# Business Case

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- This presentation is based on a business case taken from the course Data Science for Business Part 1 offered by the company Business Science and adapted to be in line with the topics covered in (Chapman and Feit 2019)

- Deliver essential knowledge within a minimal timeframe by employing hands-on learning techniques to enhance productivity in the R programming language

- You and your team will work for a corporation located in Wilton, Connecticut, United States that supplies bicycle frames and other components related to bicycles to different bicycle shops through the United States.
- Your team is assigned to complete 2 tasks:
  - Support the Research and Development (R & D) division in identifying potential new products and pricing them by using data collected from the bicycle shops.
  - Support the marketing team in the creation of a marketing segmentation clustering model by using data collected from to the bicycle shops to offer more personalized products and messaging them.

- Business unit: Cannondale Bicycle Corporation (Manufacturer)
  - Location: USA
  - Product: Bicycle frames
  - Retailers: Bikeshops located through USA
    - We are not going to analyze the business-to-customer (B2B) subchannel (Retailer to Customer) where the focus will be on the business-to-business (B2B) subchannel (Manufacturer to Retailer)

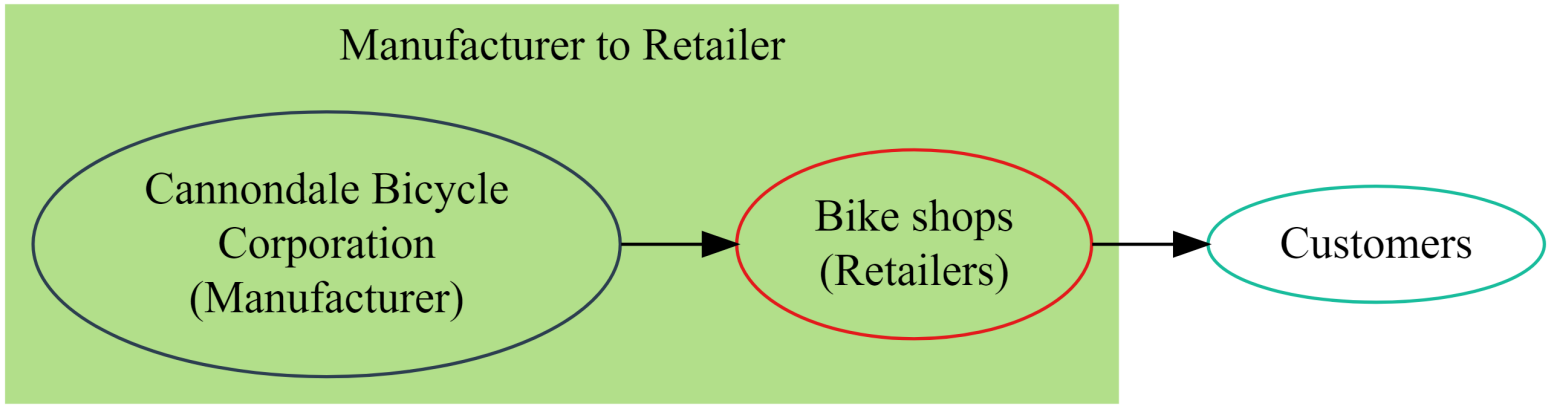


**Figure 1:** Distribution channel

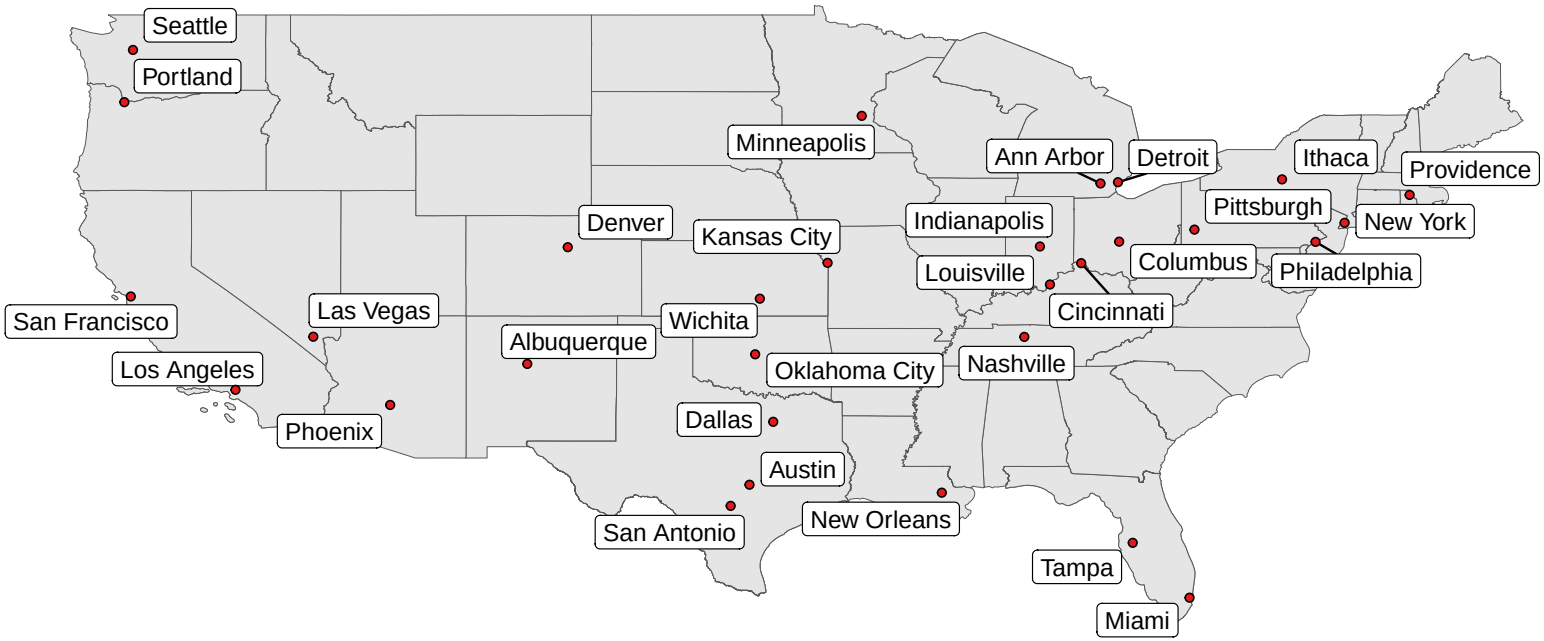


**Figure 2:** Bike shops locations

**Cannondale Bikes**

# INVOICE

XXXXX, XXXXXXXXXX, XXXXX, XXXX
Phone: (XXX) XXX-XXXX
Fax: (XXX) XXX-XXXX

INVOICE # 1
DATE: 2011-01-07

**BILL TO:**
XXXXXX XXXX
XXXXXX XXXXXXXXXX
XXX XXXXX XXXXX
XXXX, XXXX
(XXX) XXX-XXXX(123) 987-6543

**SHIP TO:**
XXXXXX XXXXX
Ithaca Mountain Climbers
XXX XXXX XXXXX
Ithaca, NY XXXX
(XXX) XXX-XXXX

**COMMENTS OR SPECIAL INSTRUCTIONS:**
XXXX XXXXXXXXXX XXXX

| SALESPERSON | P.O. NUMBER | REQUISITIONER | SHIPPED VIA | F.O.B. POINT | TERMS |
|---|---|---|---|---|---|
| XXXXX | XXX | XXXXX XXXX | Express air | Warehouse | Due on receipt |

| QUANTITY | DESCRIPTION | UNIT PRICE | TOTAL |
|---|---|---|---|
| 1 | Jekyll Carbon 2 - Over Mountain (Carbon) | 6070 | 6070 |
| 1 | Trigger Carbon 2 - Over Mountain (Carbon) | 5970 | 5970 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | TOTAL DUE | 12040 |

Make all checks payable to **Cannondale Bikes**
If you have any questions concerning this invoice, contact: XXXXX at (XXX) XXX-XXXX

**THANK YOU FOR YOUR BUSINESS!**

**Figure 3:** Invoice example representing a transaction

- Entities
  - **Product**
    - Product Id: unique product identification number
    - Model: model name of the bicycle
    - Category primary: main bicycle category (Mountain, Road)
    - Category secondary: More specific bicycle category (9 categories)
    - Frame: bicycle frame material (Carbon, Aluminum)
  - **Retailer**
    - Bike shop Id: unique bike shop identification number
    - Bike shop name
    - Bike shop state: state that the bike shop is located
    - Bike shop city: city that the bike shop is located
    - Latitude: geograhpic latitude of the bike shop location
    - Longitude: geograhpic longitude of the bike shop location

- Entities
  - **Closed order**
    - Order Id: unique order identification number
    - Order date: date the order was placed
    - Order line: sequential identification number for products on an order
    - Quantity: number of units purchased by the retailer
    - Price: unit price of the bicycle
    - Bike shop Id: unique bike shop identification number
    - Product Id: unique product identification number

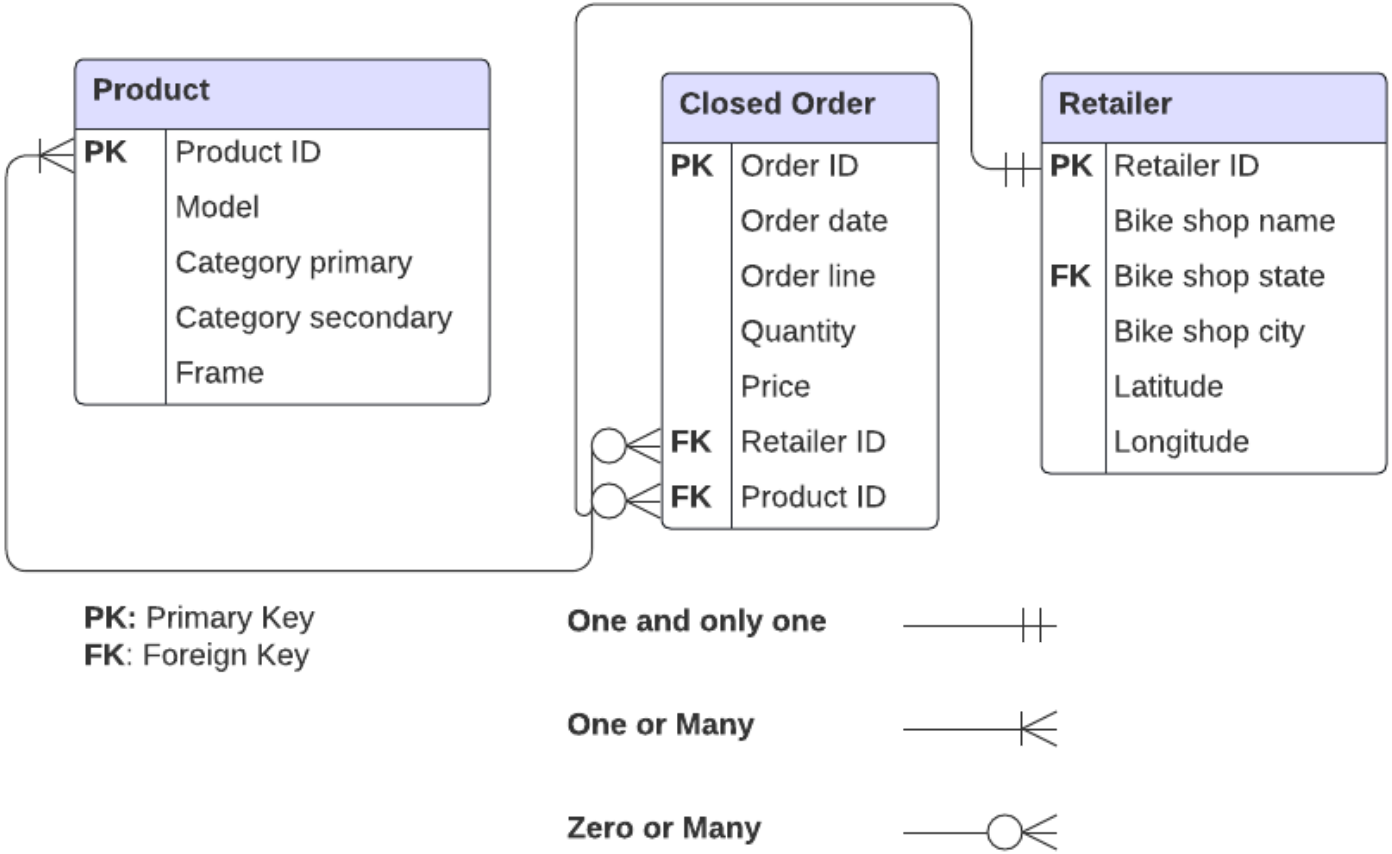


**Figure 4:** Database Entity Relationship Diagram (ERD)[1]

[1] See (Abba 2022)

- Understand the business data

```
library(tidyverse) # Remember to load the tidyverse library
library(sweep) # Remember to load the sweep library
```

```
bike_sales
```

```
# A tibble: 15,644 x 17
   order.date order.id order.line quantity price price.ext customer.id
   <date>        <dbl>      <int>    <dbl> <dbl>     <dbl>       <dbl>
 1 2011-01-07        1          1        1  6070      6070           2
 2 2011-01-07        1          2        1  5970      5970           2
 3 2011-01-10        2          1        1  2770      2770          10
 4 2011-01-10        2          2        1  5970      5970          10
 5 2011-01-10        3          1        1 10660     10660           6
 6 2011-01-10        3          2        1  3200      3200           6
 7 2011-01-10        3          3        1 12790     12790           6
 8 2011-01-10        3          4        1  5330      5330           6
 9 2011-01-10        3          5        1  1570      1570           6
10 2011-01-11        4          1        1  4800      4800          22
# i 15,634 more rows
# i 10 more variables: bikeshop.name <chr>, bikeshop.city <chr>,
#   bikeshop.state <chr>, latitude <dbl>, longitude <dbl>, product.id <dbl>,
#   model <chr>, category.primary <chr>, category.secondary <chr>, frame <chr>
```

- Only works in RStudio IDE

```
bike_sales |> View()
```

- Products
  - 97 bicycle models

**Table 1:** First 5 products

| Product Id | Model | Primary category | Secondary category | Frame |
|---|---|---|---|---|
| 48 | Jekyll Carbon 2 | Mountain | Over Mountain | Carbon |
| 52 | Trigger Carbon 2 | Mountain | Over Mountain | Carbon |
| 76 | Beast of the East 1 | Mountain | Trail | Aluminum |
| 2 | Supersix Evo Hi-Mod Team | Road | Elite Road | Carbon |
| 50 | Jekyll Carbon 4 | Mountain | Over Mountain | Carbon |

- Retailers
  - 30 bike shops

**Table 2:** First 5 retailers

| Retailer Id | Bike shop name | City | State | Latitude | Longitude |
|---|---|---|---|---|---|
| 2 | Ithaca Mountain Climbers | Ithaca | NY | 42.44396 | -76.50188 |
| 10 | Kansas City 29ers | Kansas City | KS | 39.11405 | -94.62746 |
| 6 | Louisville Race Equipment | Louisville | KY | 38.25267 | -85.75846 |
| 22 | Ann Arbor Speed | Ann Arbor | MI | 42.28083 | -83.74304 |
| 8 | Denver Bike Shop | Denver | CO | 39.73924 | -104.99025 |

- Closed orders
  - 2000 orders

**Table 3:** First 5 orders

| Order date | Order Id | Order line | Quantity | Price | Retailer Id | Product Id |
|---|---|---|---|---|---|---|
| 2011-01-07 | 1 | 1 | 1 | 6070 | 2 | 48 |
| 2011-01-07 | 1 | 2 | 1 | 5970 | 2 | 52 |
| 2011-01-10 | 2 | 1 | 1 | 2770 | 10 | 76 |
| 2011-01-10 | 2 | 2 | 1 | 5970 | 10 | 52 |
| 2011-01-10 | 3 | 1 | 1 | 10660 | 6 | 2 |
| 2011-01-10 | 3 | 2 | 1 | 3200 | 6 | 50 |
| 2011-01-10 | 3 | 3 | 1 | 12790 | 6 | 1 |
| 2011-01-10 | 3 | 4 | 1 | 5330 | 6 | 4 |
| 2011-01-10 | 3 | 5 | 1 | 1570 | 6 | 34 |
| 2011-01-11 | 4 | 1 | 1 | 4800 | 22 | 26 |
| 2011-01-11 | 5 | 1 | 1 | 480 | 8 | 96 |
| 2011-01-11 | 5 | 2 | 8 | 11190 | 8 | 66 |
| 2011-01-11 | 5 | 3 | 1 | 1250 | 8 | 35 |
| 2011-01-11 | 5 | 4 | 1 | 2060 | 8 | 72 |

- To my family that supports me
- To the taxpayers of Colombia and the **UMNG students** who pay my salary
- To the **Business Science** and **R4DS Online Learning** communities where I learn **R** and **$\pi$-thon**
- To the **R Core Team**, the creators of **RStudio IDE**, **Quarto** and the authors and maintainers of the packages **tidyverse**, **tigris**, **janitor**, **sweep**, **kableExtra** and **tinytex** for allowing me to access these tools without paying for a license
- To the **Linux kernel community** for allowing me the possibility to use some **Linux distributions** as my main **OS** without paying for a license

# References I

Abba, Ihechikara Vincent. 2022. "Crow's Foot Notation – Relationship Symbols And How to Read Diagrams." https://www.freecodecamp.org/news/crows-foot-notation-relationship-symbols-and-how-to-read-diagrams/.

Chapman, Chris, and Elea McDonnell Feit. 2019. *R For Marketing Research and Analytics*. 2nd ed. 2019. Use R! Cham: Springer International Publishing : Imprint: Springer. https://doi-org.ezproxy.umng.edu.co/10.1007/978-3-030-14316-9.