**NHL Market Entry Analysis for Dr. Rishe**

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1. Roadmap

This paper is a summary of what we found regarding the NHL expansion plan. We will start this paper with our results in section two. In section three we will talk about the variables we considered in our model. Section four incorporates the new market entries into our model. We will provide some analysis on how this can help guide your paper. In section five we will discuss variables we initially considered, but are excluded from our analysis. Section six includes some of the assumptions we made in our model.

1. Results

We used a multiple linear regression to help describe what variables contribute most to an NHL team’s revenue. There are 5 variables in our model: City Population, Hockey Popularity, Youth Hockey, >3 Sports Teams (Big 6), and Mean Earnings per Household. Our model is statistically significant with a p-value near 0, each independent variable (mentioned above) is statistically significant, we have an R of .86 (which means there is a very strong positive linear relationship between Revenue and the variables mentioned above), and we have an R Square value of .74 (which means 74% of the total variation in revenue can be explained by the relationship between revenue and our 5 variables. The remaining 26% is left unexplained.)

1. Variables
2. Revenue

Annual revenue (in millions) for an NHL team is what we are trying to describe and predict. The reason we ended up using revenue is twofold. First, entering a market is an investment. We think a high ROI defines a successful market entry. Annual revenue per team is the best indicator for this. We hypothesized that a team’s valuation wouldn’t be as good of an indicator since valuations include many variables that are left to management and a team’s longevity in the league. We ran two regressions, one with Revenue and one with Team Value as the dependent variable. Our hypothesis was correct in that our model was significantly stronger using Revenue as our predictor variable.

In terms of current value we used the team’s total value at the end of the year. For example, since the Maple Leafs were worth 1.3 billion at the end of 2013 that was the number we used in 2013. In terms of revenue, we were looking at given seasons (i.e. the 2012-2013 season which obviously encompasses two different years). In other parts of the analysis we called the 2012-13 season the 2012 season. In turn (to match that pattern), when the Forbes articles listed revenue for the 2012-2013 season, we called that 2012 revenue.

(In Millions)

Mean: 109

Median: 100

Min: 63

Max: 217

We used Forbes for this data.

<http://www.forbes.com/sites/mikeozanian/2014/11/25/the-most-valuable-teams-in-the-nhl/>

<http://www.forbes.com/sites/mikeozanian/2013/11/25/the-nhls-most-valuable-teams/>

<http://www.forbes.com/sites/mikeozanian/2012/11/28/nhl-team-values-2012-maple-leafs-first-hockey-team-worth-1-billion/>

<http://www.forbes.com/sites/mikeozanian/2011/11/30/the-business-of-hockey/>

<http://www.forbes.com/lists/2010/31/hockey-valuations-10\_rank.html>

<http://www.forbes.com/lists/2009/31/hockey-values-09\_NHL-Team-Valuations\_Value.html>

1. City Population

This variable has a coefficient of .0000085 (in millions of dollars of revenue) which means that one additional person within the hockey team’s city will increase a team’s revenue by $8.50 per year ($1,000,000 \* 0.0000085 = $8.50 per person). Even though this coefficient is the smallest, it actually influenced Revenue the most. This is because there is great variability within City Population data. While you need a lot more people within a city to influence total Revenue, there is a lot of population variability in the league, so population differences among cities are very high. It is also important to note that individual correlation of City Population with Revenue was the greatest of all other variables (r = .798; r square of .637).

To note, Canadian Cities are seemingly larger, because there are more concentrated areas in Canada, rather than a bunch of smaller cities, like in US.

Descriptive Statistics for City Population (Among Cities with Existing NHL Teams):

Mean: 1,399,709

Median: 649,514

Min: 53,951

Max: 8,438,379

US Data: US Census Bureau <https://www.census.gov/popest/data/>

Canada Population Data <http://www5.statcan.gc.ca/cansim/a26>

1. Hockey Popularity

This variable has a coefficient of .000015 (in millions of dollars of revenue) which means that one additional fan within the hockey team’s city will increase a team’s revenue by $15 per year ($1,000,000 \* 0.000015 = $15 per fan). Hockey Popularity and City Population yield similar results because we multiplied the city population data by the percentage of people within that city who are hockey fans. Thus, a one person increase in a city, will increase revenue for that city’s NHL team by $8.50, but if that person happens to be a hockey fan, the team’s revenue will increase by $15.

Descriptive Statistics for Hockey Popularity (Among Cities with Existing NHL Teams):

Mean: 395,531

Median: 74,205

Min: 4,233

Max: 3,102,496

We used a website called FiveThirtyEight to obtain popularity data <http://fivethirtyeight.com/features/why-cant-canada-win-the-stanley-cup/>

1. Youth Hockey

There is a strong positive correlation between the number of young hockey players within the same state as a hockey team and a hockey team’s revenue. We took data from the USA Hockey, which is the organization that runs all youth hockey in America to determine the amount of youth hockey activity in each state (they don’t provide city data). So, for every additional person that registers to play youth hockey via USA Hockey within a hockey team’s state, there will be an increase in team revenue of $314 ($1,000,000 \*0.000314 = $314 per individual in youth hockey). While this $314 is greater than the numbers above, it is important to note that the individual correlation with revenue isn’t as strong as the above variables. However, our findings are statistically significant.

Descriptive Statistics for Youth Hockey Participation (Among States with Existing NHL Teams):

Mean: 22,437

Median: 11,481

Min: 340

Max: 46,595

We found data from USA Hockey <http://assets.ngin.com/attachments/document/0077/6505/2014-15\_Memebership\_Reports.pdf>.

1. >3 Sports Teams (Big 6)

What does this variable mean? It counts up the number of sports teams within a given metro area. Sports teams are counted if they are in the big 6 leagues: NFL, NHL, NBA, MLB, MLS, and CFL. We used this variable as an indicator variable, so if there were more than 3 teams in the metro area, then it was assigned a value of 1. If there were 3 or fewer teams, then it was given a 0.

This variable has the greatest coefficient of 12.14. This says that if there is a metro area that has more than 3 sports teams within the “Big 6 Leagues” (including other NHL teams), then revenue will be greater for an NHL team by $12,143,581. Thus, teams want to be located in areas that already have established teams in the Big 6. This is a quick way to make revenue.

We want to note that we didn’t find a strong enough correlation to conclude whether you would rather be in a metro area that is highly saturated with other sports teams (around 8-10 other teams). However, hockey teams are, on average, surrounded by 3.5 other teams in the metro area. Thus, we looked at areas above 3 teams since that was around the average number.

Because we used an indicator variable the minimum was 0, the maximum was 1, and the mean was .425. However, below looks at the raw data without converting it into an indicator variable.

Descriptive Statistics for Number of Big 6 Teams (Among Metro Areas with Existing NHL Teams):

Mean: 3.5

Median: 3

Min: 0

Max: 10

This data was taken through due diligence. There wasn’t one website that provided all of this data. We used a bit of Wikipedia for guidance.

1. Mean Earnings per Household

The reason this variable is last is because there is a more compelling story with the other variables we found. Also, these results are a bit counterintuitive. Our findings state that there is a negative correlation between Mean Earnings per Household and a hockey team’s annual revenue. While this has the lowest individual correlation with Revenue among all other variables, it is a statistically significant variable. For every dollar decline in the mean earnings per household, a hockey team’s revenue increases by $374. There are obvious parameters with that statement since if the mean earnings per household were $0, then there wouldn’t be ticket sales and most likely no franchise.

We think that there are a few explanations for this; however, further investigation should be done. First, it could be that ticket and food prices are less in these areas which encourages more spending. Second, lower income families use sports as entertainment more frequently than higher income families (as opposed to vacations or more expensive entertainment). Third, earnings do not take purchasing power into account. Different cities have different purchasing power with their money.

Descriptive Statistics for Mean Earnings per Household (Among Cities with Existing NHL Teams):

Mean: 69,670

Median: 68,789

Min: 37,887

Max: 114,563

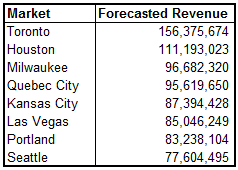
US Data: US Census Bureau <http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>

Canada Data: Statistics Canada

<http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/famil107a-eng.htm>

1. New Markets

We used the formula from the regression equation to forecast annual revenue for the potential market entries. First, this is in the United States Dollar. Also, this isn’t what the revenue would be after year one of entering the market, but what it would be over the long term. We used publically available data in 2013 (2014 and 2015 data not available) to represent today’s dollars. We didn’t calculate growth since we are merely describing historical data. Thus, if we are looking into the future, assuming all variables remain constant, this would be the Revenue breakdown. At the end of the day, it is a safe bet that the market with highest Revenue should bring in more Revenue over the long term. If you include a growth formula, the numbers will all be higher but shouldn’t change the below rank.



We evaluated 8 cities: Toronto, Houston, Milwaukee, Quebec City, Kansas City, Las Vegas, Portland, and Seattle. Houston and Toronto are the only markets that have more than 3 sports teams in the metro area. Obviously the Toronto Maple Leafs are a very established team, with a large fan base and the highest value among all current teams. There are two ways to look at this.

Toronto Makes Sense: It has a ton of people, it is very hockey oriented, NHL team’s revenue is larger when there are other sports teams already located in the city (as there are in Toronto), it would NOT be creating a new precedent (LA Kings and Ducks are in the LA area, 3 NYC area teams), and there is enough money to be spent on multiple teams.

Toronto Doesn’t Make Sense: The culture is so geared toward the Maple Leafs that a new team may not be welcome, a new team may be overshadowed by the Maple Leafs, and it makes logical sense that it could take a long time to gain revenue/value (however, the particular statistic we’re looking at says the return could be worth it).

Quebec City (where it is rumored the new team will be) did not meet the average for number of professional teams already in existence (it only had 2). Also, keep in mind there was a team there and they left (in 1995) because they couldn’t be supported financially. <<http://www.thecanadianencyclopedia.ca/en/article/nordiques-move-to-colorado/>>

Houston is the second highest-ranked city after Toronto. There is no hockey team currently, but their most recent team left after 2013 (couldn’t reach an agreement with Toyota Center - their former arena). While warm weather cities seem to negate hockey culture, our data states that Houston would be a good place to have a team.

1. Excluded Variables

* Attendance – we wouldn’t be able to use this as a variable to predict success because we wouldn’t know what the attendance would be for the potential new markets. Also, it is too difficult to predict attendance at stadiums because it is typically determined by win-loss record, and the variability with attendance among teams is small. However, there is a strong correlation between Revenue and Attendance (r is about .6). Therefore 36% of the total variation in Revenue can be explained by the relationship between Revenue and Attendance. The remaining 64% is left unexplained.
* City GDP – it was insignificant in our calculation and made our model less accurate. Perhaps this is due to discrepancies between Canada and US.
* Age of Stadium – it was insignificant in our calculation and made our model less accurate. Old stadiums could be praised due to tradition/culture while new stadiums could also be praised for renovation/modernization.

1. Data Assumptions

* We excluded 2012 data because it was the lockout year which distorted annual revenue. The model wasn’t as strong when we included 2012 data.
* We couldn’t find youth hockey data in Canada, so we assumed it would be similar to Minnesota data since Minnesota has the highest youth hockey presence in America. This is a conservative assumption due to the amount of Canadians who play in the NHL.
* Portland didn’t have Hockey Popularity data available, so we assumed that data was similar to that of San Jose.
* City GDP was difficult to calculate due to the discrepancies in the way Canada and America collects data. Also, we converted the Canadian dollar to the US dollar when necessary.