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)

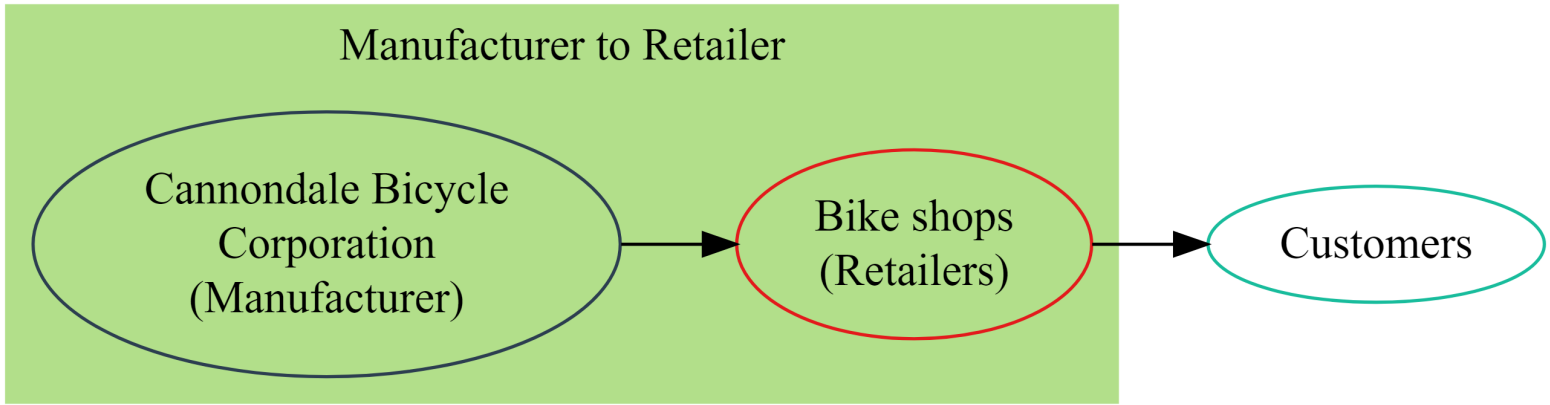

Figure 1: Distribution channel

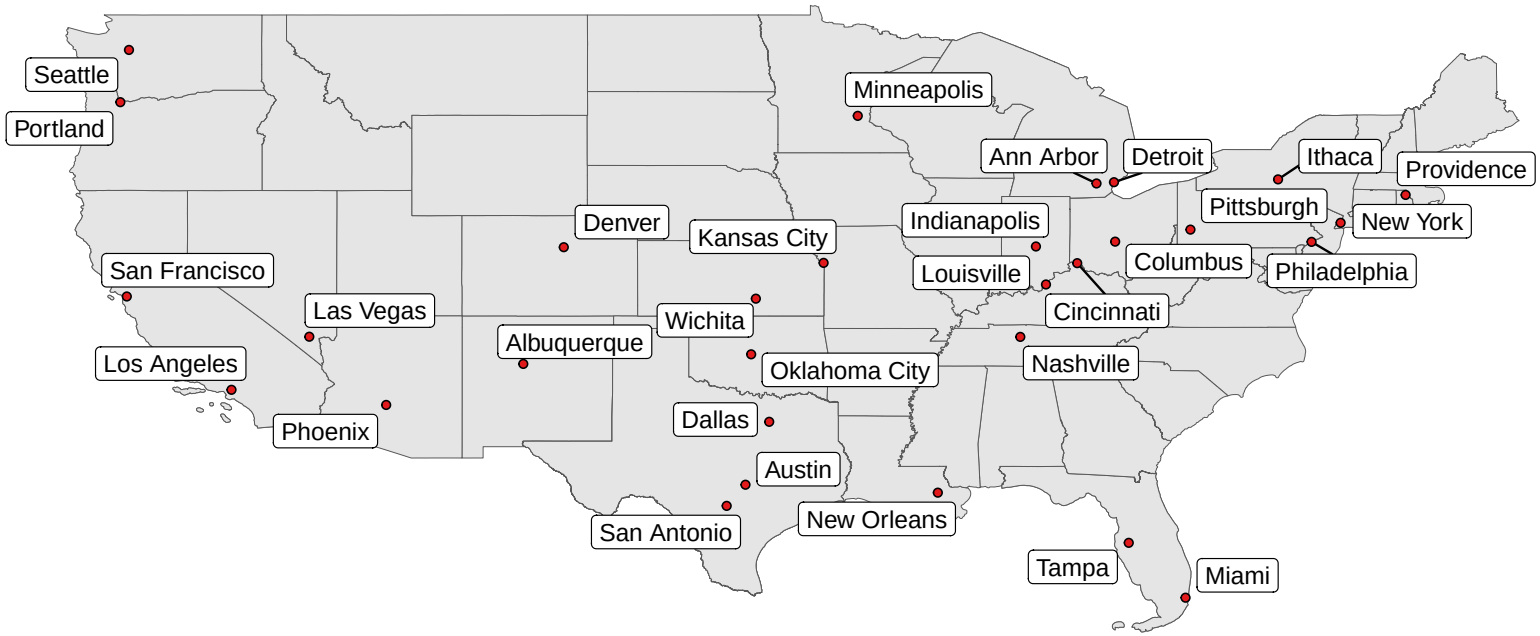

Figure 2: Bike shops locations

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

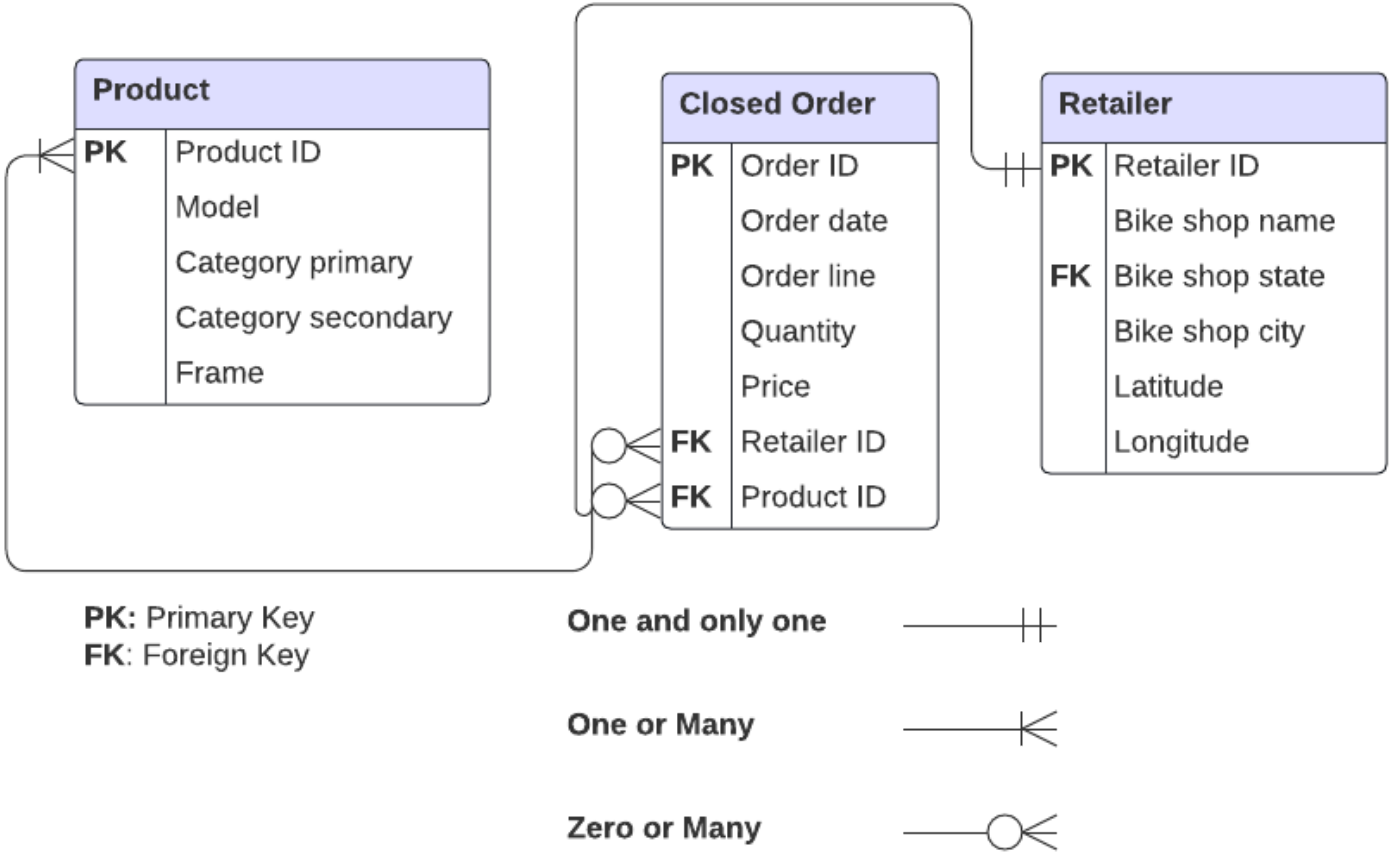

Figure 4: Database Entity Relationship Diagram (ERD)[1]

[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 **π-thon**
- To the **R Core Team**, the creators of **RStudio IDE**, **Quarto** and the authors and maintainers of the packages **tidyverse** 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.