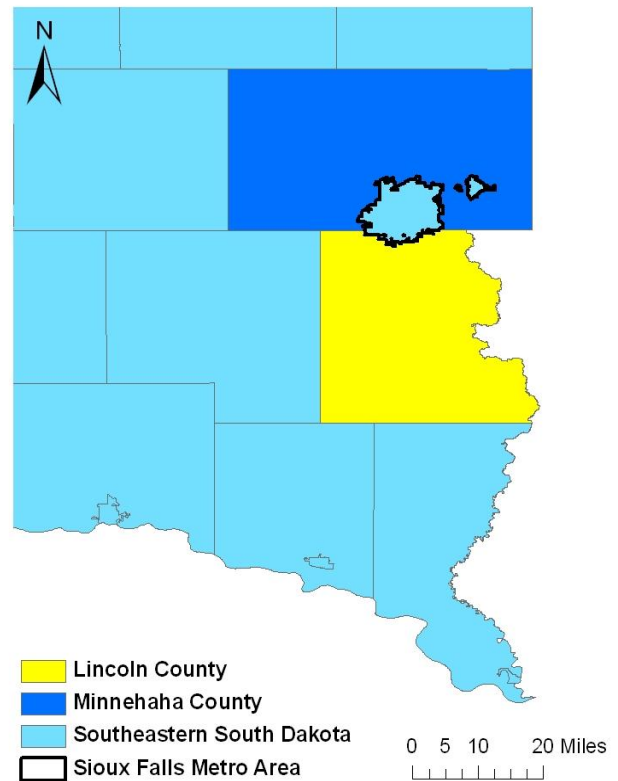

Figure 1. Southeastern South Dakota.

The service area is fairly centralized in terms of city location and contains many inner-city census blocks and neighborhoods (Figure 2).
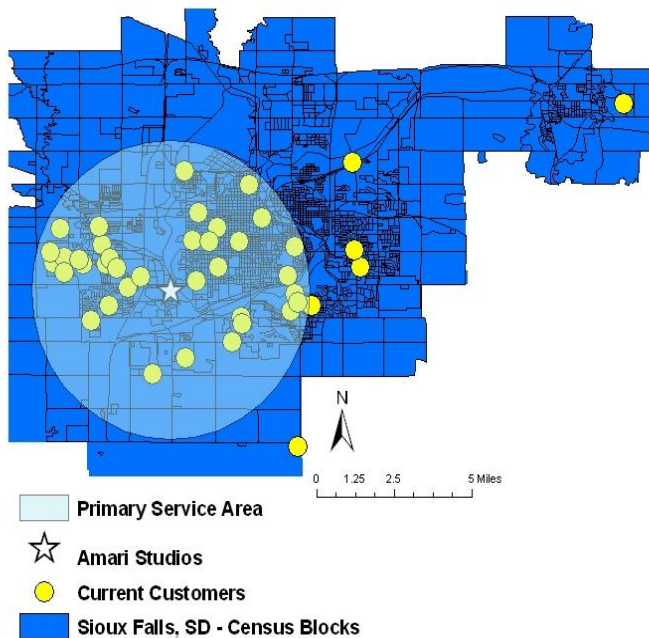
Figure 2. Amari Studios' service area.

Methods

Data Selection

According to Zahorsky (n.d.), collecting customer information is the starting point of building a valuable customer list. Information to collect can be basic ranging from names and addresses to more in-depth demographic data such as income or age. For this study, current customer information was selected as an important data source.

Census block data were also selected as an important data resource. Romeo (2005) states a marketer should look at block group data, which incorporates variables such as population, number of households, average income, etc. For this analysis, the variables selected were age, sex, race, census block population, and census block proximity (in relation to Amari Studios). These variables were chosen largely due to the fact that they were the only solid variables provided by Amari Studios. Amari Studios' ideal customer fit the following profile: 12 to 15 years of age, white, and male. The selection of the other

variables, proximity and block population, will be discussed later in the paper. These selected attributes were extracted from the US census data and added to the ArcGIS Sioux Falls, SD database for further analysis.

Data pertaining to highly trafficked public areas were also selected as an important data dimension. The Lamar Advertising Company states 21.3% of frequent shoppers are more heavily exposed to outdoor advertising than any other medium because outdoor advertising allows businesses to research mass markets and target neighborhoods that have desirable demographic compositions (Lamar Advertising, 2010).

Data Collection

According to Aaker et al. (2001), US census information is considered to be the most valuable data for market research. Therefore a majority of the data analyzed were obtained from the US government's census data.

The owner of Amari Studios' provided information pertaining to his company's clientele base (i.e. customers' age, address, gender, and race). Data pertaining to outdoor advertising methods and expenses were obtained through a local advertising company and data regarding bus stops and other outdoor areas that have public benches were collected via Google maps.

Data Conversion

After the information was collected, the spatial references were defined to ensure that all layers were projected alike.

The data for this analysis were carefully extracted from a combination of: US census data, Amari Studios' current customer data, and Google Maps. In regard

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to the US census data, the Sioux Falls map (displayed in ArcMap) was populated with census block group information. Minnehaha and Lincoln County census blocks that fell within the Sioux Falls metro area were selected and converted into a single layer. This allowed for a more effective and focused market analysis and many of the large desolate census blocks were removed. Attributes of this "Metro Area" layer, such as race, sex, population, and age were merged with the Sioux Falls shapefiles based on the common field of STFID. Each map was temporarily color coded to reveal the quantity of the desired attribute in each census block and then converted into raster format. This step was repeated until all of the desired attributes had been isolated and converted into raster form.

Point shapefiles were placed at addresses that matched Amari Studios' current customer address list. Establishing current customer proximities allowed for the creation of a service area. Once the service area was defined, a buffer around Amari Studios was created and then converted into a raster as well.

Data Manipulation

As stated by McDaniel (2010), "a market analysis should follow a programmatic technique and answer questions such as: Has the target market changed? How? Does the market exhibit any new segmentation opportunities? Do some segments appear to be more likely candidates than others for the firm's marketing efforts? What new product or service opportunities lie in the various segments?" Programmatic research helps analyze marketing options through market segmentation, market opportunity analysis, and consumer attitude/ product usage studies (Aaker et al., 2001).

One of the goals of this study was to obtain and analyze market information and specifically focus on new segmentation

opportunities by initiating a direct mailing campaign. Since Amari Studios is a relatively new company, and since no market research has been conducted prior, the programmatic research of this study followed a step-by-step process to find new business opportunities.

After the data was selected, collected, and converted, it was subjected to a series of spatial analysis processes using the raster calculator. The raster data from the "Metro Area" layer was grouped into five different classification rankings. These rankings included: total census block population, total number of Caucasian inhabitants per census block, total number of inhabitants under the age of 5 (taking into consideration that the information is ten years old), total number of males per census block, and lastly, blocks located within the current service area. These raster data sets were added with the raster calculator creating a suitability map that ranked each census block based on the desired attributes. In other words, the final output of this process displayed a map that ranked each block from "high enrollment potential" to "low enrollment potential." Areas of "high enrollment potential" had a relatively large number of young, white males that lived within the service area and areas of low enrollment potential lacked the attributes that Amari Studios was looking for. The process was repeated once more, this time for the whole study area. This revealed all the Sioux Falls' area census blocks containing ideal customers.

With the "high enrollment potential" blocks highlighted, the next step was to select the blocks that had above average numbers and create a map that displayed the areas of high enrollment potential. These areas were then converted into their own layer and further analyzed. Once the above average layer was created, it was then placed under the nearly transparent "Metro Area"

layer so that the census block information could be selected and read.

Of the highest ranking census blocks, the five with the greatest numbers and percentages, both inside and outside the service area, were selected and then covered by Tiger/Line street layers files (Figure 3).
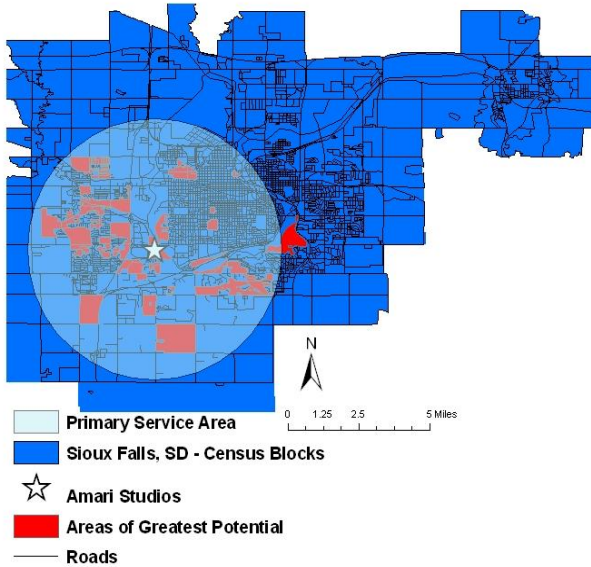

Figure 3. Street layers layered over the high enrollment potential census blocks.

Layering the street layers over the city map allowed for a more thorough analysis of the selected census blocks. Looking at the streets proximity to the selected census blocks helped determine neighborhood names and locate nearby parks, malls, etc. Using Google Maps and Google Earth helped find streets in "high enrollment potential" blocks characterized as most suitable for outdoor advertising.

Results

The analysis of US census data, Amari Studios' customer data, and scholarly material greatly facilitated marketing planning. The maps that were created not only revealed an abundance of business potential within Amari Studios' current service area but also identified some high potential areas located outside of the service area.

Service Area

As recommended by Cindy S. Garness (2010), Senior Market Analyst at Franciscan Skemp – Mayo Health system, a service area should contain approximately 80% of a business's client base. Out of Amari Studios' 53 customers, 50 are located in the Sioux Falls area and 40 of these are located within the service area. The service area is approximately 9 miles wide, 50 sq miles in area, and contains around 82,000 people (Figure 4).
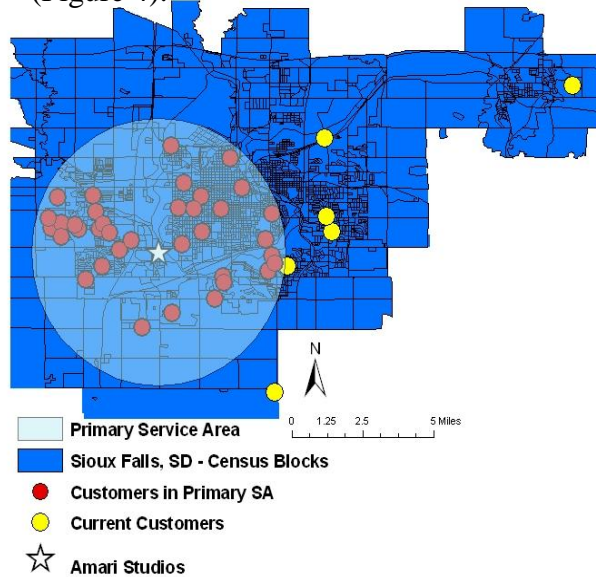

Figure 4. Amari Studios' customers and service area (Note: a number of Amari Studios' customers cannot be seen on Figure 4 as they are located a few miles outside of the Sioux Falls Metro Area).

Areas of High – Low Potential

An extensive knowledge of your customers also provides opportunities for upward and cross-selling campaigns, better responses to loyalty programs and promotions, and more precise prospecting (ESRI, n.d.). By understanding the demographic composition of a market, one can then begin to understand human purchasing habits. This

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study attempted to subset the demographic composition of Sioux Falls area census blocks and find areas that contained large numbers of ideal customers. Figure 5 displays the marketing suitability analysis final product.

The areas in dark blue are considered to have high enrollment potential, meaning that the inhabitants/consumers of this block are – statistically speaking – more likely to spend money on Amari Studios' services. Light shaded areas have low enrollment potential. These census blocks either lacked an overall large population, a large population and percentage of whites, a large population or percentage of inhabitants under 15, or just generally lacked males.
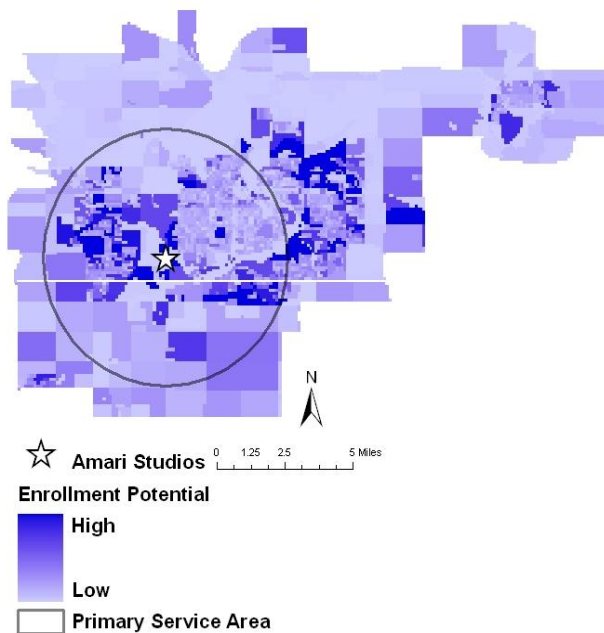

Figure 5. "High to Low" enrollment potential.

The initial analysis ignored factoring the service area into the analysis. This analysis revealed census blocks with high potential that would have otherwise been overlooked. Examining Figure 5, it appears that Amari Studios' is currently located in an area that has high potential. However, there are still many profitable neighborhoods that are unexplored. The census blocks of west central and east central Sioux Falls seem to have the highest numbers of young white males. To the far northeast there are darker census blocks. This is the Brandon, SD area – a sizable suburb that appears to contain high numbers of Amari Studios' ideal customers. To the southeast, in Lincoln County, there also appears to be a few rather large, highly populated census blocks. The county as a whole does not appear to contain large numbers of ideal customers. However, there are a few census blocks that are candidates for a direct mailing initiative.

The second high – low enrollment potential analysis added the service area into the analysis. As stated, a service area should contain 80% of a business's client base. It is not wise to waste time, money, or effort on an area that only contains 20% of a company's business, especially for a small company like Amari Studios.

Figure 6 displays the areas of high – low enrollment potential that fall within the service area. When taking a more focused approach to market knowledge, this would be the area that Amari Studios' management should first consider.
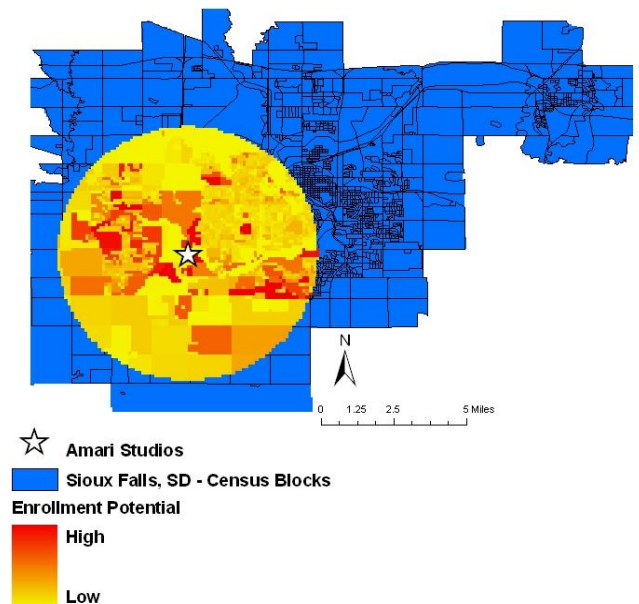

Figure 6. "High to Low" enrollment potential within the service area.

Areas of High Potential

The high – low enrollment potential map was a great starting point and conveyed abundant useful information. It allowed for an easy visualization of target market locations. However, the map was not specific enough and in some regards and perplexing/ confusing in others. The whole point of using GIS as a marketing decision tool is to save money by removing unfruitful demographic areas from an advertising campaign (Romeo, 2005).

Because the variables were somewhat generalized (population, age, race, sex, proximity), there were many census blocks that contained ideal customers. Furthermore Sioux Falls is a very homogeneous city with 93.9% of its inhabitants being white. The male/female ratio was 50.3% to 49.7 % respectively, and a fairly distributed median age of 34.1 years old (Anonymous, 2010). This also made it difficult to find areas with unique identities. Not only is the city very homogenous, but the homogeneity appears to be equally dispersed throughout the city. Even the inner-city blocks, which are quite diverse in most American cities, lack a truly distinctive demographic character. The only noticeable distinguishing features about the census block layer are the outer blocks are less populated and the inner-city blocks do not have a high number of young inhabitants.

To better understand the landscape, the data were dissected and reexamined only selecting the blocks that had above average numbers of: people, Caucasians, males, and children under the age of 15. The average census block population of the Sioux Falls area was 49.69, the average number of Caucasian individuals per block was 42.18, the average number of males under the age of 15 was 3.35 per block, and the average number of males per block was 22.56.

Reexamining the data allowed for the creation of a high enrollment potential map with further clarity. The census blocks highlighted ranked in the top 20th percentile for every attribute category. Figure 7 displays the census blocks within the service area that had the highest scores of the above average blocks.
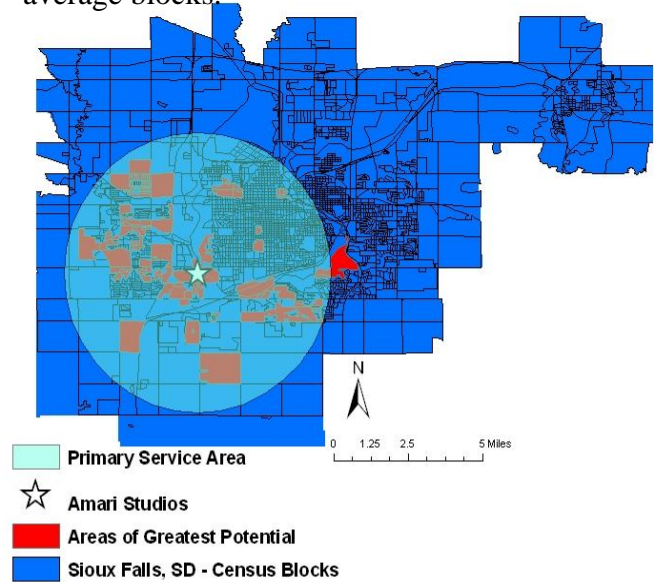

Figure 7. Areas of high potential within service area as identified as containg the top 20% of the population, males, and children under 15.

The findings for this group of census blocks were considerably higher than the Sioux Falls metro area numbers. This group of blocks contained a total of 18,768 people, in both Minnehaha and Lincoln County. The average population per block was 223.43, the average number of Caucasians was 207.29, the average number of children under 15 was 15.4, and the average number of males per block was 104.93. When looking at the desired attribute averages, this group of census blocks as a whole was 4.7 times greater than the Sioux Falls area averages - meaning, each attribute category was 4.7 times larger (on average) than a typical census block.

Again, this map was helpful but still dealt with a great deal of information. If Amari Studios was a larger company, this

may have been a sufficient analysis, but since they are still a growing company they do not have the time or money to actively pursue an 18,000 person client base.

Top 5 High Potential Areas

To narrow the analysis further, five of the highest scoring census blocks were selected for analysis (Figure 8) in which Amari Studios might consider initiating a marketing and advertising campaign.
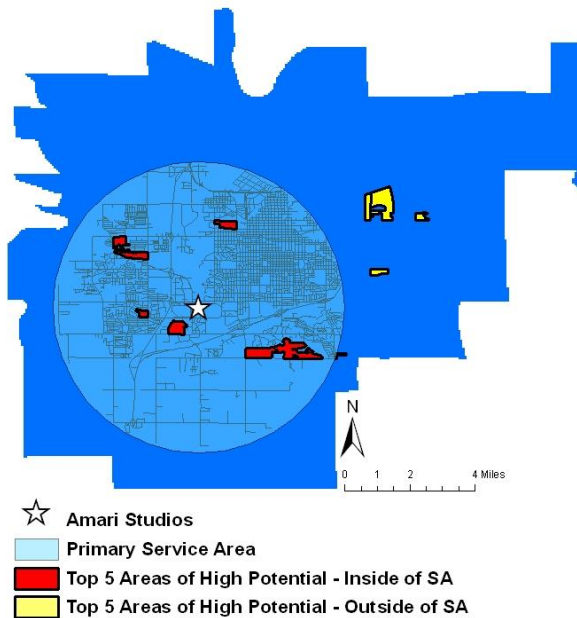

Figure 8. Top 5 areas of high potential – inside and outside of the service area.

The statistics for this group of census blocks are as follows: Inside the service area -- total population – 3160, average population per block – 632, average number of Caucasians per block – 586, average number of children under the age of 15 per block – 36, and average number of males per block – 288.2. Outside the service area -- total population – 2181, average population per block – 436.2, average number of Caucasians per block – 344, average number of children under the age of 15 per block – 58.8, and average number of males per block – 203.2. On average, the top five

census blocks selected within the service area had numbers that were 12.8 times greater that the Sioux Falls metro area average. The group of blocks located outside of the service had total averages roughly 11.5 times greater than that of the Sioux Falls metro area and with a notable increase in the average number of children under 15 – which was at 58.8 per block.

Figure 9 displays the selected demographic averages of Sioux Falls census blocks versus the five census blocks that this study selected as having the highest potential.
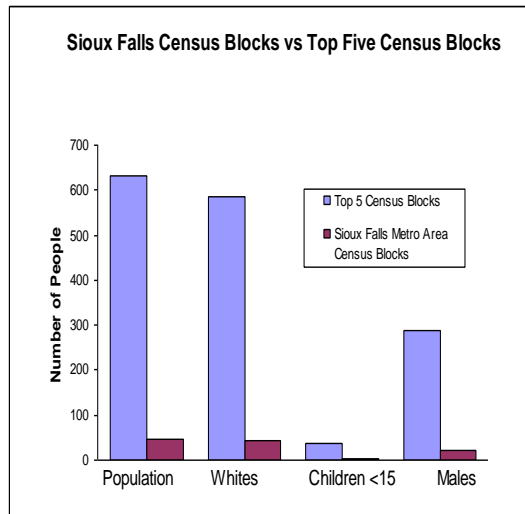

Figure 9. Sioux Falls census vs. top 5 census blocks.

The five highest ranking census blocks were: block 4050, block 1040, block 2005, block 2043, and block 1307. These blocks are also in close proximity to major parks and schools and are also near a few of the major metro transit stops which are ideal for outdoor advertising locations. The blocks located outside of the service area – blocks (1030, 1029, 3004, 2002, and 2121) – are interesting in that they contain above average numbers but are farther away and may require more effort at marketing than Amari Studios desires. These blocks also contain the highest average number of children under the age 15 – almost 1.6 times

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greater than any other area average. These blocks may not be as populated but they contain the greatest number of children.

Reaching customers is the next step. Potential customers have been identified, but Amari Studios' management has to decide what approach to take to reach them. Direct mailing is considered to be the most effective medium for direct marketing (if it reaches the proper target) (Bult and Wansbeek, 1995). Classified ads are another option but this is a less focused method of marketing. E-mail is a great way to stay connected with current customers but is somewhat useless when it come to recruiting new customers of a specific demographic (Cruz, n.d.). Outdoor advertising is another method that would work well for Amari Studios as this method allows for 24/7 viewing in a specific location.

Testing the Areas of High Enrollment Potential

With the areas of high enrollment potential located, it was time to test the hypothesis that this market analysis assumed: the areas with a population demographic similar to Amari Studios' current customer base would have a higher enrollment potential (or at least show more interest) than other census blocks. To assess this hypothesis, a small-scale, direct mailing campaign was designed. Two nearly identical promotional flyers were created; the flyers had a contemporary design with the Amari Studios' logo and contact information. The difference was in the attached promotional message. The promotional message read "Mention the promotional code when you call to schedule a free lesson.", and also included a promotional code – either 1001 or 1002. The flyers with the code 1001 were distributed to houses that fell within the census block with highest enrollment potential and the flyers with the code 1002

were distributed to houses that fell within the census block that had equivalent population numbers but did not have the desired demographic characteristics (Figure 10).
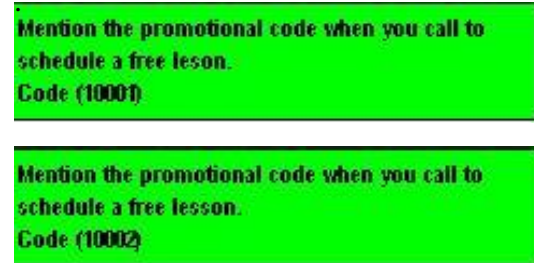

Figure 10. The promotional messages and codes that were attached to the Amari Studios flyers.

The delivery of the flyers was done in a less traditional manner. Due to lack of funding, mailing lists were unobtainable. So instead, the flyers were hand delivered. Each flyer was placed either between a household's glass door and front door or in the newspaper box (usually located directly beneath or close to a household's mailbox). With the targeted census blocks/ neighborhoods located in an ArcGIS map, it was easy to enter their addresses into a GPS and locate them firsthand. Each group of census blocks – both high enrollment potential and low enrollment potential – received 100 promotional flyers (200 flyers distributed total).

Since the recipients of the flyers were encouraged to mention the promotional code when they called in to inquire about the advertisement, locating the targeted area in which they lived was relatively simple. Recipients who mentioned the code 10001 revealed that they were located in the high enrollment potential areas while recipients who mentioned the code 10002 revealed that they were from the areas that were predicted to have low enrollment potential. Responses to the promotional flyer allowed for the creation of a response rate map – which displayed the level of interest within the target area.

Census block 4050 - the predicted high enrollment potential area – had a response rate of 15%, whereas census block 3000 – the area of predicted low enrollment potential – had a response rate of 3%. The recipients were given a two week period to respond. However, most of the inquiries came within the first five days.

Figure 11 displays the two census blocks targeted by the direct mailing campaign. Figure 12 provides a closer look at the neighborhoods that were targeted by this study.
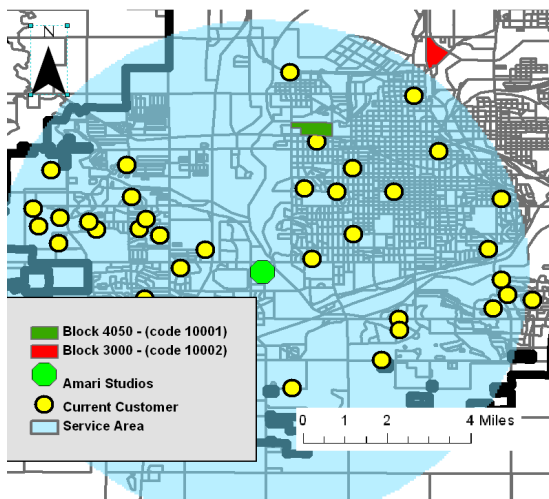

Figure 11. The census blocks targeted by the direct mailing campaign.
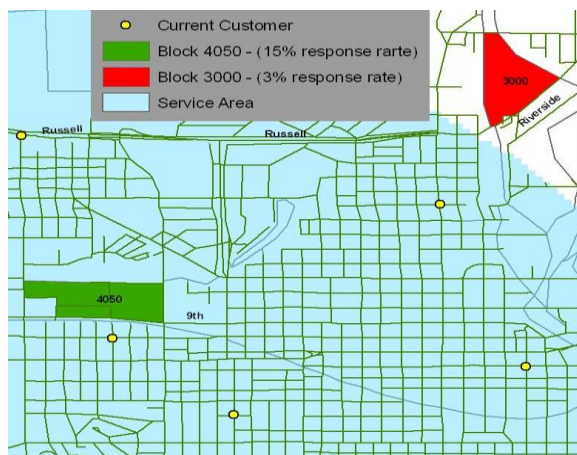

Figure 12. A closer look as census blocks 4050 and 3000.

The results from the direct mailing effort supports this study's hypothesis that targeting neighborhoods that have demographic characteristics similar to that of Amari Studios' client base will generate more interest than targeting neighborhoods that do not have similar demographic characteristics. The direct mail study was done on a small-scale but the numbers do reveal a greater interest in the high enrollment potential areas. The results of this direct mailing effort, and the study as a whole, suggest that Amari Studios should focus their advertising and marketing efforts on the areas that this study has labeled as areas of high enrollment potential.

Outdoor Advertising Locations

As mentioned, the top five service area census blocks do not only contain high numbers of ideal candidates but are also located next to highly trafficked public areas making them great locations to initiate an advertising effort. The highest ranking census block, 4050, is located in between 8th St. West and Holly Avenue in the northwestern corner of Sioux Falls. This neighborhood is located near N Western Ave and Burnside Park and would be a great spot to place an outdoor advertisement of some sort.

The second highest ranking block was census block 1040, located near West Brooks PI and Louise Ave, which is also near Sioux Falls' main mall (The Empire Mall). The third highest ranking block was census block 2005, located near 12th St and Valley View Dr. and is near a number of Sioux Falls metro transit stops. The fourth and fifth ranking census blocks were 1307 and 2043. Block 1307 is located just off Valhalla Blvd, near the Empire mall as well, and block 2043 is located in Lincoln County near E 69th street and the Sioux Falls Christian School. These neighborhoods/

census blocks are ideally situated to host some type of outdoor advertisement. Figure 13 displays the general location of where the outdoor advertisements might be considered for placement.

☆   Amari Studios
▢   Primary Service Area
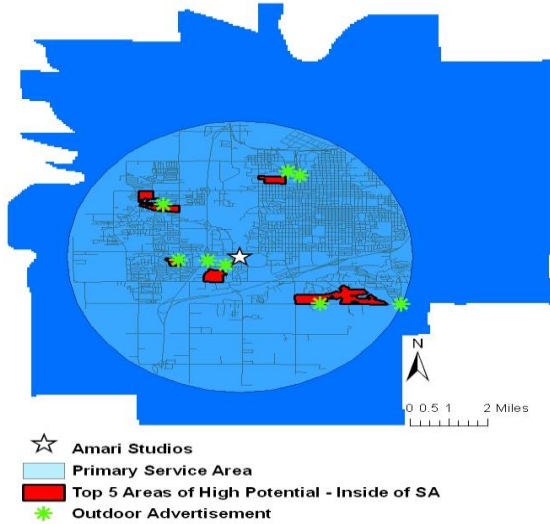▮   Top 5 Areas of High Potential - Inside of SA
✳   Outdoor Advertisement

Figure 13. Outdoor advertisement location in relation to the selected census blocks.

In Sioux Falls, SD, the company Creative Outdoor Advertising appears to have the lowest price and the largest selection of outdoor advertising options. For approximately $89.00 - $150.00 dollars a month (depending on location), Amari Studios can rent an outdoor advertising medium (Creative Outdoor Advertising, 2006). If Amari Studios decided to advertise at all locations, the annual cost would be approximately $5340.00 – $21000.00 per year.

Figure 14 is an example of what Creative Outdoor Advertising offers as an advertising medium. This type of advertising is primarily useful for traffic and commuter advertising if located properly within a consumer specified area. Bench advertising options are a very effective method of advertising and are especially effective when the target customers of the business marketers are geographically concentrated (such as census blocks) (Lichtenthal, Yadav, and Donthu, 2004).

Figure 14. An example of bench advertising.

Conclusion

Amari Studios needed to identify and localize neighborhood types to which its corporate profile (in this case, the small business) is skewed and whose residents matched its profile characteristics (Sliwinski, 2005). Identifying these areas (i.e. neighborhoods, census blocks) allowed for the creation of a marketing decision aide, which if used properly, may help Amari Studios make educated marketing and advertising decisions. Pick (2005) also indicates using GIS technology may also help reduce workforce and costs, improve productivity and performance, and increase asset value.

Scholarly market research and analysis techniques combined with GIS technology helped Amari Studios profile, analyze, segment, and locate customers, and may also help facilitate the acquisition and retention of new customers (ESRI, n.d.).

This paper examined the research problem: "Can GIS be used as a marketing decision support system to help Amari Studios locate new customers and direct advertising efforts. After completing the analysis, findings seem to support the benefits GIS has in effectively identifying marketing areas. The findings of this study demonstrate there is a very large market for the services that Amari Studios has to offer. The lack of distinct neighborhood demographic identity makes it difficult to determine the more profitable areas.

However, despite the homogeny of Sioux Falls, this study was able to locate a number of census blocks that contain high numbers of Amari Studios' potential customer. Areas such as blocks 4050, 1040, 2005, 2043, and 1307 contain sizable populations, and averages that are nearly 13 times greater than the Sioux Falls metro area average. Also, there are some interesting blocks located outside of Amari Studios' service area. Blocks 1030, 1029, 3004, 2002, and 2121 contain above average numbers of inhabitants with the desired demographic characteristics and although they are farther from Amari Studios, they may be highly profitable areas worth examining further.

The results of the direct mailing assessment further support this study's findings. With the response rate being 12% higher in the "high enrollment potential" areas (vs. the "low enrollment potential" areas), it would be fruitful for Amari Studios to continue marketing their services in those locations.

The biggest limitation of this study was the age of the census data that were analyzed. Highly detailed census data are only released once every ten years and because this study took place in early 2010, available data consisted of 2000 census data. Newer census data will become available later in 2010 year. However, the methodology behind the data analysis would be exactly the same, regardless of its age. Since this market analysis process is developed, the new 2010 census data could be easily interchanged with the older data. Also, since this information is old, Amari Studio's decision to act on this study's findings may not yield the greatest results. On the other hand, Hogan (1970) argues there is a great deal of community socioeconomic stability over a ten year period. So in other words, the community composition is most likely similar to what it was ten years prior, in 2000. Either way, the study would have more legitimacy if the 2010 census data were available.

In the end, this study supports using GIS as a marketing decision support system to help Amari Studios locate new customers and effectively direct its marketing and advertising efforts and gave Amari Studios a better understanding of where its ideal customers are located. This helps affirm ideas of Geographic Information Systems' usefulness in business decision-making by adding a spatial component to the decision process (Pick, 2005).

Acknowledgments

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