

## Case Study

### Supply and Sale Management with Business Intelligence

A Retail chain store has branches all over the country up to the thana level. Each store has an online retail store management software for procurement of different goods (items), managing the inventory and selling to the customers.

Each item has a unique id, item name, type, manufacturing country, supplier, measuring unit, unit selling price, etc. The unit selling prices may vary slightly over time.

There are 44 stores located in different areas of the country. Each store has a store id, store size, location, city, upazila, district and division. Each store has a manager, many vehicles for delivery, delivery men, accounting staff, and management staff.

In the chain of stores described above, there are many customers. A customer has a unique id, name, date of birth, gender, qualification, place of birth, profession, annual income, present address, street, city, upazila, district and division.

Customers can purchase items using different methods of payment such as cash, cards of various banks, mobile banking systems (like bKash) etc.

A customer purchases one or more items in a single transaction. In every purchase, the transaction id, the customer id, the store id, the time of purchase (time key) and the item id is stored in the database. The component of time is hour, day, date, day of the week, week, month, quarter and year. A transaction has transaction id, type, bank name.

Question: You have to apply business intelligence techniques for the following analysis of items, suppliers and stores:

- A. Descriptive analysis,
  - B. Predictive analysis, and
  - C. Prescriptive analysis.
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- I. Select the facts, the dimensions, the fact table, the dimensional tables for the above analysis.
  - II. Perform the above three analyses on specified items. Each student will be assigned two or more items for this purpose. (The course teacher will assign the item and the assignment will be recorded in a google sheet)
  - III. Perform the above three analyses on a store. Each student will be assigned a store for this purpose. (The course teacher will assign the store and the assignment will be recorded in a google sheet)
  - IV. Recommend the feasibility of a new store in a certain area.
  - V. Classify the customers based on the purchase and personal profile.
  - VI. Recommend the advertisement of an item to the customers based on the classification of the customers.

VII. Recommend anything else that you would like to increase profit or decrease losses. There are no restrictions in this case, the more you explore, the better.

**I. Select the facts, the dimensions, the fact table, the dimensional tables for the above analysis. Draw the star schema.**

**Step 1:** Identify the Business process to model in order to identify the fact table.

**Step 2:** Choose the dimensions for the fact table.

**Step 3:** Choose the attributes of dimension tables.

**II. Perform the above three analyses on an item. Each student will be assigned an item for this purpose. (The course teacher will assign the item and the assignment will be recorded in a google sheet)**

## What Does Descriptive Analytics Tell Us?

Descriptive analytics provides vital information about a company's performance. Companies use it to track their progress over time and compare performance with other businesses. It provides insights into the following.

- **Current business performance:** Companies can monitor important metrics for individuals, groups and the business overall. For example, descriptive analytics can track sales per account representative, sales of each product line or the company's overall [sales revenue](#) for a period.
- **Historical trends:** Companies can track their progress by comparing metrics for different periods. For example, companies can analyze sales growth by calculating quarterly revenue growth as a percentage and presenting the historical trend in charts.

- **Strengths and weaknesses:** Companies can use descriptive analytics to compare the performance of different business groups based on metrics such as revenue per employee and expenses as a percentage of revenue. They can also compare their performance with industry averages or published data from other companies

## Five Steps in Descriptive Analytics

Applying descriptive analytics generally starts with defining the metrics you want to produce and culminates with presenting them in the desired format. Here are the steps to follow to generate your own descriptive analytics.

1. **State business metrics:** The first step is to [identify the metrics](#) that you want to generate. These should reflect key business goals of each group or of the company overall. For example, a growth-oriented company might focus on measuring quarterly increases in revenue, while the company's accounts receivable group might want to track days sales outstanding and other metrics that reflect [how long it takes to collect money from customers](#).
2. **Identify data required:** Locate the data you need to produce the desired metrics. At some companies, the data may be scattered across multiple applications and files. Companies that use [ERP systems](#) may already have most or all of the data they need in their systems' databases. Some metrics may also require data from external sources, such as industry benchmarking databases, ecommerce websites and social media platforms.
3. **Extract and prepare data:** If the data comes from multiple sources, extracting, combining and preparing the data for analysis is a time-consuming yet vital step to ensure accuracy. This step may involve data cleansing to eliminate inconsistencies and errors in data from different sources, as well as transforming data into a format suitable for analysis tools. Advanced forms of data analytics employ a process called data modeling to help prepare, structure and organize company information. Data modeling is a framework within information systems to define and format data.

4. **Analyze data:** Companies can use a variety of tools to apply descriptive analytics, from spreadsheets to business intelligence (BI) software. Descriptive analytics often involves applying basic mathematical operations to one or more variables. For example, sales managers may want to track the average revenue per sale or monthly revenue from new customers. Executives and financial specialists may seek to **monitor financial metrics** such as **gross profit margin**, which is the ratio of gross profit to sales.
5. **Present data:** Presenting data in compelling visual forms, such as pie charts, bar charts and line graphs, often makes it easier for stakeholders to understand. However, some people, including finance specialists, may prefer to see information presented as numbers and tables.

## What are the steps in the predictive analytics process?

Five key phases in the predictive analytics process cycle require various types of expertise:

1. Define the requirements,
2. explore the data,
3. develop the model,
4. deploy the model and
5. validate the results.

Although each of these steps may be driven by one particular expertise, each step of the process should be considered a team effort.

## What Is Prescriptive Analytics?

Prescriptive analytics is a type of data analytics that attempts to answer the question "What do we need to do to achieve this?" It involves the use of technology to help businesses make better decisions through the analysis of

raw data. Prescriptive analytics specifically factors information about possible situations or scenarios, available resources, past performance, and current performance, and suggests a course of action or strategy. It can be used to make decisions on any time horizon, from immediate to long-term. It is the opposite of descriptive analytics, which examines decisions and outcomes after the fact.

## KEY TAKEAWAYS

- Prescriptive analytics is a form of data analytics that tries to answer "What do we need to do to achieve this?"
- It uses machine learning to help businesses decide a course of action based on a computer program's predictions.
- Prescriptive analytics works with predictive analytics, which uses data to determine near-term outcomes.
- When used effectively, it can help organizations make decisions based on facts and probability-weighted projections instead of conclusions based on instinct.
- Prescriptive analytics isn't foolproof, as it's only as effective as its inputs.

## How Prescriptive Analytics Works

Prescriptive analytics tries to answer the question "How do we get to this point?" It relies on artificial intelligence (AI) techniques, such as machine learning (the ability of a computer program without additional human input), to understand and advance from the data it acquires, adapting all the while.

Machine learning makes it possible to process a tremendous amount of data available today. As new or additional data becomes available, computer programs adjust automatically to make use of it, in a process that is much faster and more comprehensive than human capabilities could manage.

Prescriptive analytics works with another type of data analytics, predictive analytics, which involves the use of statistics and modeling to determine future performance, based on current and historical data. However, it goes further: Using the predictive analytics' estimation of what is likely to happen, it recommends what future course to take.