Expansion in Existing and Future Franchises

by

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Executive Summary

Zensho Group has recently acquired the restaurant US based chains CoCo's and Carrows but has not been able to affirm the same growth as the company has established in its home country of Japan. In order to fulfill their need to grow, extensive market analysis and research needs to be done. An expansion eastward and the introduction of their flagship restaurant chain, Sukiya, would offer growth potential. Determining the best locations for these new stores is the goal of this project. Low cost and high market penetration potential will be used to recommend the ideal locations that will benefit the company most.

In order to determine the lowest costs, the distance from the distribution center to the stores, the costs of the trucks along those routes, the construction would cost, and the menu items will be analyzed to firmly establish optimal growth. Using tools like Analytical Hierarchy Process, data mining using Access, and creating a database for the analysis of the project. CoCo's and Carrows will expand eastward and Sukiya will be introduced in California

Introduction

The Japanese company Zensho is looking to expand their current business located in the US. They are considering bringing their flagship restaurant, "Sukiya" to the states as well. In order to determine the best locations for these new restaurants, the initial supply chain will be taken into consideration with the locations of all the existing stores and distribution centers. Once the basic logistic plan and layout is analyzed, the future expansion and the introduction of Sukiya can be planned. The growth of existing chains will head east while the locations of the new Sukiya restaurants will be analyzed across the US. Due to the merger with the Catalina Restaurant Group Inc. in 2006, Zensho's operation has been in disarray in the States. No growth incentives have been set in the US, which is unusual, especially when the company has a history of rapid growth in Japan. In order to promote growth, expansion incentives must be introduced.

Objectives

This project will be broken down into two primary sections: the expansion alternatives for currently established restaurants and the introduction and expansion alternatives for Sukiya. Each section will be treated as its own separate entity, and will have its own design, evaluation, and results. Both aspects will build off of a common operation foundation currently established at CoCo's and Carrows thus:

1. Develop understanding of current supply chain
2. Design a method of determining an optimal location for Coco's Bakery and Carrows Restaurant.
3. Design a method of determining an optimal location for the new restaurant chain, Sukiya.

Scope:

We will take into consideration current logistics and all growth elements will be based off of the currently existing suppliers and distribution centers. Growth alternatives will all be fiscally within reason. All expansion and the introduction of the new franchise will take into consideration demographics. Comparisons between similar competitors will be used in any justifications. Implementation plan will not be devised but alternatives will be presented. A cost analysis of each alternative will be offered and triple bottom line analysis will also be a part of the analysis. Due to limited time frame, we will not do an extensive risk analysis but will attempt to maintain reasonable assumptions.

Expected Deliverable:

- Devise a future plan for restaurant locations
- Offer potential alternatives for growth
- Develop future locations alternatives
- Introduce a new franchise with optimal location alternatives
- Cost analysis of all potential locations and associated costs.

Project Outline and Schedule:

Mile Stones:

Progress Report	October 12, 2010
Competitor Comparison Completion	October 16, 2010
Alternative Distribution Locations Decided	October 20,2010
Complete Simulation	October 25, 2010
Turn In Draft	November 9, 2010
Practice Presentation For IAB	November 16, 2010
Turn in Final Copy of Report	November 16, 2010
Turn in CD to IME Department	November 30, 2010

Industrial Engineering Orientation:

Several fundamentals from Industrial Engineering will be used in order to complete the current project.

Coursework	**Application**
IME 314: Engineering Economics	Cost Benefit Analysis
IME 239: Industrial Costs and Controls	Triple Bottom Line Analysis
IME 405: Operation Research II	Development of a strategy to select alternatives
IME 407 Operations Research III	Develop optimal transportation model
IME 408 Systems Engineering	Apply problem solving methodology
IME 417 Supply Chain and Logistics	Basic supply chain and logistics
IME 421 Manufacturing Organizations	Understand international business structure
IME 443: Facility Planning and Design	Determining facility locations

Background

Zensho Group is a Mass Merchandising (MMD) Company and parent to over 20 restaurant chains with about 4000 stores located throughout the world. A majority of the stores are located in Japan and the US based chains are all within the Catalina Restaurant Group Inc which own and operate the Carrows and CoCo's chains in the US. The company deals with every aspect of their supply chain from agriculture to manufacturing to logistics to food services. The company holds quality above all else concerning their food products from acquiring to selling in their restaurants. Each plant at which food is being handled and processes have and On-Site Quality Test Center to help comply to Japanese laws and regulations in regards to food handling. This model will be mimicked here in the US to meet US standards as well as Japanese. The MMD

system allows for enhanced synergy between all aspects of this chain and between each company within the group. In their logistics, not only do they maintain safety standards but lower their carbon footprint by implementing eco friendly initiatives, for instance their trucks takes used cooking oil from their restaurants and converting it into fuel.

The company started in 1982 in Yokohama, Japan starting with bentou (Japanese style lunch boxes) to go shops and then expanded with a distribution center located in Tochigi. Initially they focused primarily on their main store "Sukiya" which specializes in Gyudon, rice beef bowls. Then over the years the company acquired other companies like Coco's Japan Co., Ltd, Gyuan Co., Ltd, Yamato Foods Co., Ltd and etc. The company went public in 1997 and listed in the Tokyo stock exchange in 1999. Established companies like Techno Support Co., Ltd and Global Foods, Ltd. Zensho America Corporation was established in 2004 for business expansion to America. Currently the Catalina Restaurant Group in the US which is the parent company for Coco's and Carrows in the US, has stores located all throughout California and with some stores in Arizona, Nevada, and Colorado. The company has plans to expand east.

The primary distribution center that Zensho uses to supply Coco's and Carrows is located in Riverside, California and is owned by MBM Corporation. MBM Corporation is a privately owned foodservice distributor and one of the largest in the country. Specializing in distribution to 25,000 franchises nationwide, MBM Co. also has over thirty distribution centers throughout the US. They provide a majority of the products required by Coco's and Carrows and usually fills orders at a rate of about two weeks. The remaining products that are not supplied by MBM

Co. are purchased from local suppliers. Dairy, produce, fresh bread, and beverages are some of the items purchased elsewhere.

Literature Review

The literature review goes over the basics of supply chain and a few articles focus specifically on Japanese supply chain. The next set of sources detail market research and restaurant information in general.

Hirata explains the system which he coins Customer Satisfaction Planning (CSP) to replace the outdated MRP/ERP systems used in a majority of today's supply chains. Both the technique and programs that evolved from it are outdated and needs to be completely reworked for the new world in order to ensure accuracy and quality. CSP in the design of the supply chain will help with the company who stresses quality above all and the CSP system seems to beat the same drum. The book explains how to implement this system as well. (Hirata 2009)

Beamon's article essentially breaks down what exactly is a supply chain and explains multiple tools and methods used in supply chain management. This will help with the bread and butter of the project, the design of the supply chain. Based on the tools and methods given in the article, the best design for the supply chain can be determined. The article gives many links to the aforementioned tools and methods as well. (Beamon 1997)

Lamming's article goes over the history of Japanese supply chain management and compares and contrasts with western SCM philosophy. This article can be used in the justification and explanation of some features my design may incorporate involving the localization and translation of Japanese SC methodology. (Lamming 2001)

Lee's article explains the rate at which modern supply chains have expanded and changed recently and counters with measures to help keep up with the changes in management. Lee explains the idea behind the Triple A's of modern supply chain management, agile, adaptable, and aligned. The topics in this article can be used to help modernize any aspects of the SC that may be falling behind. (Lee 2004)

Narasihman and Kim's article takes a look at supply chain integration and uses Japanese and Korean firms as examples. Which would be related to the aspect where a Japanese company trying to integrate a new franchise into a new market, a way to diversify their products. (Narasimhan & Kim 2002)

Lewis and Slack's book explains the general idea when developing a supply chain strategy, specifically the chapter regarding choosing the right supply chain for the product/service, in the case of this project, a restaurant chain will be used. (Lewis & Slack 2003)

Maloni and Brown's article targets the design and management of a supply chain specifically within the food industry. Once again perfect for relating to the new franchise that will be integrating into the US supply chain.(Maloni & Brown 2006)

Ohmae's book explains how the Japanese think in business and how to do business in Japan. This will help translate to U.S. Companies that may be involved in the supply chain, just how the Zensho Group will think like and compare with the American style of business. (Ohmae 1991)

Chang's article explains how the Japanese implemented their newly growing industries into the U.S. And the success behind it. This will help in modeling the introduction of the new Japanese restaurant chain and determine some ideal methods and options for introduction and growth. (Chang 1995)

Hennart's article reviews the Japanese position on U.S. Based manufacturing locations and their

decision to fully own or partly own these locations. This can become a potential option for the introduction of the new restaurant chain and this article can help determine the feasibility and method of implementation if required. (Hennart 1995)

Hwang's article reviews how to use the Analytical Hierarchy Process to plan an optimal location. It covers using a three step plan based on service level, multi criteria decision analysis and stochastic set covering method. It uses AHP to determine where and how many restaurants should be located in a given area. The methods used in this article will help the design process of this project. (Hwang 2006)

Honohue's article reviews the Restaurant Performance Index (PRI) and its importance on how it should be monitored. It defines the current RPI and the criteria that determines it. The article sums up the past years performances and reports on what other restaurants are doing. It will help determine if expansion in this year is viable.(Honohue 2010)

Barberian's article covers how a menu will determine what type of crowd you want. It relates menu to a good business plan, which should be defined by the people you serve, employees and location. This will be used to create some constraints concerning the area and demographics of the new locations. (Barberian 2000)

Bojanic's article reviews the differences in income, age and location for customers who prefer takeout. It covers how carryout customers are increasing in the dining industry. This article will help determine criteria and constraints for given areas. It relates to geographic differences. The west and east coast will differ in their options on carryout. (Bojanic 2007)

Hyun's article reviews the relationship between customer’s loyalty and the quality of chain restaurants. It defines the five main influences food quality, price, service quality, location and environment that are important to keep customers coming back. This article can be used to

determine if competition in the new locations will be detrimental to a new location. Also, it will help determine what aspects will help the restaurant chain succeed in the future expansion. (Hyun 2010)

Current State

Currently there are two U.S based franchises Coco's Bakery Restaurant and Carrows Restaurant. Coco's Bakery Restaurant has 122 locations throughout California, Arizona and Nevada. Carrows Restaurant has 90 locations throughout California, Texas, New Mexico, Arizona and Nevada. More than 80 percent of both franchises are located in California. Both franchises are resupplied by MBM Food Service. The main distribution center is located in Riverside, which supplies 65 percent of the demand. The rest of the supplies come from local suppliers near each cluster of locations. These suppliers fulfill demand on produce, dairy, ice cream, fresh bread, and beverages.

Currently both restaurant chains target family dining. Carrows Restaurant sets its focus to family and senior customer ranges. Coco's Bakery Restaurant focuses on mainly serving families. Both restaurants vary in their menu selection. Carrows specializes in classic American favorites, while Coco’s is more diverse and serves a mixture of Italian, Mexican, Indian and international cuisines. Coco's also, has a bakery which specializes in pies, cakes, muffins, cookies and biscuits. The current main competitors of these two chains are Denny's, Marie Callender's and IHOP.

Future Opportunities

Coco's Bakery and Carrows Restaurants are currently located only on the west coast of the United States. There is an opportunity for growth onto the west coast. Before designing a growth model certain trends must be taken into account. The Restaurant Performance Index (RPI), Current Situation Index (CSI) and the Expectation Index. These can be found on the National Restaurant Association reports. The RPI is a monthly composition of the health of the restaurant industry. Recently the RPI has been below 100 since January 2010. As of September 2010 the RPI hit a solid 100.3 indicating a current increase in customer traffic. The improved traffic was found in the same-store sales which imply that franchises are receiving a more positive trend. The RPI is based off of two components, the CSI and the Expectation Index. The figure below shows the constant fluctuation in RPI from July of 2002 to July of 2010.

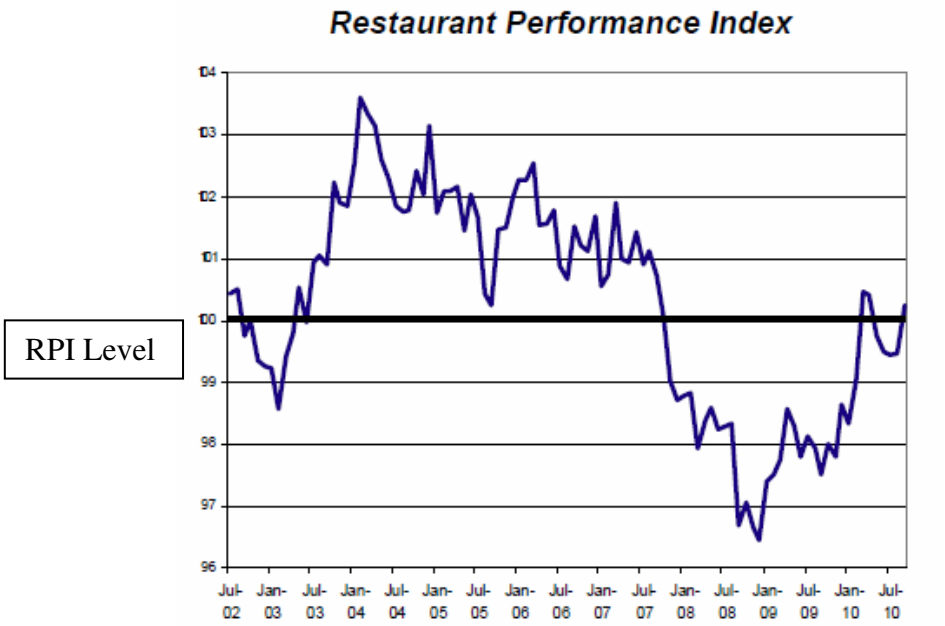

Figure 1

The CSI measures the trends in same-store sales, traffic, labor and capital expenditures. Currently the CSI is at the highest level that it has been in nearly three years. The previous forecast for capital expenditure and the current data are following a positive trend. The

investments made for the previous year in restaurants have not reached its break-even point. The Expectations Index is a measure of a six month forecast for same-store sales, employees, capital expenditures and business conditions. The current Expectations Index is at 101.1 as of September 2010. The trends from all three indexes indicate a positive forecast for the future. The figure below shows the trends in CSI and Expectations Index for July of 2002 to July of 2010.

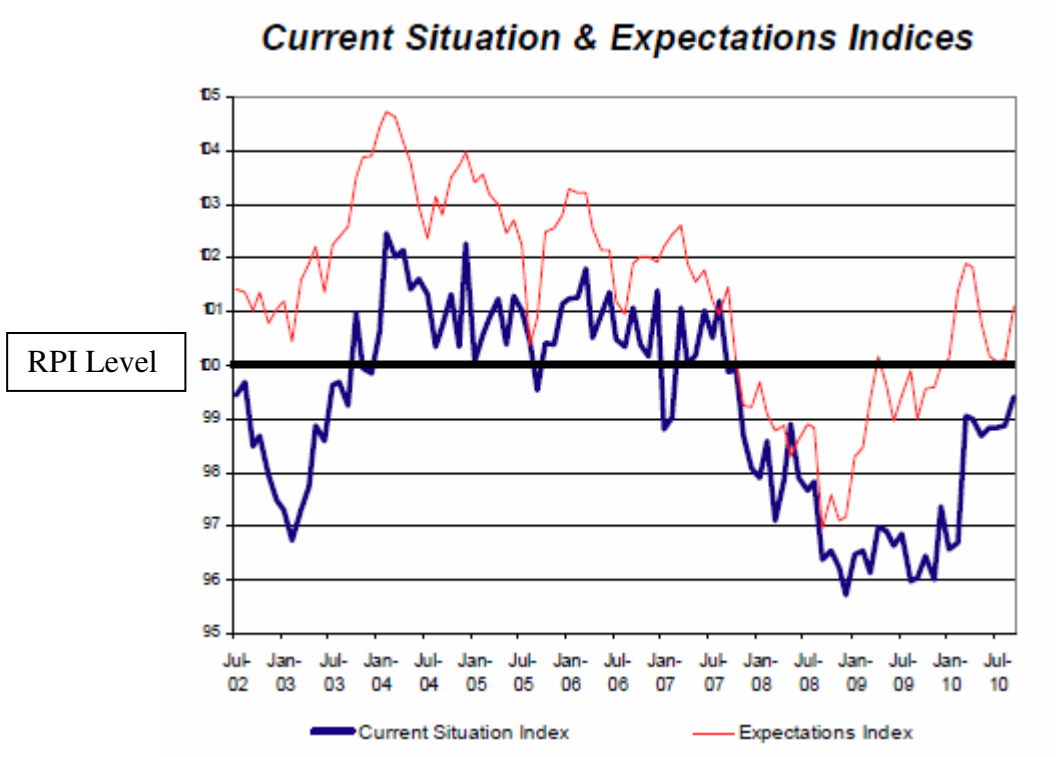

Figure 2

Since 2008 the general health of the restaurant industry has been steadily recovering. Currently there are indications of returning customer traffic and an increase in restaurant health. The CSI for current capital expenditure did show a negative forecast rate for the previous year, but the forecast for Capital Expenditure rates, which include equipment, expansion or remodeling, have increased from 42 percent to 47 percent for the next six months.

Design

Target Market for CoCo's and Carrows Restaurants

The RPI and future forecasts in this year are positive. Future expenditures like expansion of chain restaurants can be considered now. First, a plan and analysis for expansion must be made. The first step into deriving an alternative is to define the set of criteria for the new location. The market location and customers will be determined by a set of criterion. The target market is restricted to the east coast. The cities that will be targeted will be in Alabama, Connecticut, Delaware, Florida, Georgia, Massachusetts, Maryland, New Jersey, New York, North Carolina, South Carolina and Pennsylvania. These states were chosen because the current supplier MBM Foodservices is located there. It is assumed that MBM will be providing around 65 percent of the supplies needed. The supplies covered in fresh and daily tags will come from local suppliers. The location will also be determined by the following criterion: median age and income, demographic population, family density, average household size, current population, and number of restaurant per ten thousand people. Each of these criterions will be given a set value, according to the trend of current existing locations. Data was collected from each current existing location to find a minimum, maximum and medium value. From these findings a set target constraint for each criterion is created by using the average value. The demographic results show a large Caucasian population in many of their current locations. Therefore new locations should have at least 50 percent Caucasian. The two chains cater to families, thus the family density is set to 70 percent or higher. A higher family density means a larger population of families in a given area. The next criterion examined is median age. The current locations average age is 35 years old. With this average the constraint is set to a range of 20 to 50 years of age. After medium age, average income is evaluated. This range is $35,000 to $50,000. According to the U.S. Census Bureau $50,000 is the national family average. So the constraint

will be no greater than $50,000. Next is the average family house hold constraint. The U.S Census Bureau defines the average family as consisting of three or more members. Thus the constraint must be at least three. For population an assumption is made that the restaurant must be located in a populated area defined as a county or city. The U.S Census Bureau defines a county as a urban area containing at least ten thousand people. The population constraint is set to a population that exceeds ten thousand. The last criterion is the number of competitive restaurants per ten thousand people in a given location. The average competition level in the current existing chain is seven. With this the constraint for competitive restaurants will be a maximum of 7 restaurants in the area. This concludes all the set criterion, the next step is data collection.

Data Collection

In order to gather information a program was created to pull data from various sources. Only publicly available sites were used with this program. Data collecting from these sites is a tedious job. The program was designed to pull the desired demographics and statistics off of the City-Data site pertaining to the requested city or state. City Data is a site with a compilation of data for more than 74,000 cities. The criterions for the program to gather are: median age and income, demographic percentage and population, family density, average household size, current population, and number of restaurant per ten thousand people. The program is a similar design to the U.S Census Bureau's search, except it is set to look for specific criteria and allows easy data transfer to databases. In order to run this program a local host/server and Internet connection must be available. A local server is required to store data that needs to be acquired. Once a local server is established the file must be placed in the sites or owners folder for the current server. If

a local server does not exist, then the program used in this project was XAMPP, a free open source server package. The file is accessed through the local host home page. The program is started by selecting the capture button seen below.

Figure 3

The next page that comes up will be the state selection page. The following page list provides links to all the states on the east coast. Each state has two links, the name of the state and the name of the state2. The name of the state refers to cities that have a population over six thousand people. The name of the state2 refers to the cities with population levels below six thousand people.

Alabama
Alabama2
Alaska
Alaska2
Arizona
Arizona2
Arkansas
Arkansas2
California
California2
Colorado
Colorado2
Connecticut
Connecticut2
Delaware
Delaware2
District-of-Columbia
Florida
Florida2
Georgia
Georgia2
Hawaii
Hawaii2
Idaho
Idaho2
Illinois
Illinois2
Indiana
Indiana2

Figure 4

Next, select the desired state. This will take the operator to a page which will provide a table of all the cities in the state. As shown below, the page shows the amount of cities in the state. It also, shows the minimum and maximum constraint that can be set on data gathering. This constraint allows the operator to choose from selecting a single city, to multiple or all cities.


STATE: **California** (554 cities)
Back to States

ALL (min: 0, max: 554)
Adelanto
Agoura Hills
Alameda
Alamo
Albany
Alhambra
Aliso Viejo
Alondra Park
Alpine
Alta Sierra
Altadena
Alum Rock
American Canyon
Anaheim
Anderson
Antioch
Apple Valley
Aptos
Arcadia
Arcata
Arden Arcade
Arroyo Grande

Figure 5

After selecting a city or multiple cities, the next page will bring up a table with all the data pertaining to the criterion requested. The table is set up to ease the transfer of data from this page onto an excel sheet or database. A simple data capturing add-on will reduce time for transferring data if needed. The information that is acquired can have a set number of locations gathered by the user if a full search is consuming too many resources. To set limits, the operator must open the file in the sites folder. The program is coded in Hypertext Preprocessor (PHP). Any text edit program will be sufficient. Locate line ninety and change the values of the min and max as shown below.

```
if(count($found) != 0){
                        return $found;
                }else{
                        return 0;
                }
        }
}
```

$capture = new Capture("http://www.city-data.com/", 0, 10);

This will limit the amount of cities the program will process per cycle. If you do not need a limit set the min and max values to zero. See Appendix C for source code.

The program was created as an alternative to relying on other outsource packets of information that require purchasing. The information from this program will be consistent and data will be based off of one source site.

Method

Microsoft Access was used to create a database to store and filter the new data. The data was filtered by the use of the following criterion: median age and income, demographic percentage and population, family density, average household size, current population, and number of restaurant per ten thousand people. These criteria help narrow down the locations specific to the categories mentioned earlier. A form was created in order to fulfill future analysis and data mine for specific scenarios. The form gives control over the following criterion: Age Range, Income Range, Population Range, Number per household, Competitive restaurants in area, Percentage of families on area, and the demographics. These options are shown on the following page.

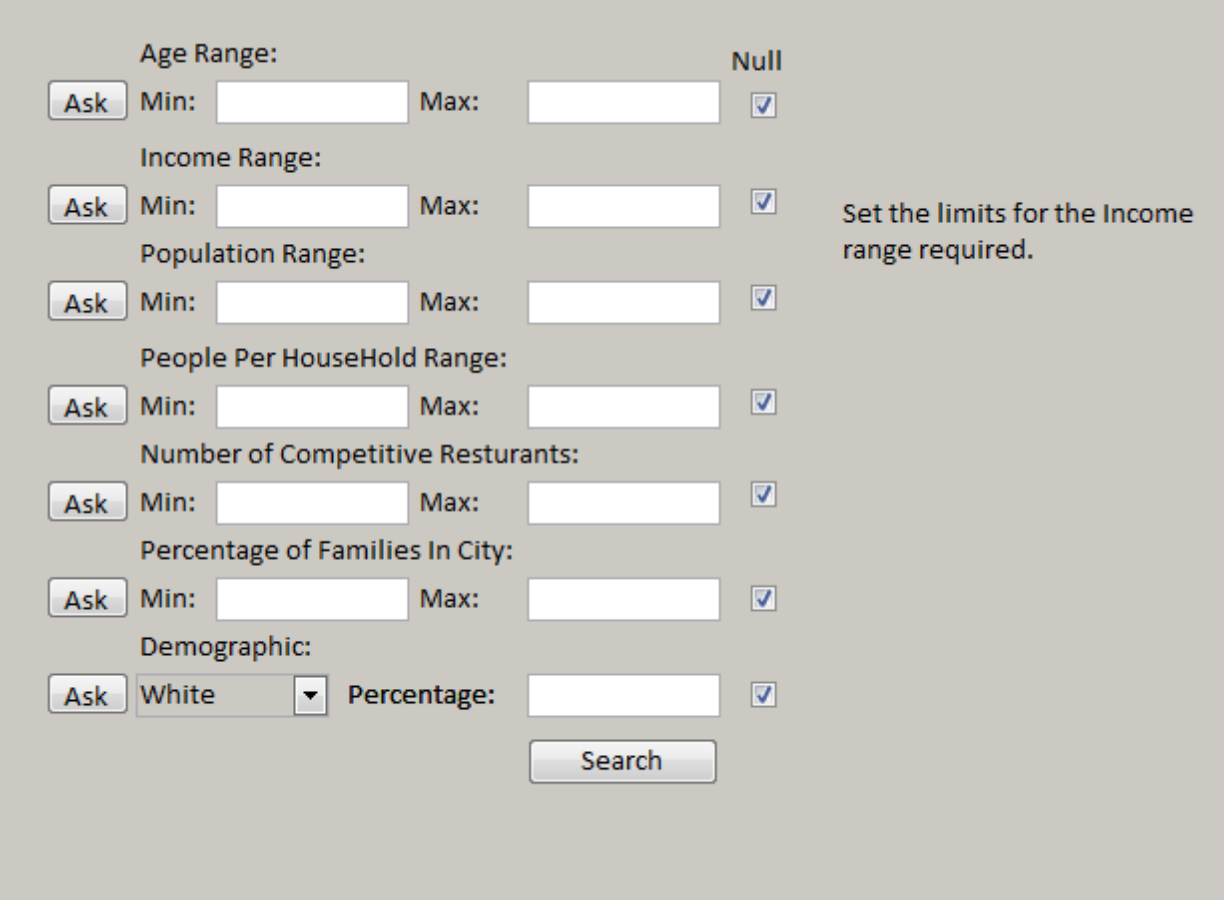

Figure 6

The form is setup to be user friendly. The ranges are placed in the min and max boxes for each criterion. If there is a question, on the definition of the criteria, there is an ask button which gives a brief definition. If criteria are not needed then the null check boxes are provided to null the value out of the equation. Once all boxes are filled with the desired constraints, select the search button.

Results:

After running the Access Database form, the following results were formulated:

Table 1

City	MedianAge	MedianHHIncome	AverageHHSize	FamilyPercent	ResturantsPer10k	Population
Plant-City-Florida	33	45998	3	72	6	29915
Auburndale-Florida	36	42080	3	73	5	11032
Bellview-Florida	36	45583	3	73	6	21201
Tillmans-Corner-Alabama	35	41795	3	76	5	15685
Lakewood-New-Jersey	23	39324	4	78	6	36065
Ridgeway-New-York	37	45518	3	70	5	13380
Hope-Mills-North-Carolina	31	48648	3	76	6	11237
Jacksonville-North-Carolina	22	38353	3	79	5	66715

Eight cities were selected as potential locations for a new location on the east coast. The last criteria to measure is the distance from a MBM distribution center. Shown on the table below are the distances that were applied. Distances were calculated using google maps.

Table 2

City		Time (min)	Miles	Cost
Plant-City-Florida	Min	81	70.3	$ 135.00
	Max	85	73.1	$ 141.67
Auburndale-Florida	Min	67	54.2	$ 111.67
	Max	67	54.2	$ 111.67
Bellview-Florida	Min	260	257	$ 433.33
	Max	300	271	$ 500.00
Tillmans-Corner-Alabama	Min	342	351	$ 570.00
	Max	398	375	$ 663.33
Lakewood-New-Jersey	Min	474	438	$ 790.00
	Max	494	443	$ 823.33
Ridgeway-New-York	Min	538	494	$ 896.67
	Max	570	538	$ 950.00
Hope-Mills-North-Carolina	Min	114	109	$ 190.00
	Max	125	125	$ 208.33
Jacksonville-North-Carolina	Min	137	102	$ 228.33
	Max	137	102	$ 228.33

The table shows the minimum and maximum distance for alternative routes to the location. It also shows the estimated cost assuming transportation cost is $100 per hour. The next cost which will be used to filter the locations is construction cost. Cost estimates are found at Reed Construction Data's site. The material used for construction will be concrete stucco with bearing

walls. The following table will show the estimated cost for construction with and without a union.

Table 3

City	Building Type	Labor	Cost
Plant-City-Florida	Stucco/Bearing Wall	Union	$538,410
		Open Shop	$495,180
Auburndale-Florida	Stucco/Bearing Wall	Union	$538,410
		Open Shop	$495,180
Bellview-Florida	Stucco/Bearing Wall	Union	$506,315
		Open Shop	$465,705
Tillmans-Corner-Alabama	Stucco/Bearing Wall	Union	$500,420
		Open Shop	$460,465
Lakewood-New-Jersey	Stucco/Bearing Wall	Union	$663,515
		Open Shop	$609,805
Ridgeway-New-York	Stucco/Bearing Wall	Union	$591,465
		Open Shop	$544,305
Hope-Mills-North-Carolina	Stucco/Bearing Wall	Union	$466,360
		Open Shop	$429,680
Jacksonville-North-Carolina	Stucco/Bearing Wall	Union	$452,605
		Open Shop	$416,580

The colors follow the key below:

Table 4

Key	
Least Expensive	
Middle	
Expensive	

The locations are split into three different categories: Least Expensive, Middle, and Expensive. These are justified by their variation in price of construction. In the table above, Hope Mills and Jacksonville North Carolina are the least expensive to construct a new facility. The costs are average costs for the construction of a four thousand square foot restaurant. Next, competition is compared. The table below shows the difference in number of competitive restaurants in the given area.

Table 5

City	Competition	Labor	Cost
Plant-City-Florida	6	Union	$ 538,410.00
		Open Shop	$ 495,180.00
Auburndale-Florida	5	Union	$ 538,410.00
		Open Shop	$ 495,180.00
Bellview-Florida	6	Union	$ 506,315.00
		Open Shop	$ 465,705.00
Tillmans-Corner-Alabama	5	Union	$ 500,420.00
		Open Shop	$ 460,465.00
Lakewood-New-Jersey	6	Union	$ 663,515.00
		Open Shop	$ 609,805.00
Ridgeway-New-York	5	Union	$ 591,465.00
		Open Shop	$ 544,305.00
Hope-Mills-North-Carolina	6	Union	$ 466,360.00
		Open Shop	$ 429,680.00
Jacksonville-North-Carolina	5	Union	$ 452,605.00
		Open Shop	$ 416,580.00

The colors follow the key below:

Table 6

Key	
Non Competitive	
Competitive	

In the table above it shows that there is a slight difference in number of competitive restaurants in the area. The range varies between five to six competitive restaurants per ten thousand people. It also shows that Jacksonville North Carolina is also one of the locations that has the least competition. With these three results an Analytic Hierarchy Process (AHP) is created to select the optimal location out of these options. The first step in creating the AHP was defining the ranking system. The ranks are:

- 1 equal importance
- 3 weakly more important

- 5 strongly more important
- 7 very important
- 9 absolutely important

Once the ranks were defined, three criteria were made. The three criteria are Cost, Competition and Travel. These criteria where used to make comparison between the eight locations. The tables on the next page show the ranks given:

Table 7

Cost	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC
PCF	1.00	1.00	1.00	2.00	7.00	7.00	0.14	0.14
AF	1.00	1.00	1.00	2.00	7.00	7.00	0.14	0.14
BF	1.00	1.00	1.00	3.00	8.00	8.00	0.20	0.20
TCA	0.50	0.50	0.33	1.00	8.00	8.00	0.20	0.20
LNJ	0.14	0.14	0.13	0.13	1.00	0.50	0.11	0.11
RNY	0.14	0.14	0.13	0.13	2.00	1.00	0.11	0.11
HMNC	7.00	7.00	5.00	5.00	9.00	9.00	1.00	0.50
JNC	7.00	7.00	5.00	5.00	9.00	9.00	2.00	1.00
Total	17.79	17.79	13.58	18.25	51.00	49.50	3.91	2.41
Competition	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC
PCF	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
AF	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
BF	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
TCA	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
LNJ	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
RNY	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
HMNC	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
JNC	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
Total	12.00	6.00	12.00	6.00	12.00	6.00	12.00	6.00
Travel	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC
PCF	1.00	0.50	7.00	7.00	9.00	9.00	3.00	3.00
AF	2.00	1.00	8.00	8.00	9.00	9.00	4.00	4.00
BF	0.14	0.13	1.00	3.00	4.00	4.00	0.17	0.17
TCA	0.14	0.13	0.33	1.00	3.00	4.00	0.17	0.17
LNJ	0.11	0.11	0.25	0.33	1.00	4.00	0.14	0.14
RNY	0.11	0.11	0.25	0.25	0.25	1.00	0.14	0.14
HMNC	0.33	0.25	6.00	6.00	7.00	7.00	1.00	3.00
JNC	0.33	0.25	6.00	6.00	7.00	7.00	0.33	1.00
Total	4.17	2.47	28.83	31.58	40.25	45.00	8.95	11.62

After ranking the locations, a percentage is found from the total in each column. These percentages are used to make weighted average of advantages and disadvantages between the locations. The next step was to rank the criteria. The table on the next page shows the ranks given.

Table 8

Criteria	Cost	Competition	Travel
Cost	1.00	4.00	3.00
Competition	0.25	1.00	0.33
Travel	0.33	3.00	1.00
Total	1.58	8.00	4.33

After ranking the criteria, a percentage is found from the total in each column. Like the previous table the percentages are used to make a weighted average of advantages and disadvantages between criteria. These weights are then multiplied by the weights of the locations. Then each row is summed to get the final weight. The final weights are shown below:

Table 9

Locations	Weight
Plant-City-Florida (PCF)	0.13
Auburndale-Florida (AF)	0.16
Bellview-Florida (BF)	0.09
Tillmans-Corner-Alabama (TCA)	0.08
Lakewood-New-Jersey (LNJ)	0.03
Ridgeway-New-York (RNY)	0.04
Hope-Mills-North-Carolina (HMNC)	0.22
Jacksonville-North-Carolina (JNC)	0.26

The table above shows that Jacksonville North Carolina is the optimal choice out of the eight locations. It has the highest weight. The next location, which has a close weight to Jacksonville is Hope Mills, North Carolina. These two locations can be potential future alternatives for expansion of Coco's and Carrows Restaurant. All the processes that have been used to determine this outcome can change according to the constraints that are set. The methods and programs used can be easily altered if necessary to find new alternatives. See Appendix B for AHP operations.

Introduction of Sukiya

Design

There are many factors involved in the introduction of a new restaurant. Sukiya's major competitor in Japan is Yoshinoya, who already has stores located in the U.S. Due to the fact that both restaurants are direct competitors over in Japan with the same target customers, types of food served, style of service, and similar niche, it is a reasonable assumption that Sukiya will face similar competition in the States. Since the two are very similar, approaching US introduction similar to Yoshinoya would be a reasonable assumption. Many of the criteria for a Sukiya store can mimic that of Yoshinoya's, due to their successful entry into the US market. There has been a recent trend where ethnic food sales have been increasing 5% a year. With the recent growing trend in ethnic food consumption and the rising popularity of Quick Service Restaurants, Sukiya has the potential for growth in the US.

Additional criteria based on personal preference and experience was also used. Many Americans are unfamiliar with Asian cuisine and in particular, Japanese. Most only have experience in sushi restaurants which are not an accurate depiction of all Japanese food and in most cases, of Japanese sushi itself. In the world of American sushi, the food is heavily westernized and a majority of it is not traditional, skewing the public's view of Japanese food. Many Japanese restaurants are also not owned by Japanese and the menu is altered as the owner desires. This causes quite the confusion when considering what exactly is Japanese food in America. This makes it very difficult to open a traditional Japanese restaurant of any kind in America without completely changing the restaurant. But in lieu of all the confusion, Sukiya can still adjust to these American tastes to create an ethnic fusion, which is used in a variety of restaurants located

across America.

Sukiya will not serve any sushi or rolls of any sort, but the menu will be predominantly rice bowls. The trademark product that Sukiya specializes in particular is Gyudon, thinly sliced beef over rice and targets quick service. The Japanese menu is quite expansive and has breakfast, lunch, and dinner specials. Unfortunately many of the items will not do well in America, in particular the breakfast menu due to the vast difference in what Japanese and Americans consider breakfast. Many of these items are unknown to those outside of Japan and thus would not be able to penetrate the market effectively. The target market must be somewhat introduced to Japanese culture and food for best results for initial induction of the chain. The menu must also be simplified and maybe even altered to fit the tastes and needs of the target customers. Yoshinoya has taken a similar approach and has added items that would appeal to their target market better; Sukiya too can follow with some preliminary market research based on location.

The first thing that must be taken into consideration is the state in which to introduce and expand the chain. A good demographic would be to choose the states with the highest Japanese populations, which are; California, Hawaii, New York, Illinois, and Washington state. Another aspect that is taken into consideration when deciding the state is the location of current Zensho operations. The map on the following page shows the Japanese population distribution by county.

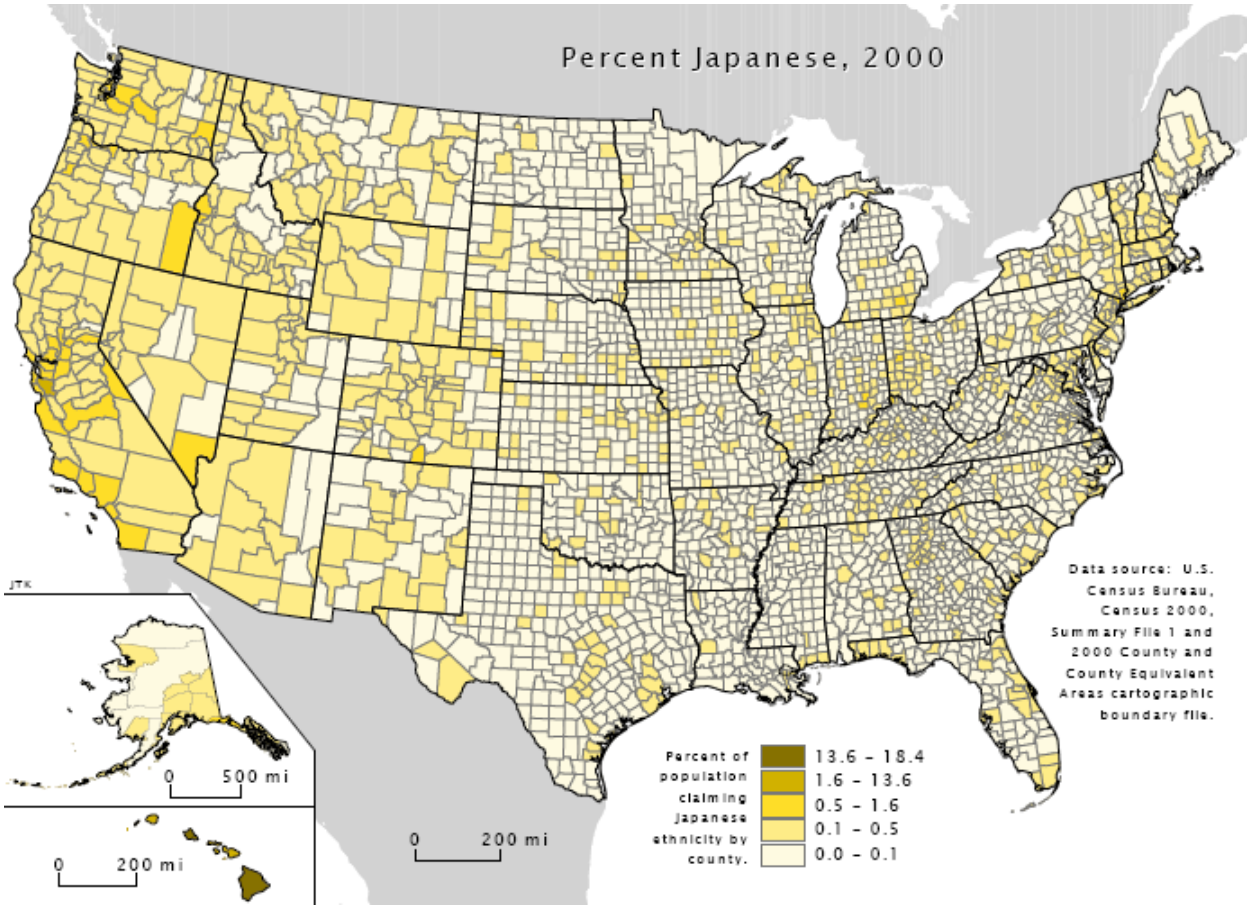

Figure 7

In order to achieve maximum initial market penetration, the target city should have a population larger than 25,000 and at least 10% Asian population. The population of the city must be large enough to maximize the business both for maximum exposure and customer frequency. Albeit the total Asian population in the US is only four percent, with the Japanese population a meager only 0.3%, there are locations with high Asian concentrations than can be used as stepping stones into the US market. Asians tend to be much more familiar with other Asian cultures so naturally a large concentration of Asian Americans would be a suitable location for a new Asian restaurant.

Yoshinoya has a preferred demographics list:

- Residential/HH Population: 24,000+ within 1 mile radius
- Daytime Employment: 16,000+ within 1 mile radius
- Blue Collar Employees: 700+ within 1 mile radius
- Average Age: 31~37 within 1 mile radius
- Married Percentage: 40%~46% within 1 mile radius
- Average HH Income: $42,000~$65,000 within 1 mile radius

From this list, the customer demographics can be determined. Like Yoshinoya, some of the similar criteria have been used, for example, the city population must be greater than 25,000. Also the age range falls within a similar range as well.

The Riverside distribution will still be used for the Sukiya chain and the use of local suppliers similar to what Coco's and Carrows existing supply chain. There is a potential in which the Riverside distribution center may not be able to offer supplies to Sukiya due to its specialized menu. In order to counter this possibility, the distribution company, Maruhana USA Corporation is taken into consideration as a potential supplier. Maruhana is a wholesale distributor, specializing in Japanese goods and services located in Vernon, in Los Angeles. Anything that MBM may not be able to supply can be ordered from Maruhana. Another option that can be

considered would be the introduction of an additional distribution center. MBM has another distribution center located in Pleasanton, California which would be ideal for Northern California locations in tackling the logistics issue of expanding northward with a southern located distribution center. With these distribution networks taken into consideration, the optimal locations can be better realized.

Once the initial location alternatives have been selected, construction costs need to be taken into considerations. Costs values from Reed Construction Data cater specifically to restaurant buildings and will be used in considering the cost of construction. This data is regional and up to date as of 2008, and thus the alternative cities should be clustered to match region. This clustering network is used in operations research and will also help with the logistics network. Once the alternatives are clustered, the cost analysis of each cluster should help determine the cost of construction at each location.

Method

The first step in introducing the new chain was to determine key locations based on the criteria sets. The largest populations of Japanese Americans are California, Hawaii, New York, Washington, and Illinois. Primarily they are concentrated in the major cities of the aforementioned states. Also, Yoshinoya is currently located in California, Arizona, and Nevada. Combining these two criteria, the ideal candidate for the introduction of the chain would be California.

After deciding on the state, a spreadsheet with all cities within California is created which states the city name and population. In addition to the population, the Asian population, and average age of the population is appended to this table. Following a similar criteria to that of Yoshinoya, the data will then be narrowed down. Initially, only the cities with a population greater than 25,000 are chosen. Next, cities with an Asian population density larger than 15% are filtered out and finally the average age of the city must fall below 37 years.

Once the cities are narrowed down, and then they can be clustered based on their distance from the distribution centers. Once they are clustered, the potential routes from the distribution center can be created to minimize cost and maximize the number of stores that can be stocked. Making assumptions as to the truck size, truck costs, driving time, and truck load amount must be made for this calculation based on a weekly restock rate of two times per week.

The next step is to determine how many Yoshinoya's are located within the same location alternatives. This will help determine if there will be competition within that city, due to the same target market and product mix that both restaurants offer, this factor is of high importance.

The final step would be determining the logistics involved for the location alternatives. The distance of each city to the Riverside distribution is calculated with the amount of time. Also the location of the Maruhana distribution center in Vernon will be taken into consideration. These distances will add weight to the logistics assuming a $100/hr rate of trucks.

Combining these three factors for each alternative location is then weighed against each other

using the analytical hierarchy process. The three criteria are given weights determined by previous research. The three criteria are; construction costs, logistics, and competition. Logistics will have the highest weight due to the high operation costs, followed by competition. With one major competitor being very similar, it is weighted relatively high. Finally construction costs, which we assume will have a reasonable internal rate of return, and the fact that the IRR is affected by the aforementioned criteria as well, will thus not have as much weight.

Results and Discussion

After data mining and sorting the potential locations based on the different criteria, there are 51 optimal locations:

Table 10

Milpitas
Daly City
Union City
Fremont
Santa Clara
Sunnyvale
South San Francisco
San Francisco
San Jose
San Ramon
Newark
San Bruno
Vallejo
Elk Grove
Stockton
Mountain View
Florin
Dublin
Parkway-South Sacramento
Pleasanton
Berkeley

Sacramento
Davis
Laguna
San Pablo
Suisun City
Marina
Pittsburg
Campbell
Oakland
Rosemead
San Gabriel
Diamond Bar
Rowland Heights
Alhambra
Westminster
Hacienda Heights
Irvine
Garden Grove
Cypress
Gardena
West Covina
Chino Hills
Carson
Buena Park
Fullerton
Stanton
El Monte
Tustin
Brea
La Mirada

These locations are then broken up further based on the construction data regions. The final location alternatives are grouped into seven clusters; San Francisco, San Jose, Sacramento, Stockton, Inglewood, Alhambra, and Anaheim clusters.

Table 11

Alhambra Cluster	**Anaheim Cluster**	**Inglewood Cluster**	**Sacramento Cluster**
Rosemead	Tustin	Gardena	Davis
San Gabriel	Brea	Carson	Sacramento
Diamond Bar	La Mirada		South Sacramento
Rowland Heights	Fullerton		Florin
Alhambra	Buena Park		Elk Grove
Hacienda Heights	Stanton		Laguna
West Covina	Garden Grove		Parkway-South Sacramento
Chino Hills	Irvine		Suisun City
El Monte	Cypress		
San Jose Cluster	**San Francisco Cluster**	**Stockton Cluster**	
Mountain View	Marina	Stockton	
Sunnyvale	San Francisco	Pittsburg	
Santa Clara	Daly City		
San Jose	South San Francisco		
Campbell	San Bruno		
Fremont	Vallejo		
Newark	San Pablo		
Milpitas	Berkeley		
Union City	Oakland		
Dublin	San Ramon		
	Pleasanton		

The following table shows the cost analysis of each cluster using either Face Brick with Concrete Block Back-up / Bearing Walls or Concrete Block with Stucco/Bearing Wall and then comparing Union cost versus open shop shown on the following page.

Table 12

City	Building Type	Labor	Cost	Min
Sacramento	Face Brick with Concrete Block Back-up / Bearing Walls	Union	$351,080	$305,880
		Open Shop	$322,580	
	Concrete Block with Stucco/Bearing Wall	Union	$332,740	
		Open Shop	$305,880	
Alhamra	Face Brick with Concrete Block Back-up / Bearing Walls	Union	$337,980	$244,500
		Open Shop	$310,480	
	Concrete Block with Stucco/Bearing Wall	Union	$244,500	
		Open Shop	$294,420	
San Fransisco	Face Brick with Concrete Block Back-up / Bearing Walls	Union	$397,580	$346,160
		Open Shop	$365,160	
	Concrete Block with Stucco/Bearing Wall	Union	$376,620	
		Open Shop	$346,160	
Anaheim	Face Brick with Concrete Block Back-up / Bearing Walls	Union	$339,620	$296,720
		Open Shop	$312,100	
	Concrete Block with Stucco/Bearing Wall	Union	$322,920	
		Open Shop	$296,720	
San Jose	Face Brick with Concrete Block Back-up / Bearing Walls	Union	$376,300	$327,820
		Open Shop	$345,840	
	Concrete Block with Stucco/Bearing Wall	Union	$356,640	
		Open Shop	$327,820	
Stockton	Face Brick with Concrete Block Back-up / Bearing Walls	Union	$340,920	$298,020
		Open Shop	$313,420	
	Concrete Block with Stucco/Bearing Wall	Union	$324,220	
		Open Shop	$298,020	
Inglewood	Face Brick with Concrete Block Back-up / Bearing Walls	Union	$326,520	$285,900
		Open Shop	$300,000	
	Concrete Block with Stucco/Bearing Wall	Union	$311,120	
		Open Shop	$285,900	

Key	
Cheapest	
Middle	
Expensive	

The results vary based on two possibilities. The first option assumes the current logistic network is taken into consideration, the AHP analysis show that Alhambra is the ideal location due to its low costs and low logistics costs, even though it has relatively high competition. The table below shows the final ranking from the AHP analysis. See Appendix A for complete analysis.

Table 13

Ranks	
Sacramento	0.13
Alhambra	0.34
San Francisco	0.10
Anaheim	0.11
San Jose	0.07
Stockton	0.14
Inglewood	0.11

The second option takes into consideration the use of the Pleasanton distribution center. We assume that due to the distribution center being owned by the same company, adopting another DC into the current operations should be cheaper and easy to integrate. With this Pleasanton DC, the Sacramento and San Francisco clusters appear to be the most attractive locations.

For the initial introduction of Sukiya, the optimal location would be any of the cities in the San Francisco cluster, no Yoshinoya's are located in the area, the logistics cost is minimized with the use of the Pleasanton DC, not only do the locations have a high Asian population but the Japanese population in particular is relatively high as well. The next step would be to do market analysis for the regions to determine the best menu items and to also initiate an extensive risk analysis. This additional research and information will help with further expansion opportunities.

Conclusion

Coco's and Carrows

There are eight alternative locations that meet the current constraints for Coco's and Carrows Restaurants. The top two alternatives determined by the AHP are Jacksonville and Hope Mills, North Carolina. These two locations meet the criteria of a low cost of construction, low competition level and low travel distance from a supplier. For future expansion onto the west coast these two alternatives are ideal.

Sukiya

Ideally, due to demographics, California should be the primary target for the locations for potential Sukiya restaurants; specifically the greater Los Angeles area, the bay area, and the Sacramento area. Based on these three primary regions, smaller groups can be determined based on the demographics stated earlier. These groups can then be compared against one another based on logistics, construction costs, and demographic mix. Specifically these clusters have been grouped based on construction data where which using open shop rather than union and the construction material being concrete block with stucco/bearing walls are the most optimal. Based on the results, Alhambra region would be the most ideal location albeit if a new distribution center were to be used in Pleasanton, the San Francisco and San Jose area would become ideal.

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Appendix A

Alternative	Construction Costs	Competition	Logistics Costs
Sacramento	0.10	0.25	0.05
Alhambra	0.38	0.04	0.60
San Fransisco	0.02	0.25	0.02
Anaheim	0.13	0.05	0.15
San Jose	0.03	0.13	0.04
Stockton	0.12	0.26	0.04
Inglewood	0.22	0.02	0.09

Criteria	Construction Costs	Competition	Logistics Costs
Construction Costs	1.00	0.33	6.00
Competition	3.00	1.00	5.00
Logistics Costs	0.17	0.20	1.00
	4.17	1.53	12.00

Criteria	Construction Costs	Competition	Logistics Costs	
Construction Costs	0.24	0.22	0.50	
Competition	0.72	0.65	0.42	0.32
Logistics Costs	0.04	0.13	0.08	0.60
	1.00	1.00	1.00	0.08

Ranks	
Sacramento	0.13
Alhambra	0.34
San Fransisco	0.10
Anaheim	0.11
San Jose	0.07
Stockton	0.14
Inglewood	0.11

Appendix B

Locations
Plant-City-Florida (PCF)
Auburndale-Florida (AF)
Bellview-Florida (BF)
Tillmans-Corner-Alabama (TCA)
Lakewood-New-Jersey (LNJ)
Ridgeway-New-York (RNY)
Hope-Mills-North-Carolina (HMNC)
Jacksonville-North-Carolina (JNC)

1	equal importance
3	weakly more important
5	strongly more important
7	very strongly more important
9	absolutely more important

Cost	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC
PCF	1.00	1.00	1.00	2.00	7.00	7.00	0.14	0.14
AF	1.00	1.00	1.00	2.00	7.00	7.00	0.14	0.14
BF	1.00	1.00	1.00	3.00	8.00	8.00	0.20	0.20
TCA	0.50	0.50	0.33	1.00	8.00	8.00	0.20	0.20
LNJ	0.14	0.14	0.13	0.13	1.00	0.50	0.11	0.11
RNY	0.14	0.14	0.13	0.13	2.00	1.00	0.11	0.11
HMNC	7.00	7.00	5.00	5.00	9.00	9.00	1.00	0.50
JNC	7.00	7.00	5.00	5.00	9.00	9.00	2.00	1.00
	17.79	17.79	13.58	18.25	51.00	49.50	3.91	2.41

Competition	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC
PCF	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
AF	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
BF	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
TCA	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
LNJ	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
RNY	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
HMNC	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50
JNC	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
	12.00	6.00	12.00	6.00	12.00	6.00	12.00	6.00

Travel	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC

PCF	1.00	0.50	7.00	7.00	9.00	9.00	3.00	3.00
AF	2.00	1.00	8.00	8.00	9.00	9.00	4.00	4.00
BF	0.14	0.13	1.00	3.00	4.00	4.00	0.17	0.17
TCA	0.14	0.13	0.33	1.00	3.00	4.00	0.17	0.17
LNJ	0.11	0.11	0.25	0.33	1.00	4.00	0.14	0.14
RNY	0.11	0.11	0.25	0.25	0.25	1.00	0.14	0.14
HMNC	0.33	0.25	6.00	6.00	7.00	7.00	1.00	3.00
JNC	0.33	0.25	6.00	6.00	7.00	7.00	0.33	1.00
	4.17	2.47	28.83	31.58	40.25	45.00	8.95	11.62

Cost	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC	
PCF	0.06	0.06	0.07	0.11	0.14	0.14	0.04	0.06	0.08
AF	0.06	0.06	0.07	0.11	0.14	0.14	0.04	0.06	0.08
BF	0.06	0.06	0.07	0.16	0.16	0.16	0.05	0.08	0.10
TCA	0.03	0.03	0.02	0.05	0.16	0.16	0.05	0.08	0.07
LNJ	0.01	0.01	0.01	0.01	0.02	0.01	0.03	0.05	0.02
RNY	0.01	0.01	0.01	0.01	0.04	0.02	0.03	0.05	0.02
HMNC	0.39	0.39	0.37	0.27	0.18	0.18	0.26	0.21	0.28
JNC	0.39	0.39	0.37	0.27	0.18	0.18	0.51	0.42	0.34
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Competition	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC	
PCF	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
AF	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
BF	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
TCA	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
LNJ	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
RNY	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
HMNC	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
JNC	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Travel	PCF	AF	BF	TCA	LNJ	RNY	HMNC	JNC	
PCF	0.24	0.20	0.24	0.22	0.22	0.20	0.34	0.26	0.24
AF	0.48	0.40	0.28	0.25	0.22	0.20	0.45	0.34	0.33
BF	0.03	0.05	0.03	0.09	0.10	0.09	0.02	0.01	0.05
TCA	0.03	0.05	0.01	0.03	0.07	0.09	0.02	0.01	0.04
LNJ	0.03	0.04	0.01	0.01	0.02	0.09	0.02	0.01	0.03
RNY	0.03	0.04	0.01	0.01	0.01	0.02	0.02	0.01	0.02
HMNC	0.08	0.10	0.21	0.19	0.17	0.16	0.11	0.26	0.16
JNC	0.08	0.10	0.21	0.19	0.17	0.16	0.04	0.09	0.13
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Alternative	Cost	Competition	Travel
PCF	0.08	0.08	0.24

AF	0.08	0.17	0.33
BF	0.10	0.08	0.05
TCA	0.07	0.17	0.04
LNJ	0.02	0.08	0.03
RNY	0.02	0.17	0.02
HMNC	0.28	0.08	0.16
JNC	0.34	0.17	0.13

Criteria	Cost	Competition	Travel
Cost	1.00	4.00	3.00
Competition	0.25	1.00	0.33
Travel	0.33	3.00	1.00
	1.58	8.00	4.33

Criteria	Cost	Competition	Travel	
Cost	0.63	0.50	0.69	0.61
Competition	0.16	0.13	0.08	0.12
Travel	0.21	0.38	0.23	0.27
	1.00	1.00	1.00	

Ranks	
PCF	0.13
AF	0.16
BF	0.09
TCA	0.08
LNJ	0.03
RNY	0.04
HMNC	0.22
JNC	0.26

Appendix C

Data Collecting Code

```
<?php

class Capture{

      private $siteURL;

      private $stateURL;

      private $cityURL;

      private $minLimit;

      private $maxLimit;


      function __construct($siteURL, $minLimit, $maxLimit){
            /* Initialize site information */
            $this->siteURL   = $siteURL;
            $this->minLimit = $minLimit;
            $this->maxLimit = $maxLimit;
            $this->stateURL = $this->getStates();

            /* Run the main program */
            $this->main();
      }

      private function main(){
            if(isset($_GET["state"])){
                  if(isset($_GET["city"])){
                        if($_GET["city"] == "all"){
                              $cities = $this->getCities($_GET["state"]);
                              $numCities = sizeof($cities);

                              if($this->maxLimit > $numCities){
                                    $this->maxLimit = $numCities;
                              }else if($this->maxLimit == 0){
                                    $this->maxLimit = $numCities;
                              }

                              if($this->minLimit < 0){
                                    $this->minLimit = 0;
                              }

                              for($i = $this->minLimit; $i < $this-
>maxLimit; $i++){
                                    $temp = $this-
>getProperties($cities[$i], $_GET["state"]);
```

```
                                        $properties[key($temp)] =
$temp[key($temp)];
                                   }
                              }else{
                                   $properties = $this-
>getProperties($_GET["city"] . ".html", $_GET["state"]);
                              }

                              $this->displayProperties($properties,
$_GET["city"]);
                         }else{
                              $this->cityURL = $this-
>getCities($_GET["state"]);
                              $this->displayCities($_GET["state"]);
                         }
                    }else{
                         $this->displayStates();
                    }
               }

               private function getStates(){
                    $lines = $this->readPage($this->siteURL);

                    foreach($lines as $line){
                         if(preg_match_all('#href="/city/([^"]+)"#i', $line,
$matches, PREG_SET_ORDER)){
                              foreach($matches as $match){
                                   $states[] = $match[1];
                              }
                         }
                    }
                    return $states;
               }

               private function displayStates(){
                    if(isset($this->stateURL)){
                         foreach($this->stateURL as $state){
                              $slug = explode(".", $state);

                              echo '<a href="?state=' . $slug[0] . '">' .
$slug[0] . '</a><br />';
                         }
                    }else{
                         echo "<p>States not found.</p>";
                    }
               }

               private function getCities($state){
                    $lines = $this->readPage($this->siteURL . "city/" . $state
. ".html");
```

```
            foreach($lines as $line){
                  if(preg_match_all('/<td.*>.*<a
href=\'([^javascript].*)\'/', $line, $matches, PREG_SET_ORDER)){
                        foreach($matches as $match){
                              $cities[] = $match[1];
                        }
                  }
            }
            return $cities;
      }

      private function displayCities(){
            if(isset($_GET["state"]) && isset($this->cityURL)){

                  $maxLimit = ($this->maxLimit == 0) ? sizeof($this-
>cityURL) : $this->maxLimit;
                  $maxLimit = ($this->maxLimit > sizeof($this->cityURL))
? sizeof($this->cityURL) : $this->maxLimit;

                  echo "STATE: <b>{$_GET['state']}</b> (" .
sizeof($this->cityURL) . " cities) <br />";
                  echo '<a href="?">Back to States</a><br /><br />';
                  echo '<a href="?state=' . $_GET["state"] .
'&city=all">ALL</a> (min: ' . $this->minLimit . ', max: ' . $maxLimit
. ')<br />';

                  foreach($this->cityURL as $city){
                        $slugName = str_replace(".html", "", $city);

                        if(ctype_alnum($_GET["state"])){
                              $slugAlpha = str_replace("2", "",
$_GET["state"]);
                        }else{
                              $slugAlpha = $_GET["state"];
                        }

                        $slugBase = str_replace("-{$slugAlpha}", "",
$slugName);

                        $slugClean = str_replace("-", " ", $slugBase);

                        echo '<a href="?state=' . $_GET["state"] .
'&city=' . $slugName . '">' . $slugClean . '</a><br />';
                  }
            }else{
                  echo "<p>Cities not found.</p>";
            }
      }

      private function getProperties($city, $state){
```

```
            $lines = $this->readPage($this->siteURL . "/city/" .
$city);
            $city = str_replace(".html", "", $city);

            /* Optimization Flags */
            $medianAgeFlag = false;
            $medianIncomeFlag = false;
            $averageHouseholdFlag = false;
            $percentageHouseholdFlag = false;
            $fullServiceFlag = false;
            $raceFlag = false;

            foreach($lines as $line){
                  /* variable must be concatinated otherwise value will
get written over with a blank with each $line */
                  if(!$medianAgeFlag)
                        $medianAge .= $this->getMedianResidentAge($line,
&$medianAgeFlag);
                  if(!$medianIncomeFlag)
                        $medianIncome .= $this-
>getMedianHouseholdIncome($line, &$medianIncomeFlag);
                  if(!$averageHouseholdFlag)
                        $averageHousehold .= $this-
>getAverageHouseholdSize($line, &$averageHouseholdFlag);
                  if(!$percentageHouseholdFlag)
                        $percentageHousehold .= $this-
>getPercentageOfFamilyHousehold($line, &$percentageHouseholdFlag);
                  if(!$fullServiceFlag)
                        $fullService .= $this-
>getFullServiceRestaurants($line, &$fullServiceFlag);
                  if(!$raceFlag){
                        $temp = $this->getRace($line, &$raceFlag); /*
array returned so DO NOT concatinate */

                        if($temp != 0){
                              $race[key($temp)] = $temp[key($temp)];
                        }
                  }
            }

            $properties[$city]["medianAge"] = $medianAge;
            $properties[$city]["medianIncome"] = $medianIncome;
            $properties[$city]["averageHousehold"] = $averageHousehold;
            $properties[$city]["percentageHousehold"] =
$percentageHousehold;
            $properties[$city]["fullService"] = $fullService;
            $properties[$city]["white"]["count"] = $race["white"][0];
            $properties[$city]["white"]["percent"] = $race["white"][1];
            $properties[$city]["hispanic"]["count"] =
$race["hispanic"][0];
```

```
            $properties[$city]["hispanic"]["percent"] =
$race["hispanic"][1];
            $properties[$city]["black"]["count"] = $race["black"][0];
            $properties[$city]["black"]["percent"] = $race["black"][1];
            $properties[$city]["asian"]["count"] = $race["asian"][0];
            $properties[$city]["asian"]["percent"] = $race["asian"][1];
            $properties[$city]["two"]["count"] = $race["two"][0];
            $properties[$city]["two"]["percent"] = $race["two"][1];
            $properties[$city]["american"]["count"] =
$race["american"][0];
            $properties[$city]["american"]["percent"] =
$race["american"][1];
            $properties[$city]["other"]["count"] = $race["other"][0];
            $properties[$city]["other"]["percent"] = $race["other"][1];
            $properties[$city]["hawaiian"]["count"] =
$race["hawaiian"][0];
            $properties[$city]["hawaiian"]["percent"] =
$race["hawaiian"][1];

            return $properties;
      }

      private function displayProperties($properties, $city){

            $cities = array_keys($properties);

            echo "STATE: <b>" . str_replace("-", "", $_GET["state"]) .
"</b> <br />";
            echo '<a href="?">Back to States</a> &lt;&lt; ';
            echo '<a href="?state=' . $_GET["state"] . '">Back to
Cities</a> ';

            ?>

            <table border="1">
                  <tr>
                        <th>City</th>
                        <th>Median Resident Age</th>
                        <th>Median Household Income</th>
                        <th>White alone Population</th>
                        <th>White alone Percentage</th>
                        <th>Black alone Population</th>
                        <th>Black alone Percentage</th>
                        <th>Hispanic Population</th>
                        <th>Hispanic Percentage</th>
                        <th>Two or more races Population</th>
                        <th>Two or more races percentage</th>
                        <th>American alone Population</th>
                        <th>American alone percentage</th>
                        <th>Asian alone Population</th>
                        <th>Asian alone Percentage</th>
```

```
                        <th>Other race alone Population</th>
                        <th>Other race alone Percentage</th>
                        <th>Native Hawaiian and Other Pacific Islander
alone Population</th>
                        <th>Native Hawaiian and Other Pacific Islander
alone Percentage</th>
                        <th>Average Household Size</th>
                        <th>Percent of Family Households</th>
                        <th>Full-service Restaurants /10,000 pop.</th>
                  </tr>
            <?php
            foreach($cities as $city){
            ?>
                  <tr>
                        <td><?php echo str_replace("-", " ",
str_replace(".html", "", str_replace("-{$_GET['state']}", "",
$city))); ?></td>
                        <td><?php echo $properties[$city]["medianAge"];
?></td>
                        <td><?php echo
$properties[$city]["medianIncome"]; ?></td>
                        <td><?php echo
$properties[$city]["white"]["count"]; ?></td>
                        <td><?php echo
$properties[$city]["white"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["black"]["count"]; ?></td>
                        <td><?php echo
$properties[$city]["black"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["hispanic"]["count"]; ?></td>
                        <td><?php echo
$properties[$city]["hispanic"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["two"]["count"]; ?></td>
                        <td><?php echo
$properties[$city]["two"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["american"]["count"]; ?></td>
                        <td><?php echo
$properties[$city]["american"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["asian"]["count"]; ?></td>
                        <td><?php echo
$properties[$city]["asian"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["other"]["count"]; ?></td>
                        <td><?php echo
$properties[$city]["other"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["hawaiian"]["count"]; ?></td>
```

```
                        <td><?php echo
$properties[$city]["hawaiian"]["percent"]; ?></td>
                        <td><?php echo
$properties[$city]["averageHousehold"]; ?></td>
                        <td><?php echo
$properties[$city]["percentageHousehold"]; ?></td>
                        <td><?php echo $properties[$city]["fullService"];
?></td>
                  </tr>
            <?php
            }
            ?>
            </table>
            <?php
      }

      private function readPage($page){
            $pageLines = @file($page);

            return $pageLines;
      }



      /** GET functions that retrieve city properties */
      #looks for string or common format
      private function getMedianResidentAge($line, $ptrFlag){

            if(preg_match('/<td>Median resident
age:&amp;nbsp;<\/td><td><img.*>&amp;nbsp;(.*) years<\/td><\/tr><tr>/', $line,
$match)){
                  $found = $match[1];
                  $ptrFlag = true;
            }
            return $found;
      }

      private function getMedianHouseholdIncome($line, $ptrFlag){

            if(preg_match('/Estimated median household income.*: (.*)
\(/', $line, $match)){
                  $found = $match[1];
                  $ptrFlag = true;
            }
            return $found;
      }

      private function getAverageHouseholdSize($line, $ptrFlag){

            static $nextLineFlag = false;
```

```
            if(preg_match('/Average household size:(.*)/', $line)){
                  $nextLineFlag = true;
            }

            if($nextLineFlag){
                  if( preg_match('/This
village: <\/td><td><img.*> (.*) people<\/td><\/tr><tr>/',
$line, $match) ||
                        preg_match('/This
town: <\/td><td><img.*> (.*) people<\/td><\/tr><tr>/',
$line, $match) ||
                        preg_match('/This
city: <\/td><td><img.*> (.*) people<\/td><\/tr><tr>/',
$line, $match) ||
                        preg_match('/This
place: <\/td><td><img.*> (.*) people<\/td><\/tr><tr>/',
$line, $match) ||
                        preg_match('/This
area: <\/td><td><img.*> (.*) people<\/td><\/tr><tr>/',
$line, $match)){
                        $found = $match[1];
                        $ptrFlag = true;
                  }
            }
            return $found;
      }

      private function getPercentageOfFamilyHousehold($line, $ptrFlag){

            static $nextLineFlag = false;

            if(preg_match('/Percentage of family households:(.*)/',
$line)){
                  $nextLineFlag = true;
            }

            if($nextLineFlag){
                  if( preg_match('/This
village: <\/td><td><img.*> (.*)<\/td><\/tr><tr>/', $line,
$match) ||
                        preg_match('/This
town: <\/td><td><img.*> (.*)<\/td><\/tr><tr>/', $line,
$match) ||
                        preg_match('/This
city: <\/td><td><img.*> (.*)<\/td><\/tr><tr>/', $line,
$match) ||
                        preg_match('/This
place: <\/td><td><img.*> (.*)<\/td><\/tr><tr>/', $line,
$match) ||
```

```
                    preg_match('/This
area: <\/td><td><img.*> (.*)<\/td><\/tr><tr>/', $line,
$match)){
                    $found = $match[1];
                    $ptrFlag = true;
               }
          }
          return $found;
     }

     private function getFullServiceRestaurants($line, $ptrFlag){

          if(preg_match('/Number of full-service
restaurants:.*<img.*> (.*) \/.*<\/td><\/tr><tr><td>/', $line,
$match)){
               $found = $match[1];
               $ptrFlag = true;
          }
          return $found;
     }

     private function getRace($line, $ptrFlag){

          if(preg_match('/White alone - (.*) \((.*)\)/', $line,
$match)){
               $found["white"][0] = $match[1];
               $found["white"][1] = $match[2];

          }else if(preg_match('/Hispanic - (.*) \((.*)\)/', $line,
$match)){
               $found["hispanic"][0] = $match[1];
               $found["hispanic"][1] = $match[2];

          }else if(preg_match('/Black alone - (.*) \((.*)\)/', $line,
$match)){
               $found["black"][0] = $match[1];
               $found["black"][1] = $match[2];

          }else if(preg_match('/Asian alone - (.*) \((.*)\)/', $line,
$match)){
               $found["asian"][0] = $match[1];
               $found["asian"][1] = $match[2];

          }else if(preg_match('/Two or more races - (.*) \((.*)\)/',
$line, $match)){
               $found["two"][0] = $match[1];
               $found["two"][1] = $match[2];

          }else if(preg_match('/American alone - (.*) \((.*)\)/',
$line, $match)){
               $found["american"][0] = $match[1];
```

```
                $found["american"][1] = $match[2];

            }else if(preg_match('/Other race alone - (.*) \((.*)\)/',
$line, $match)){
                $found["other"][0] = $match[1];
                $found["other"][1] = $match[2];

            }else if(preg_match('/Native Hawaiian and Other Pacific
Islander alone - (.*) \((.*)\)/', $line, $match)){
                $found["hawaiian"][0] = $match[1];
                $found["hawaiian"][1] = $match[2];

            }

            if(count($found) != 0){
                return $found;
            }else{
                return 0;
            }
      }

}

$capture = new Capture("http://www.city-data.com/", 0, 10);




?>
```

AHP