Business Analytics Problem-Solving Process

Answer the questions below. Use the 6 steps of the business analytics process as a framework for performing the analysis.

# Instructions:

Add your contribution in purple text so it is quickly identified. Make a comment indicating that you made the contribution and any notes or issues you wish to share about it.

# What is the gap between what happened previously and what is wanted now?

*Look through the explicit and implied problems and what might be wanted for an upcoming Hallowine event below.*

*For each problem indicate what the loss/cost for this problem is and give an example of the problem from the data (use the link to the data).*

**P1: Items went unsold.** Would like to have 100% sale of all items since there is no salvage value. We want to understand better what kinds of items are of high interest and would likely sell and what affects if an item will sell. What items attract people to attend the event (sells tickets to the event).

**Loss:**

**Example:**

**P2: Items were undersold.** The problem in the previous auction is that some items were undersold. As a charity event, underselling may represent a missed opportunity to maximize the funds raised for the charitable cause. Organizers typically aim to encourage competitive bidding to ensure that items are sold at their fair market value or even above it. Strategies such as providing detailed item descriptions, highlighting the value or uniqueness of items, and creating a lively bidding atmosphere can help mitigate underselling and boost fundraising efforts. We would like to have 0% undersold items.

**Loss**: Items sold for less than 40% of their value is "undersold" because we lost out on the opportunity to get at least 40% of the value as a cash donation and the opportunity to sell a different item for more than 40% of its value. This is an “opportunity loss” based on the lost potential revenue from the difference between what the item sold for and what we could expect from a 40% cash donation. Additionally, if the item were not accepted for the auction, there was an opportunity to accept and sell a different item that would have sold for more than 40%. Therefore the loss for an undersold item may be represented by:

Loss from undersold item = Potential Cash Donation - sale price + Potential sale price of another item that would no undersell = 40%\*item value + average sale price of not-undersold item.

To get the loss form all undersold items we can look at the sum of the losses for each undersold item, the average loss from undersold items, or the % of loss from undersold relative to total sales.

**Example**: Coupon books. They had a value of $30.00 but only sold for $20. Since we haven’t computed the average sale price of not-undersold items yet, the opportunity loss from this item is at least (.4\*30 - 20) = $8.

**P3: Problem with accepting donated items for the auction.** There could be a possible issue with accepting donated items for the auction if there is a low possibility of the item being bidded on and bought (unsold). It would be counterintuitive for the auction to accept donated items that are not going to have a high probability of being bidded on as there is no salvage value for each item and there is a limited amount of space for the items, meaning that items on the auction that are not sold have opportunity loss. This can be seen in the data sheet when examining the kinds of auction items that did not sell or were undersold in terms of category and identifying that some categories are not performing well, what values of items in those categories underperformed, and the degree of interest in given items in

Another issue with accepting donated items for the auction is the possibility that there may be too much of a certain auction item category which would not be beneficial to the auction as there would not be enough diversity amongst the auction and people would get bored or have diluted interest. It would be beneficial to the auction if a diverse and successful amount of item categories were focused on to ensure that the sales of these items have a higher probability of being sold and promote interest through uniqueness, scarcity, or a good deal. It should be a goal of the auction to sell 100% of the items put up for the auction.

There is also an issue of Space. Large items would take lots of room and are difficult to manage (and for buyers to take). We have limited space and large items that do not perform well reduce the opportunity to sell many smaller items that may perform better. Therefore, we need to consider how much room we have for all the items (if we do take in large items) and/or how many items we will have in the auction.

The problem is that **we have several different goals** for accepting items. We want to accept items that **will sell for as much as possible**. We want **items that have a high interest** - that will get a lot of people. We also want to have **variety** when deciding what items to accept while also managing the space considerations.

**Loss:**

**Example:**

**P4: Problem with soliciting items for the auction.** The Hallowine organization requested some items they assumed would have high interested. However, this assumption proved unreliable resulting in unsold or undersold items. The demand was much lower than the supply. This caused an opportunity loss where items that would have performed better could have been solicited. We want to balance the demand and supply of all items they request for auction to avoid this problem in the future. That is, we what to prioritize and how much of the category (gift cards, art, etc.) should be solicited. Previously the committee was just guessing on what they could get instead of finding out what they should get. They need to consider: how much storage they have, how many things they should get, which things sell well, and remove bias. The committee needs better guidance for what items to solicit and how many they should aim to acquire rather than ask donors for a cash donation.

Another problem with soliciting items for the auction might be that some people/companies might not be very interested in donating to YMCA and they are less willing to donate items/money for the auction. For restaurants that are only willing to donate restaurant gift cards, if YMCA rejected to take these gift cards and asked for money donations, the restaurant owners could be unwilling to do so or even be offended by the rejection.

**Loss:**

**Example:**

**P5: Min bid not enforced.** The problem in the previous auction is that some items were sold for less than the min bid. What we expect is that all items that are bid on will get at least the min bid. The min bid is something we set. For this auction, setting the min bid should reduce or avoid under-selling (items sold for too little) but also encourage bidding. Also, determine what policy or rules to use if the min bid is not met (e.g. reject all bids under the min bid). Want to know the consequence/loss of not enforcing min bid. Why was the min bid not enforced? As the auction got towards the end, attendees were told they could bid less than the min bid if there were no bids on an item at that time. This may not be true for all items. Some items may have a salvage value (e.g. restaurant gift cards).

**Loss:**

**Example:**

**P6: Min bid not set effectively.** There was a problem with setting the min bid. Currently we just guess at a good min bid and it’s unclear that this is effective in achieving our goals. However, If set too high, the item might not sell at all. If set too low, we won’t be able to achieve the values that we want (undersell). We want to set the min.bid to achieve our goals of getting at least 40% of the item sale value or ot would have been better to ask for a cash donation for that item. Our goal is to balance things. To set the bid value high so that it pushes over 40% of the sales price, but we do not want it too high to where they don't bid.

**Loss:**

**Example:**

**P7: Increments were not set effectively.** The bid increment for the majority of the items were set very low relative to the value (e.g $2 or $5). We want to sell and/or offer items with a high interest to maximize sales. Having a low bid increment would unconsciously set the value of the items at a low level. As with the min bid, our goal is to balance things. If we set the bid increment too high and enforce it, fewer people will bid and we may not maximize the sales price. If we set it too low, we may get a lot of bidders, but it may not push the sales price over the 40% of the value (or much over the mid bid).

Bid increment is clearly dependent on value. The higher the value of an item, the larger an increment people are willing to make when bidding on it. Also, increment may be dependent on category of the item. Some kinds of items people are willing to bid up faster than other kinds. We are unsure on what the relationship between bid increment and category of item is. How should we set bid increments to help achieve our goals?

**Loss:**

**Example:**

**P8: Increments were not enforced:** There are items that met the mid bid, but did not follow the bid increments. The goal of the bid increments is to maximize the amount per bid to maximize the sale price. If the bid increment is not enforced, it is difficult for us to manage the auction in terms of selling the items for more than 40% of their values. Many items were undersold which may be in part due to do not enforcing bid increments. We should look at the items that did not follow the bid increment, and investigate if they sold more than 40% of their value. With this, we can have a better idea of how bad of a problem this is if the increment is not enforced.

**Loss:**

**Example:**

**P9: Problem with missing min bid and bid increment.** There were items with missing minimum bid and bid increments. A problem with missing minimum bids or bid increments could be that the items undersell. A benefit of missing bids or bid increments is that items that are at risk in being unsold may be more likely to sell. The main problem with this is that for items that are missing data, it makes the item more difficult to manage. What happens when the min bid and increment are not set is that we do not have any control over the sales price. This makes the items for the auction set into a free-for-all. We want to set the min bid and increments to make people interested in the auction? We expect min bid and increments to be set to help manage our goals, when we don’t set it, it becomes a problem because we may not achieve our goals and increases the variation (higher risk) that we are not going to achieve certain goals.

Not setting a min bid or increment could imply that the item is not popular. Can we try to determine why they weren’t set? (on purpose, last minute thing, etc). Are these not set because people are unsure of what the item should be set at? Why do we care about this as a problem? Should be set in a certain way to help achieve our goals of higher sales price, encouraging interest in the item, and fundraising more.

**Main problem: Lack of controllability & Lack of manageability**

Another issue with the missing values for the minimum bid or the bid increment could be that the bidders may bid for the items at unusual/unrealistic prices. This could lead to the items being auctioned at prices that may not be expected of those items.

**Loss:**

**Example:**

# What data is involved?

*Download a copy of the data. Inspect the data and report on the following (in the spreadsheet):*

*Create a data legend. For each column, describe what the variable is (if it is a variable) and what data type it is (nominal, ordinal, interval, ratio) and if the variable is controllable, uncontrollable, or an effect (dependent.*

[data legend]  
**Category**: categorical, nominal, controllable

The category is the general type of item it is and there are only so many categories health & beauty, houseware, and jewelry as well as this misc. Items do not fit perfectly into only once category and not all items fit into a category. Categories can be used to analyze past auctions and see what items/ category groups are most popular. It could also be useful for the attendees to find items at the silent auction and to set goals to solicit items and understand the diversity of stuff. We can also examine the quality of categories i.e. how some are popular and don’t sell for a lot, unpopular items sell for a lot etc.

**Hallo-Wine silent auction items:**

**Value:**

**Min. bid:**

**Increment:**

**sales price:**

**winning bidder:**

**Donor:**

**Intiated by:**

*Is there any obviously incorrect data?*

**duplicate data:**

* There are 2 Chinese framed sculpture and teapot sold to the same person (Cheryl Parker). There was probably only one of this item and if there were two, it’s unlikely that the same person purchased both for exactly the same price.

**Possibly in error data [there is at least 1 clear error]:**

* There Baci Bistro $25 gift certificate being sold for $70 versus the Baci Bistro $100 gift certificate being sold for $100

*Indicate records with missing data (you do not need to do anything with this just now, just indicate what’s missing)*

**Records with missing data [Explain possible ways to guess at some of the missing values]:**

* 50 quarter pounders from McDonalds: missing values were value, min bid, and increment. We can guess the value of it by looking up how much one quarter pounder would be. According to the Mcdonalds website, it is $6.29 for one (50x6.29 = 314)(before tax) $230.18 in 2009

*Are there any obvious outliers? If so, indicate what they are and why they are outliers (you do not need to do anything with these just now). Why is this important? Discussing the outliers now may help understand how these items may have skewed the data when analyzing the performance as these particular items may have been strategized purposely to reach certain goals. We won’t use these items to represent the general data.*

List outliers and why they are unusual or unexpected [there are at least 3!]:

1. The 1-week stay at Thailand resort is an outlier because it is the only auction item with value over $600 that was sold. This is considerably highty than the value of most other items sold.

*Are there any obviously missing variables? If so, list them and why they are needed.*

[There are at least 2 missing variables]

1. Number of bids on item: This is needed to guage interest in an item

**Potentially useful data not available:**

1. Bid Time (This could show us how frequent people were bidding on an item and how in demand this item was. For instance, if the bid was every 30 seconds we could assume that people were watching the product like a hawk to try to win it and rebid)

# What background knowledge is needed?

*Is there any missing information that is needed or would be useful?* [there are at least three things things]

1. Number of people who attended the event - This tells us about how much people are interested in this event. It also indicates how much the items Hallowine solicited from the donors attracted people.