Dashboards, Scorecards & Visualization Project
MSIS 2629

Evaluating States in USA for setting up manufacturing factories

Submitted By:

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URLs

Tableau public link :

https://public.tableau.com/profile/priyanka.reddy#!/vizhome/StatesEvaluation/EvaluatingStates

Github link : https://github.com/priyankark01/DashboardsProjects-StateEval

Project Summary

      I am evaluating a suitable state to set up a large scale manufacturing facility during the year 2017-2018. So, lets consider a hypothetical automobile company – Alpha industries that is planning to expand its business due to increasing demand. In order to cater to the increasing demand, the managers at Alpha are evaluating where to set up manufacturing factory facilities in United States. So, the audience of this visualization is the managers who are responsible for deciding the location for next set of factories. As part of this project I have presented the relevant data required for analysis and prioritized the factors based on the business needs. On evaluation it is found that Nebraska, Michigan and South Dakota seem to be suitable states now. Also, due to the exact information constraint, I am analyzing suitable states by a set of attributes and have assumed that transportation of finished goods is of low significance/out of scope. As these facilities are going to generate huge employments, I have assumed that pitching the idea to the state government can provide a subsidy deal and hence am considering unemployment data as well.

Project Documentation

A manufacturing facility is a huge investment thus evaluating all possible factors is of utmost necessity. I have considered below factors for each state in US to analyze, evaluate and arrive at determining suitable states.

1. Cost of doing business
2. Infrastructure facility
3. Business friendliness
4. Workforce ranking
5. Education levels
6. Robbery rates
7. Felony rates
8. Unemployment
9. Tax Rates on Manufacturers by State

I. Data Collection

As the managers are evaluating locations for the years 2017-2018, I have gathered data as a snapshot at a single point of time with most government census data dating back to 2015 as this was the latest year to have the required information.

Part 1 - Business parameters

Data for attributes such as cost & ease of doing business, infrastructure facility, business friendliness, workforce ranking are obtained state wise from an article in CNBC.

Link to article - http://www.cnbc.com/2016/07/12/americas-top-states-for-business-2016-the-list-and-ranking.html

Part 2 - Crime rates

Data for crimes is obtained from knoema.com -> US Regional Crime datasets. I have extracted the data for the year 2015 with all the indicators by county. In order to obtain the crime rate, the population estimates for 2015 are required and this data is obtained as population by county from https://www.ers.usda.gov/data-products/county-level-data-sets/

Part 3 - Education and unemployment levels

These datasets have also been downloaded from https://www.ers.usda.gov/data-products/county-level-data-sets/

Part 4 – Tax rates

Data is obtained from "Location Matters: Effective Tax Rates on Manufacturers by State" from taxfoundation.org.

Link to article - https://taxfoundation.org/location-matters-effective-tax-rates-manufacturers-state/

II. Data Preparation

1. For data available from xls file, I have read them into data frames and retained the necessary columns. For many data frames where county level information was included, I have aggregated at a state level. In my opinion, since the manufacturing facility is a hub of lots of activity with machinery and goods in factory prone to thefts, I have divided the crime data into Felony and Theft.

2. For the state ranking information available from webpage, I have retrieved the embedded table into a dataframe.

3. Since the nature of jobs in the manufacturing facility will require a high school diploma, I am extracting the percent of adults with high school diploma.

4. The python notebook I have used for data preparation is State_Evaluation_DataPrep.ipynb.

III. Data Presentation

1. Cost of doing business in my opinion is one of most critical factors. Hence I have picked the top 20 states and group these states as Desirable_States_ByCost in ""Desired States by Cost" sheet. I have considered these states and further analyzed with respect to other parameters.

2. I am analyzing the business parameters such as workforce, business friendliness, infrastructure facility as a series of horizontal bar charts in "Business Parameters" sheet. The states shown in this sheet are only the ones falling in

Desirable_States_ByCost group. I have placed workforce, bsiness friendliness and infrastructure facility in the order of priority to decide on the location

3. Next, I am analyzing the crime data per state in "Desired Crimes by State" sheet. I am using a calculated fields to determine robbery_rate and felony_rate by state. I have plotted the felony vs robbery rates as scatter plots. I have then categorized states into a category "Crime reasonable states" – recognized as green points by setting reference lines. I have consciously set the Reference_Robbery_Rate to a lower value considering the risk of thefts in a manufacturing facility.

4. I am presenting the unemployment and education level data in the "Unemp & Edu levels" sheet.

5. Finally, I have combined all these sheets into a dashboard and linked the state filter to all the worksheet

IV. *Evaluating desirable states*

From the dashboard, it is evident that Nebraska, Michigan, South Dakota fall into top 20 low cost of doing business, and among the high ranking states in terms of workforce. There is a slight compromise with the business friendliness and infrastructure. But these states definitely fall into "Crime reasonable states" category. Furthermore among the sates mentioned, Nebraska has a tax rate of 6.5% for manufacturers as per the article in taxfoundation.com.

Disclaimer – Nebraska seems to be a good option among the states as per the parameters I have considered.

Project Critique

- To determine a location for a massive production/manufacturing unit, businesses consider multiple parameters in addition to the parameters considered as part of this project

- The project does not consider evaluating the locations based on the concentration of industries (such as Michigan has more automotive industries)

- Also, there is capture of very vital factors such as ease of bringing in raw materials and distribution.

- Since the primary criteria for state evaluation is Cost, a further analysis of averages wages for such employment by state could be considered.
- I should have represented unemployment and education level data in a more convincing manner.