**Determining the Appropriate Analysis Technique**

**Task 1**

* + A proposal
  + Simply fill out the template
  + Submit the Waiver-Release Form (and Organization Verification Form as necessary) *note: you can use either electronic signature(s) or print and sign the form(s)*)
  + You must pass Task 1 before you can submit Task 2

**Task 2**

* + A report

**Considerations**

* 1. You should have familiarity with the business situation that you will analyze
  2. Is your business question clear and succinct?
  3. Is your proposed data gathering approach feasible? Do you have consent to collect and use the specific data?
  4. Will you be collecting a sufficient number of observations for statistical reliability (often need 30+ observations)?
  5. Can your data be analyzed using one of the analytical techniques that you have learned? Do you know what technique is appropriate?
     + if not sure, talk with a Course Mentor
  6. Is it clear to you what software you will use to analyze your data and create any necessary tables, charts or graphs?

**Performance Assessment Examples**

|  |  |  |  |
| --- | --- | --- | --- |
| **Small Business (Yoga studio)** | **What factors impact donations to a yoga studio?** | **Donation amount, driving distance from studio, and associated zip code population.** | **Multiple Regression** |
| Health Care | Is there a relationship between number of training hours for counselors and number of patient incidents requiring physical restraint? | Counselor training info and 3 years of monthly incidence data. | Regression |
| HR | Is there a perceived difference in the effectiveness of a new versus old employee incentive plan? | Ratings of the effectiveness of new versus old plan (n=804). | Paired sample t-test. |
| Non-Profit | Is there a trend in the incidence of child abuse in a particular State? | 2 years of monthly incidence rates of child abuse | Time series analysis |
| Health Care | Should a staffing plan for emergency nurses be adjusted based on time of day? | Number of emergency patient arrivals every 3 hours over a week. | Chi-Square test |
| Local Government | Are there differences in average police salaries across 3 adjoining precincts? | Annual salaries of individual police officers from 3 precincts | ANOVA |

**You will need to analyze your data with one appropriate and approved analysis technique**

**What are NOT Analysis Techniques**

* + Means
  + Correlation
  + Net Promoter Score
  + Bar Chart or Histogram
  + Line Graph
  + Scatter Plot
  + Time-Series/Trend Chart
* *These are examples of Descriptive Statistics rather than Analyses.*
* *You might calculate and include one or more of these, but they are not analyses per se.*
* *These are types of Graphs/Charts rather than types of Analyses. You are expected to include a chart in your report in addition to an analysis.*

**What are Allowed Analysis Techniques**

**Recommended Analysis Techniques:**

• regression *(linear regression, multiple regression, or logistic regression)*

• time series/trend analysis *(regression, exponential smoothing, moving avg)*

• chi-square

• t-test *(one sample, two independent samples, or paired)*

• ANOVA

• crossover analysis

• break-even analysis

**Additional Approved Analysis Techniques:**

• statistical process control

• linear programming

• decision tree

• simulation

**Analysis Techniques**

Two general categories of analysis techniques…

1. **Statistical Analyses (i.e., Inferential Statistics)**
   * Goal is to make an inference about a larger population based on analysis of a smaller sample
   * Is there a statistically significant finding (trend, group difference, etc.)?
   * e.g., regression, t-test, Chi-Square, ANOVA
2. **Decision Science**
   * Analytics to derive an optimal solution/decision
   * e.g., break-even analysis, simulation, linear programming

**Analysis Techniques**

Statistical Analyses:

* + **One-sample t-test** – comparing 1 mean to a standard
  + **Two-sample t-test** – comparing 2 means
  + **ANOVA** – comparing 3 or more means
  + **Regression & Time-Series Analysis**
    - Is there a significant relationship and/or trend?
    - Do you want to forecast/predict some value?
  + **Logistic Regression** – regression where dependent variable is binary (e.g., yes/no, treated/not treated, etc.)
  + **Chi-Square** – are there significant patterns/differences among frequency (categorical) data

**Decision Science Analysis Techniques**

Recall, these are analytics to derive an optimal solution or decision. Covered in this course…

**Recommended Decision Science Techniques:**

• crossover analysis

• break-even analysis

**Additional Approved Decision Science Techniques:**

• statistical process control

• linear programming

• decision tree

• simulation

**Crossover Analysis**

**Use:**

* + Determine the least expensive option, of 2 or more options, at different volumes of need (considers both fixed costs and variable costs)

**Example:**

A school district wants to determine whether it makes more sense to purchase a hybrid powered bus or a diesel powered bus (that differ in the cost to purchase and cost per mile to operate)

**Break-Even Analysis**

**Use:**

* + Determine the volume at which Total Revenues make up for (equal) Total Costs
* **Example:**
* An entrepreneurial artist wants to sell hand-designed t-shirts online. She wants to determine how many she will need to sell to cover her costs and then start making a profit

**Statistical Process Control**

**Use:**

* + Derive standards and then monitor whether a process is meeting those standards

**Example:**

* + An Internet Service Provider monitors whether there are atypical changes in the number of customer complaints it receives

**Linear Programming**

**Use:**

* + Determine how best to use limited resources (e.g., employee hours, materials, space) to either maximize profits or minimize costs

**Example:**

Determine number of junior and senior nurses to assign to emergency versus in-patient wards based on a series of constraints, in order to control costs while meeting patient needs

**Decision Tree**

**Use:**

A form of financial modeling that considers different options, and determines the options(s) with the highest profit potential based on a set of specified assumptions and outcome probabilities

**Example:**

* + A non-profit charity wants to determine which of 3 options, that have different resource requirements and possible outcomes, will generate the highest net charitable contributions.
  + an internet campaign
  + a mailing campaign
  + organizing a 5k charity run

**Simulation**

**Use:**

Computer-based models that simulate real-world situations for different “What if ?" scenarios

**Example:**

* + A hospital has a policy of ordering 10 sets of crutches whenever the inventory gets down to 5 sets or fewer. It takes anywhere from 2 days to 2 weeks for an order to arrive. Every now and then the hospital runs out of crutches when there is a high demand. A new re-order policy is needed to minimize running out of crutches, while minimizing inventory (because hospital storage space is scarce).