



## **Methodology Statement: ESRI's Scorecard Analysis**

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# Methodology Statement: ESRI's Scorecard Analysis

## An ESRI White Paper

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# Methodology Statement: ESRI's Scorecard Analysis

When considering where to expand your business, you must know if the prospective trade area is similar demographically to the areas around your existing successful locations. If you use vague or incorrect information as part of your site selection decisions, you can lose time and money when the sites don't fit your company's business model. ESRI's solution is the **Scorecard Analysis**. It will help you clarify the demographic element of site selection and select potentially successful sites.

## What Is a Scorecard Analysis?

To identify the characteristics of a successful site, the Scorecard Analysis defines the socioeconomic variables that most closely relate to the sales from each of your stores. These variables then serve as benchmarks in the evaluation of new sites. The Site Score, a summary measure in the Scorecard Analysis, enables you to easily identify prospective trade areas that closely match your benchmarked criteria.

A Scorecard Analysis highlights the demographic variables that best describe the market area around an existing business. After ESRI completes the customized Scorecard Analysis, the template will be available to you whenever you wish to consider a new site. ESRI can perform the Scorecard Analysis for you or install the template in your ArcGIS® Business Analyst desktop software, enabling you to perform your own analyses. If you choose the latter, ESRI's client services team will assist you with the installation and applications.

## How Is a Scorecard Analysis Created?

For a successful analysis, total annual sales data and customer records from each store location are required. To produce a Scorecard Analysis, ESRI geocodes the customer records by store location, assigns geographic coordinates to each address, and computes trade areas around each site. ESRI conducts a spatial analysis of each site's geocoded customer records to derive drive-time polygons. These polygons are computed to produce an average drive time that will serve as the uniform trade area to approximate the typical customer draw for every location. After this standard trade area is established, ESRI selects socioeconomic and demographic characteristics such as age, income, and education that are relevant to your specific industry sector. These characteristics are then correlated to the total annual sales by store.

The Scorecard Analysis employs *correlation analysis*, a statistical technique that measures the strength and direction of the relationship between sales and specific socioeconomic variables. Because large sample sizes produce a more statistically robust correlation, using information for fewer than 50 existing stores is not recommended. These stores should be similar not only in concept but should have been in operation *for at least two years* to ensure that sales performance data accurately reflects each store's market presence within the trade area.

The Scorecard Report lists the variables with a strong relationship to store sales. These variables will serve as benchmarks for evaluations of new sites. The report also includes

descriptive data such as minimum and maximum values, averages, and ranges to help assess each benchmarked variable against the characteristics of new sites.

### **Sample Scorecard Report for ABC Company**

To understand how a Scorecard Analysis can help your business, here is a sample scenario and a Scorecard Analysis report.

ABC Company of Oldtown, USA, sells widgets in 120 urban and rural locations throughout the United States. All of ABC's stores have been operating for more than three years. To accommodate the increased demand for its widgets, ABC must quickly identify the most profitable markets for expansion. Several managers thought that a potential area would be Newtown, USA.

ESRI used the ABC Company sales and customer data to define the differences between all consumers in a market and the consumers who buy widgets. A correlation analysis uses the broad measure of total sales to identify the characteristics that are specific to each location. Another analysis can use sales data that is specific to widgets. ESRI evaluated whether an urban or rural classification distinguished between these two consumer groups.

This sample report for ABC illustrates how a Scorecard Analysis works. Because the potential site is in a business district, "urban consumers" were targeted for this example. The report lists the variables that most closely correlated to store sales, benchmark values, and the Site Score. The Site Score is a weighted summary measure that can easily be used to evaluate multiple prospective sites. The score ranges from 0 to 100, where higher scores indicate sites that more closely match the benchmark values. A score of 0 means that no variable for the proposed site met the predetermined minimum (or maximum) criteria. A score of 100 signifies that every variable met and exceeded the threshold values.

The Trade Area column registers the demographic values of the proposed site. The Meets Criteria column records each variable as Fail, Pass, or Exceed based on an internal algorithm that compares the benchmark values to the values of the trade area.

### **Manual Site Review**

ABC Company can also override the Site Score and manually determine if the demographic variables pass the predetermined criteria. The demographic variables are listed in descending order based on the value of their correlation. ABC Company managers should focus on the table's first entry. For example, 2008 Average Family Income represents the demographic variable that has the strongest relationship to store sales. When evaluating potential expansion sites, ABC Company managers can begin their analysis with that characteristic.

From the Scorecard template, ABC Company observed that the average annual family income for Newtown is \$68,894. The managers compared this figure to the benchmarks for the same variable in the report and decided that it passed their criteria. (The same conclusion is evident in the Scorecard's internal evaluation, as shown by the "Pass" classification listed in the Meets Criteria column.) Let's review these steps to see how ABC Company reached this conclusion:

1. Because the correlation coefficient is a positive value of +0.78, ABC Company recognized that higher average family incomes are strongly associated with stores with higher sales.
2. ABC Company then compared the minimum and maximum values of average family income based on its 120 stores. The value of \$68,894 for Newtown falls comfortably between the minimum of \$41,510 and the maximum of \$136,983. At \$79,445, is the value for Newtown close enough to the average family income for all stores to merit a new site?
3. ABC Company then evaluated Newtown's income by determining if it was within the acceptable range of income values. The range for average family income is  $\pm$  \$21,270. Approximately 68 percent of ABC Company's 120 stores are located in areas where the average family income is between \$58,175 and \$100,715. The lower end of the range of \$58,175 can be treated as the absolute acceptable minimum when comparing the income value of a proposed site. However, the range used in the Scorecard's internal evaluation is determined by a more restrictive decision rule—half the cited range. So, instead of the \$58,175 minimum, the Scorecard uses the more restrictive minimum of \$68,810. In this example, Newtown's average family income passes the most restrictive criteria.
4. Finally, ABC Company compared the benchmark median value of average family income to the benchmark average. The median represents the value that splits the income distribution into two equal parts. Half of its 120 stores fall below \$74,702; half are above. Because it is unaffected by extreme high or low values, the median can be a more reliable measure. Although the median cannot be substituted for the average to determine a range of acceptable values, it provides a point of comparison.

This evaluation should be performed for all the variables listed on the Scorecard. Sites that match most or all of the demographic targets are the best prospects for expansion. For your convenience, definitions are included for each variable listed in the report



# SCORECARD REPORT

**ABC Company**

**Product:** Widgets  
**Market Type:** Urban Consumers (120 Existing Locations/10-Minute Drive Time)  
**Proposed Site:** Business District of Newtown  
**Address:** 1234 Main Street  
 Newtown, USA

ITEM	CORREL. <sup>a</sup>	MIN. <sup>b</sup>	MAX. <sup>c</sup>	AVG. <sup>d</sup>	RANGE <sup>e</sup>	MEDIAN <sup>f</sup>	TRADE AREA <sup>g</sup>	MEETS CRITERIA
2008 Average Family Income	+0.78	\$41,510	\$136,983	\$79,445	±\$21,270	\$74,702	<b>\$68,894</b>	Pass
2008 Number of Households	+0.64	6,922	111,647	32,342	±14,297	26,356	<b>4,894</b>	Fail
2000 High School Diploma	+0.61	7,128	194,118	44,932	±16,348	33,242	<b>11,948</b>	Fail
2008 Rate of Unemployment	-0.57	2.8%	9.2%	6.1%	±1.5%	6.0%	<b>3.8%</b>	Exceed
2000–08 Population Growth	+0.48	0.1%	2.3%	0.8%	±0.5%	0.6%	<b>1.5%</b>	Exceed
2008 Total Population 18+	+0.43	8,493	202,749	51,142	±17,864	38,977	<b>12,479</b>	Fail

Note: This sample report should be used for illustrative purposes only.

SITE SCORE<sup>h</sup>

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## Table Footnotes

- Correlation coefficient. A value near +1 indicates a strong positive relationship; a value near -1 indicates a strong negative relationship.
- The minimum value of the distribution.
- The maximum value of the distribution.
- The arithmetic average of the distribution.
- The range of values that contains approximately 68 percent of all observations.
- The value that divides the distribution into two equal parts and is unaffected by extreme observations.
- Results from the proposed trade area.
- The Site Score ranges between 0 and 100. The closer the proposed trade area reflects the benchmark values, the higher the Site Score will be. A score of 100 indicates that all variables exceed the benchmark criteria.

## Explanation of Variables

- 2008 Average Family Income:** ESRI's current-year update of average income of all family members aged 15 years and older. This average represents the mean of the distribution and is calculated from aggregate income divided by all families.

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- **2008 Number of Households:** ESRI's current-year update of all occupied housing units.
- **2000 High School Diploma:** The total population aged 25 years and older who attained at least a high school diploma in 2000.
- **2008 Rate of Unemployment:** ESRI's current-year update of the unemployment rate. This figure is calculated by dividing all unemployed persons into the civilian labor force (i.e., the number of persons aged 16 years or older who are either working or are actively seeking work).
- **2000–2008 Population Growth:** Calculated as an average annual compound rate of change from 2000 to 2008 for the total population.
- **2008 Total Population 18+:** The total number of residents aged 18 years and older in an area.