

Articulating Business Metrics in a Business Case Study

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1. Instructions

You are a business analyst at Di Chiara Consulting. You have been given the following case description from a potential client.

Happy Yogurt, a national chain of frozen yogurt stores with about 500 stores in 40 cities, is asking for assistance with its business processes. The average number of visitors per store has held constant over the past several years, but revenues per store are down by an average of 10%, and many stores are no longer profitable. The client suspects that a large amount of inventory is being thrown away unused at the end of each day. At the same time, customer polling suggests that the yogurt flavor customers want is often not available, even when the flavor is posted on the menu. People also complain about stores being closed when they visit. Now, the chain is facing increased competition from frozen yogurt sold in 24-hour grocery stores. Happy Yogurt has asked your team to recommend business process changes that can help them increase revenues and restore profitability.

Happy Yogurt currently has the following data available:

- 4 years of cash register data for every store that has, for each transaction, the date and time of the purchase, the specific items purchased, and the sales price of each item purchased.
- 4 years of delivery data that lists how much of each kind of yogurt mix, flavoring, and topping was delivered to each store each week.
- Typical public company accounting data, including annual revenues, annual cost of goods sold, in-store inventory on hand at the end of the year.

No other company data is available.

As a business analyst at Di Chiara Consulting, you will need to identify one business metric that could be extracted from the available data in the Happy Yogurt case study in order to suggest a business process change that could be related to improving Happy Yogurt's revenue or store profitability.

Remember, an effective metric is one that is directly related to the business process being examined. As such, the metric can be used to help identify a business problem to be addressed with a business process change, and later can also help determine if the implemented change was successful (through seeing if the changes in the metric are in the direction you would expect after implementing the business process change).

2. Submission

The fact that the average number of visitors per store has held constant over the past several years and that revenues per store are down by an average of 10% are issues related to sales and marketing and therefore they would need to be monitored by using **revenue metrics**.

The hint that a large amount of inventory might be thrown away unused at the end of each day and that customer polling suggests that the yogurt flavor customers want is often not available are profitability related issue since they are related to inventory management and they would need to be monitored by using **profitability metrics**.

People also complain about stores being closed when they visit and new the chain is facing increased competition from frozen yogurt sold in 24-hour grocery stores. Those problems are related to churn and they would need to be monitored with **risk metrics**.

This proposal focuses on **profitability metrics** that is used to **improve the inventory management process**. The proposed change has also potential positive impact on revenue and risk management.

A better inventory management process increases profits since it reduces the fixed costs of storage while reducing the negative float and hence the amount of interest to pay. It also reduces waste while potentially increasing sales (and therefore revenues) since it minimizes the risk that a customer visit ends empty handed and therefore the customer remains unsatisfied.

The following **steps** are contained in this proposal:

1. Based on the available historical data, finding the expected average amount of items sold for each SKU in each shop per week. Using this result for an initial indication of the number of items to be purchased each week per shop and per SKU.
2. Calculating and monitoring weekly a dynamic profitability metrics: the inventory turnover for each shop and for each SKU.
3. Adjusting the value calculated in step 1 dynamically each week based on the result of step 2.
4. Verifying the effectiveness of the metrics over a period of few months.

The stock keeping unit (SKU) is the kind of item that is stocked in the shop and purchased by the customer that in this case is the kind of yogurt mix, flavoring, and topping.

2.1. Finding the Expected Average Amount of Items Sold per Shop and per SKU in a Week

By using the cash register data, with the store and the SKU used as keys, the amount of items sold for each SKU in each shop is calculated for each week of the 4 years. Then the arithmetic mean of those values is calculated by using all the values related to a certain shop and a certain SKU. This is done for all the shops and all the SKUs.

The result is the initial value of the items to be purchased for a certain shop for a certain SKU for the next week.

2.2. Calculating the Metrics

1. Number of goods sold on each shop for each SKU

By using the cash register data, with the store and the stock keeping unit SKU used as keys, the amount of items sold for each SKU in each shop is calculated for each week.

2. Number of items delivered to each store for each SKU

By using delivery data, once again by using the store and the SKU as keys, the number of items delivered to each store for each SKU is extracted for each week. The initial value of this number has been calculated above (expected average amount of items sold per shop and per SKU in a week).

3. Inventory turnover for each shop, each SKU

By assuming that the initial inventory is zero for each SKU and for each shop, the inventory turnover for each shop, each SKU is calculated as:

$$\begin{aligned}\text{Inventory Turnover (shop, SKU)} &= \\ &= \text{number of goods sold in this shop for this SKU} / \text{inventory in this shop for this SKU} = \\ &= \text{number of goods sold in this shop for this SKU} / (\text{number of items delivered in this shop for} \\ &\quad \text{this SKU} - \text{number of goods sold in this shop for this SKU})\end{aligned}$$

This number gives for each shop and each SKU the number of times the inventory is sold and replaced in the considered time interval.

Every week this metric is updated by adding in the previous formula:

- at the numerator: the number of goods sold on each shop for each SKU in the current week
- at the denominator: the difference between the number of items delivered to each store for each SKU and the number of goods sold on each shop for each SKU in the same week

For the first two weeks the initial value is used for defining the number of items delivered to each store for each SKU.

The result is a metrics giving the value of the cumulative inventory turnover over the period from the first week till the current week.

2.3. Process Changes

Each week the metrics is checked and compared to the value obtained in the previous week. If it has increased, then more items of that SKU have to be purchased for that shop. If it has decreased, then less items of that SKU need to be purchased for that shop.

If the metrics has decreased, it means that the inventory turnover has decreased compared to the previous week, that is, in the last week there have been too many purchased items compared to the sold items. On the other hands, If the metrics has increased, this means a growth in the inventory turnover compared to the previous week and that means that in the last week there have been little purchased items compared to the sold items.

This is a dynamic metric since it can change significantly over intervals of few weeks and there are specific actions that the company can take to impact visibly the metric in short term.

This improves inventory management since it allows reducing waste while at the same time minimizing the risk that a customer does not buy since the customer has not found the wished product.

2.4. Verifying the Effectiveness of the Metrics

After few months of using the new process (for example, 3 months), the average days inventory per shop and per SKU of the last period is compared to the corresponding value of the previous 3 months.

The days inventory is calculated as follows:

$$\text{Days Inventory (shop, SKU)} = \text{Number of Days} / \text{Inventory Turnover (shop, SKU)}$$

where number of days in this example is 90.

If the day inventory has decreased, it means that the company has replaced the inventory more often and therefore it has sold it in average in a smaller amount of days. Therefore, the process change has been successful to reduce waste.

If the day inventory value is well above 7, it means that the company has time to refurnish the shop before it has run out of that SKU in that shop.

On the other hand, if the day inventory is less than 7, it means that the company tends to run out of that SKU in that shop before it can replace it and therefore there is the risk of losing sales and getting dissatisfied customers. In this case, the number of items delivered to the store for the SKU has to be increased.