Part 1+ 2

2025-03-14

```r
library(ggplot2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```r
mobiles_dataset<- "C:/Users/asus/Desktop/Homework 3/mobiles_dataset.csv"
```

```r
data<- read.csv(mobiles_dataset)
```

```r
head(data)
```

```
##   Company.Name          Model.Name Mobile.Weight RAM Front.Camera Back.Camera
## 1        Apple     iPhone 16 128GB          174g 6GB         12MP        48MP
## 2        Apple     iPhone 16 256GB          174g 6GB         12MP        48MP
## 3        Apple     iPhone 16 512GB          174g 6GB         12MP        48MP
## 4        Apple iPhone 16 Plus 128GB         203g 6GB         12MP        48MP
## 5        Apple iPhone 16 Plus 256GB         203g 6GB         12MP        48MP
## 6        Apple iPhone 16 Plus 512GB         203g 6GB         12MP        48MP
##    Processor Battery.Capacity.mAh Screen.Size.inches
## 1 A17 Bionic                 3600                6.1
## 2 A17 Bionic                 3600                6.1
## 3 A17 Bionic                 3600                6.1
## 4 A17 Bionic                 4200                6.7
## 5 A17 Bionic                 4200                6.7
## 6 A17 Bionic                 4200                6.7
##   Launched.Price.Pakistan.PKR Launched.Price.India.INR Launched.Price.China.CNY
## 1                      224999                    79999                     5799
## 2                      234999                    84999                     6099
## 3                      244999                    89999                     6499
## 4                      249999                    89999                     6199
## 5                      259999                    94999                     6499
## 6                      274999                   104999                     6999
##   Launched.Price.USA.USD Launched.Price.Dubai.AED Launched.Year
```

```
## 1                    799              2799         2024
## 2                    849              2999         2024
## 3                    899              3199         2024
## 4                    899              3199         2024
## 5                    949              3399         2024
## 6                    999              3599         2024
```

```r
colnames(data)
```

```
##  [1] "Company.Name"            "Model.Name"
##  [3] "Mobile.Weight"           "RAM"
##  [5] "Front.Camera"            "Back.Camera"
##  [7] "Processor"               "Battery.Capacity.mAh"
##  [9] "Screen.Size.inches"      "Launched.Price.Pakistan.PKR"
## [11] "Launched.Price.India.INR" "Launched.Price.China.CNY"
## [13] "Launched.Price.USA.USD"   "Launched.Price.Dubai.AED"
## [15] "Launched.Year"
```

```r
data <- data %>%
  mutate(
    Price_PKR_USD = Launched.Price.Pakistan.PKR * 0.0036,
    Price_INR_USD = Launched.Price.India.INR * 0.011,
    Price_CNY_USD = Launched.Price.China.CNY * 0.14,
    Price_AED_USD = Launched.Price.Dubai.AED * 0.27
  )
```
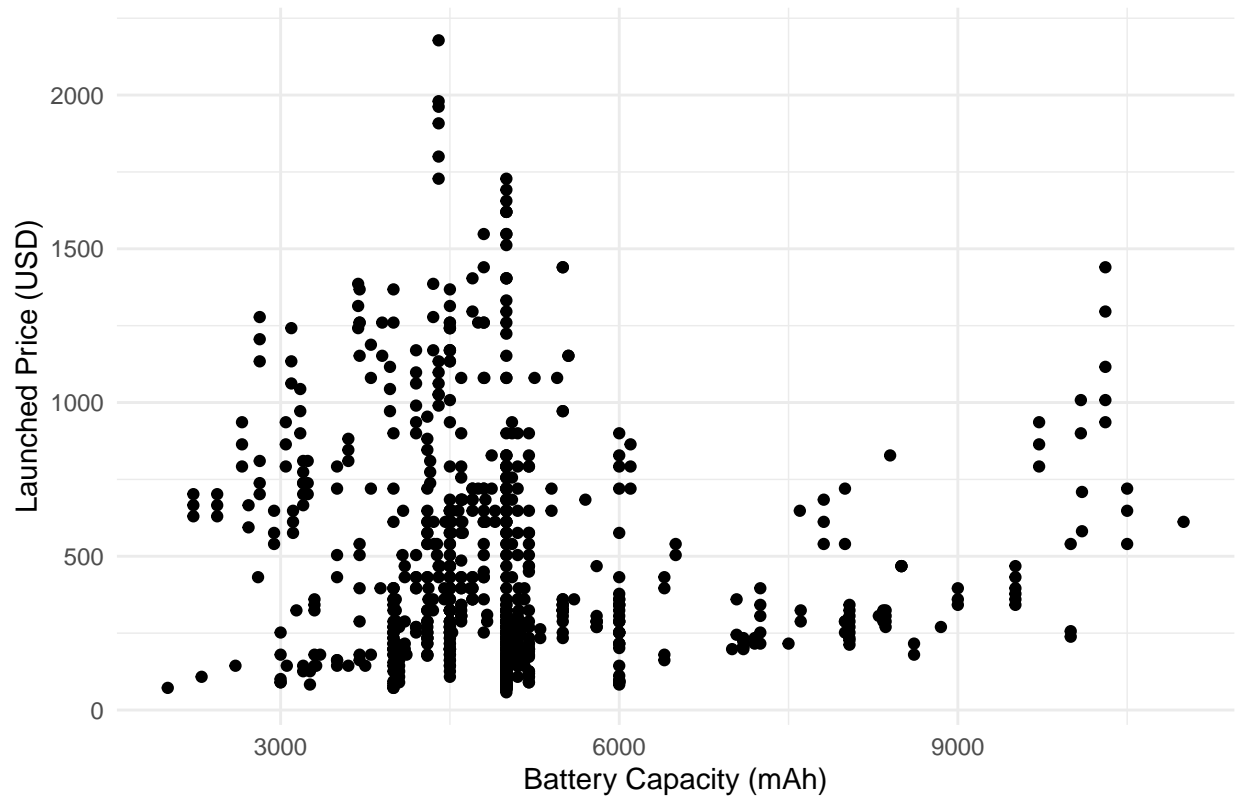
```r
ggplot(data = data , aes(x = Battery.Capacity.mAh, y = Launched.Price.USA.USD)) +
  geom_point() +
  labs(
    title = "Battery Capacity vs. Launched Price (USD)",
    x = "Battery Capacity (mAh)",
    y = "Launched Price (USD)"
  ) +
  theme_minimal()
```

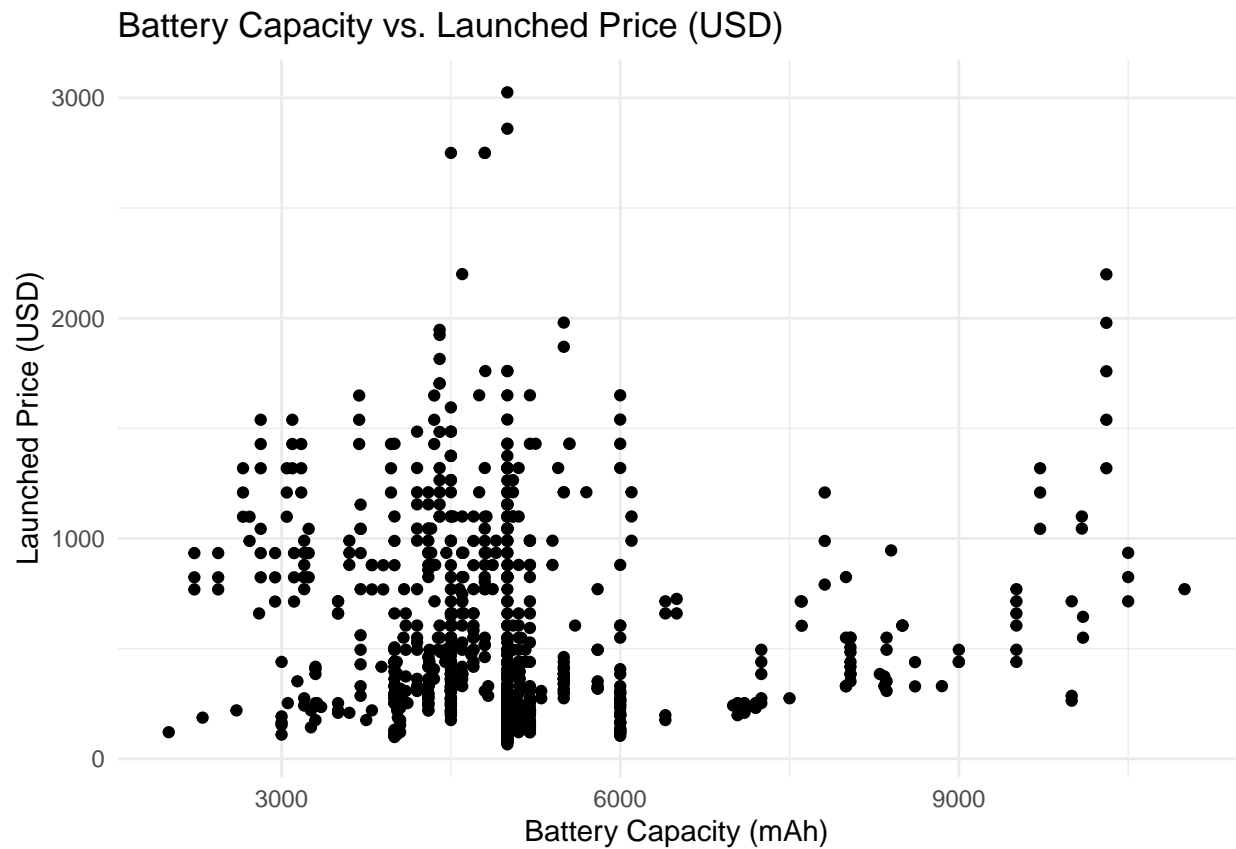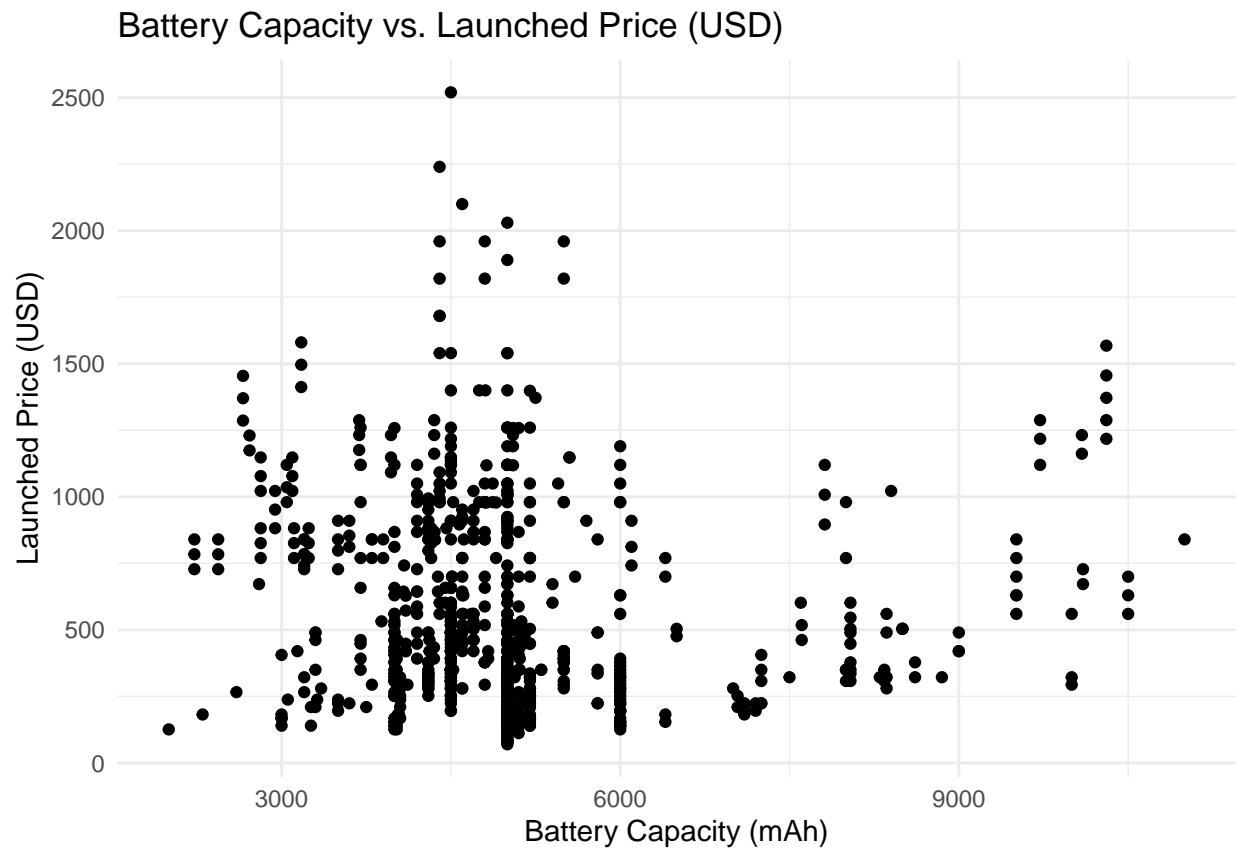# Battery Capacity vs. Launched Price (USD)
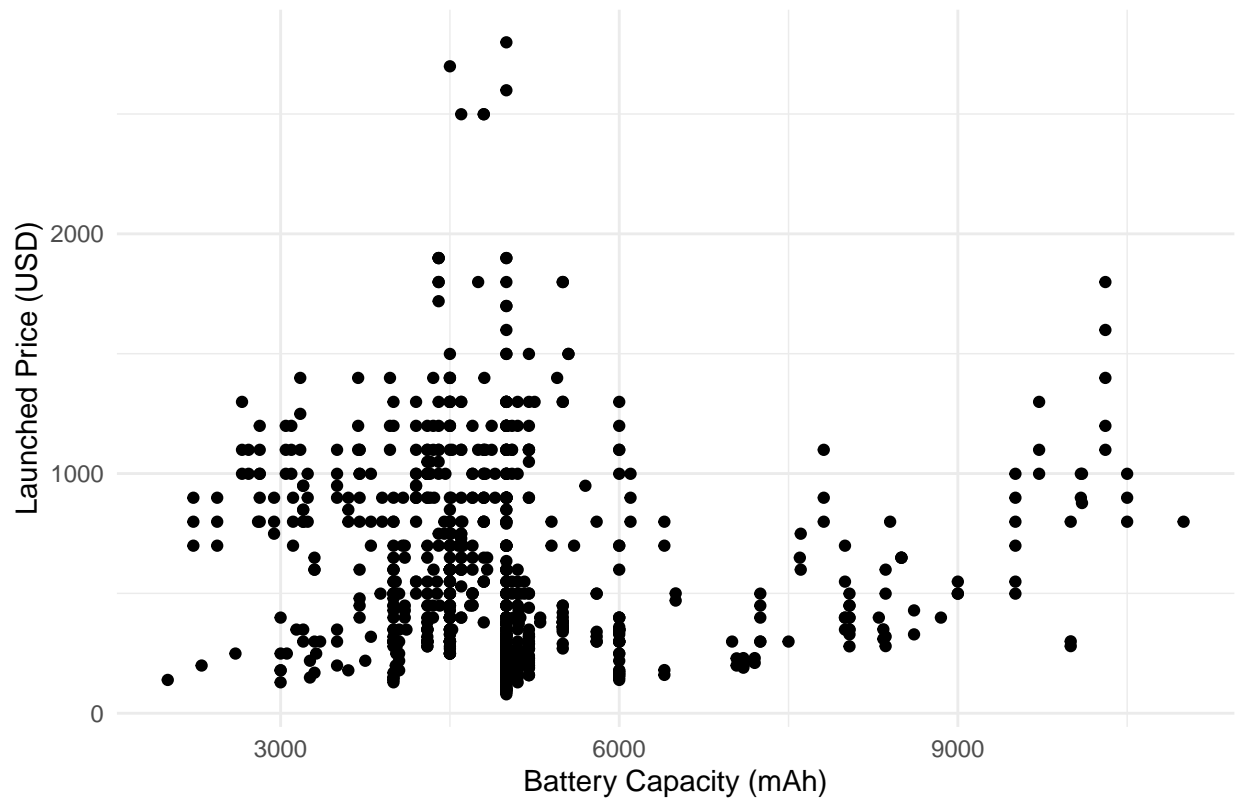

```
ggplot(data = data, aes(x = Battery.Capacity.mAh, y = Price_PKR_USD)) +
  geom_point() +
  labs(
    title = "Battery Capacity vs. Launched Price (USD)",
    x = "Battery Capacity (mAh)",
    y = "Launched Price (USD)"
  ) +
theme_minimal()
```

Battery Capacity vs. Launched Price (USD)


```
ggplot(data = data, aes(x = Battery.Capacity.mAh, y = Price_INR_USD)) +
  geom_point() +
  labs(
    title = "Battery Capacity vs. Launched Price (USD)",
    x = "Battery Capacity (mAh)",
    y = "Launched Price (USD)"
  ) +
theme_minimal()
```

Battery Capacity vs. Launched Price (USD)


```
ggplot(data = data, aes(x = Battery.Capacity.mAh, y = Price_CNY_USD)) +
  geom_point() +
  labs(
    title = "Battery Capacity vs. Launched Price (USD)",
    x = "Battery Capacity (mAh)",
    y = "Launched Price (USD)"
  ) +
theme_minimal()
```

Battery Capacity vs. Launched Price (USD)


```
ggplot(data = data, aes(x = Battery.Capacity.mAh, y = Price_AED_USD)) +
  geom_point() +
  labs(
    title = "Battery Capacity vs. Launched Price (USD)",
    x = "Battery Capacity (mAh)",
    y = "Launched Price (USD)"
  ) +
theme_minimal()
```

Battery Capacity vs. Launched Price (USD)
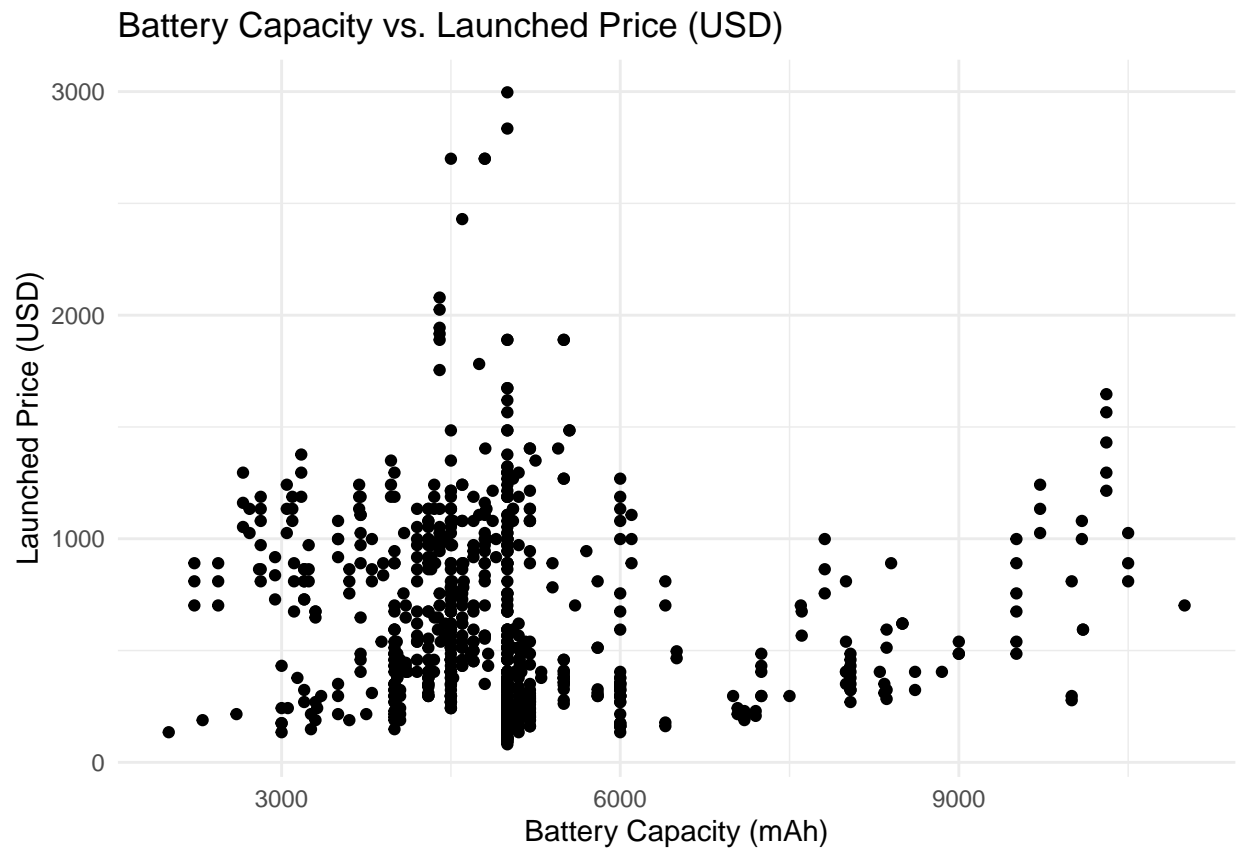

```r
data_summary_USA <- data %>%
  group_by(RAM) %>%
  summarise(Average_Price_USD = mean(Launched.Price.USA.USD, na.rm = TRUE))
```

```r
ggplot(data_summary_USA, aes(x = as.factor(RAM), y = Average_Price_USD, fill = as.factor(RAM))) +
geom_bar(stat = "identity") +
labs(
  title = "Average Price by RAM Size",
  x = "RAM Size (GB)",
  y = "Average Launched Price (USD)"
) +
theme_minimal()
```
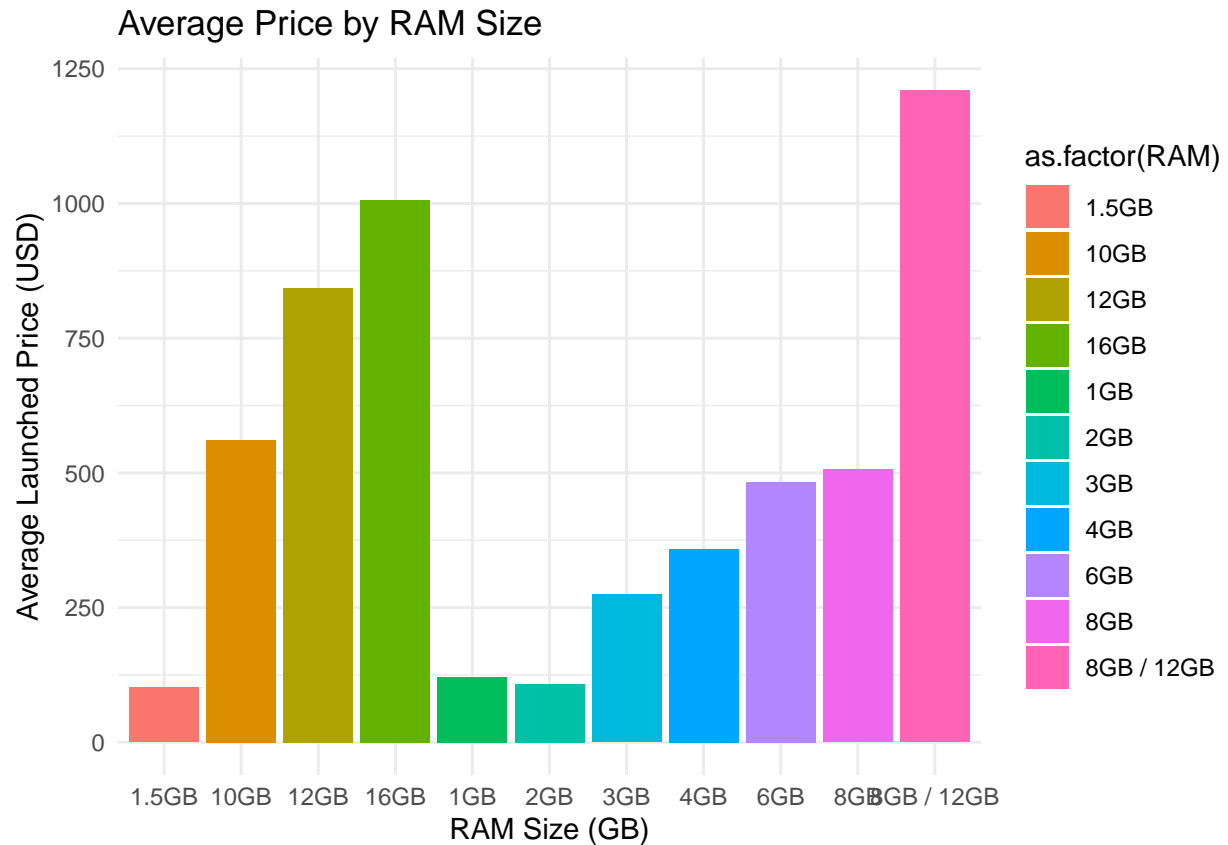
Average Price by RAM Size
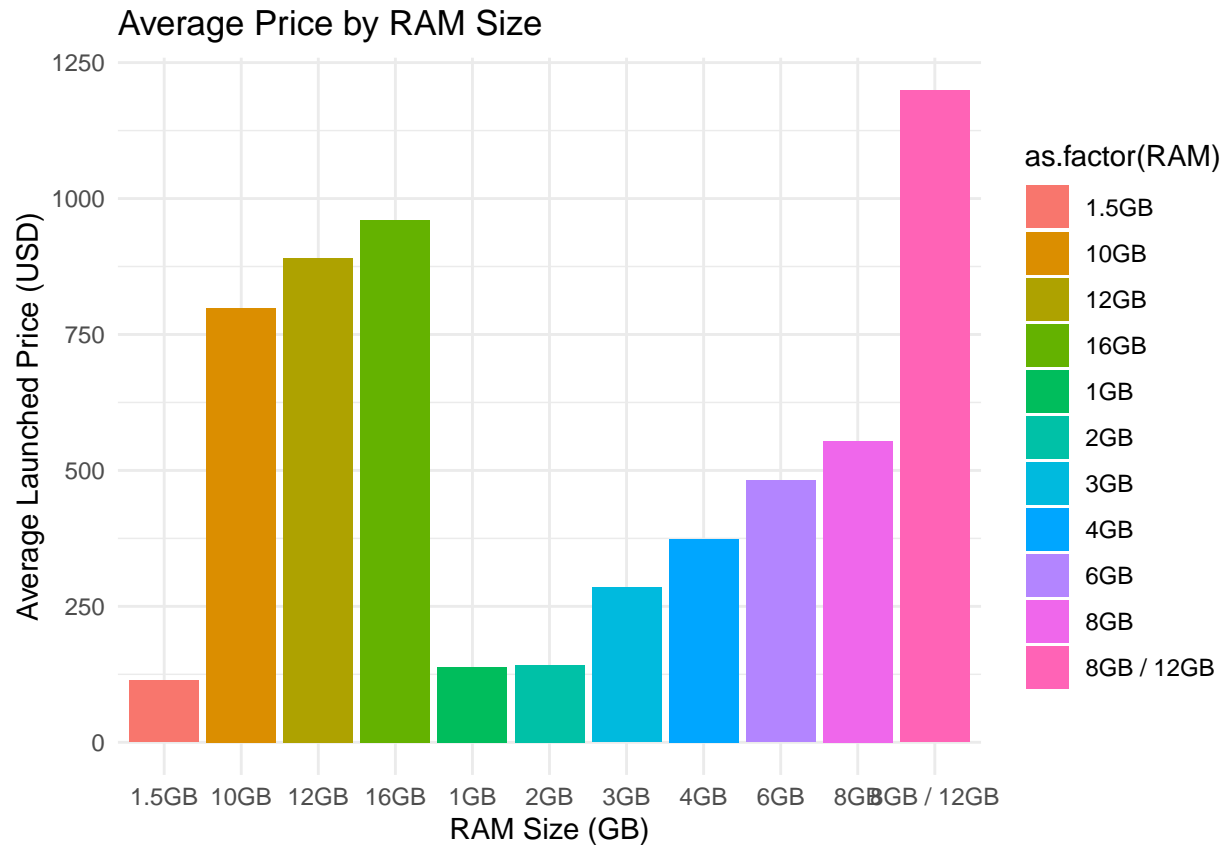

```r
data_summary_PKR <- data %>%
  group_by(RAM) %>%
  summarise(Average_Price_PKR_USD = mean(Price_PKR_USD, na.rm = TRUE))


ggplot(data_summary_PKR, aes(x = as.factor(RAM), y = Average_Price_PKR_USD, fill = as.factor(RAM))) +
geom_bar(stat = "identity") +
labs(
  title = "Average Price by RAM Size",
  x = "RAM Size (GB)",
  y = "Average Launched Price (USD)"
) +
theme_minimal()
```
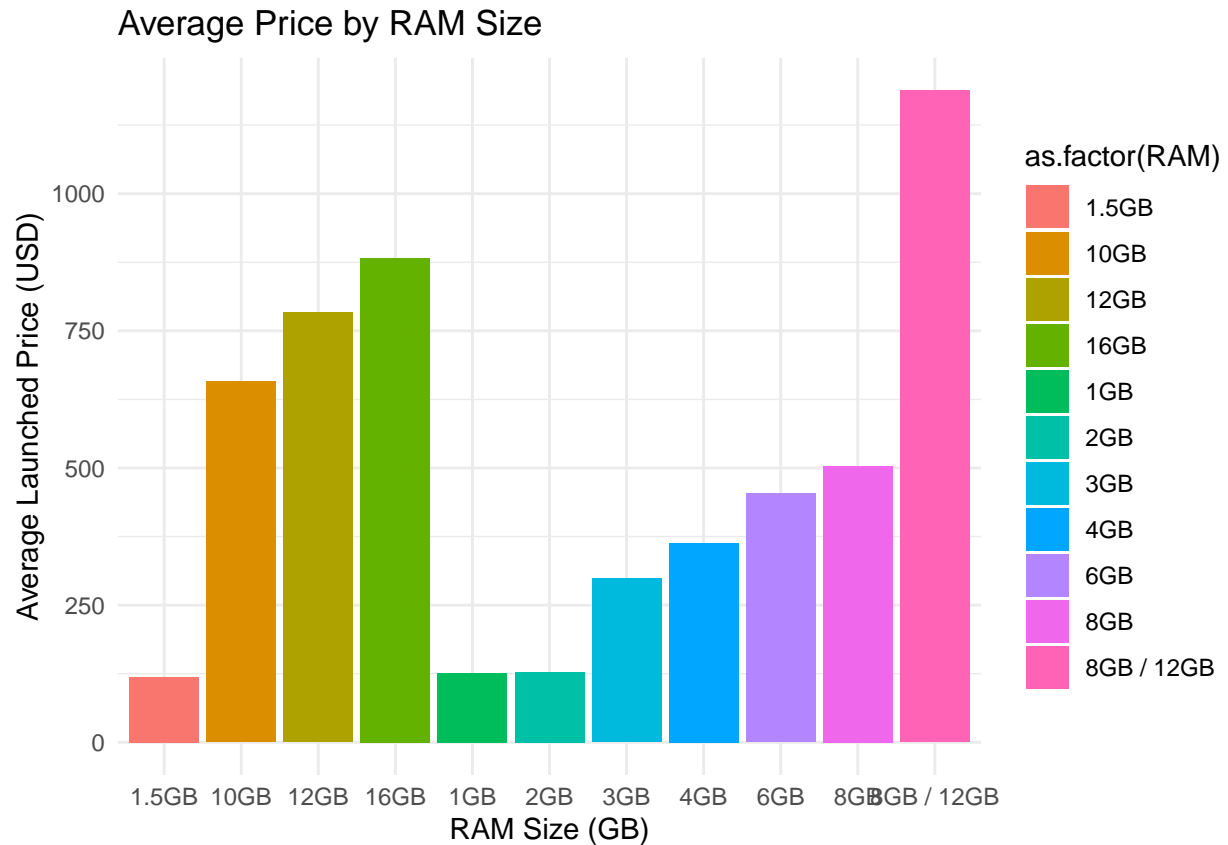
Average Price by RAM Size
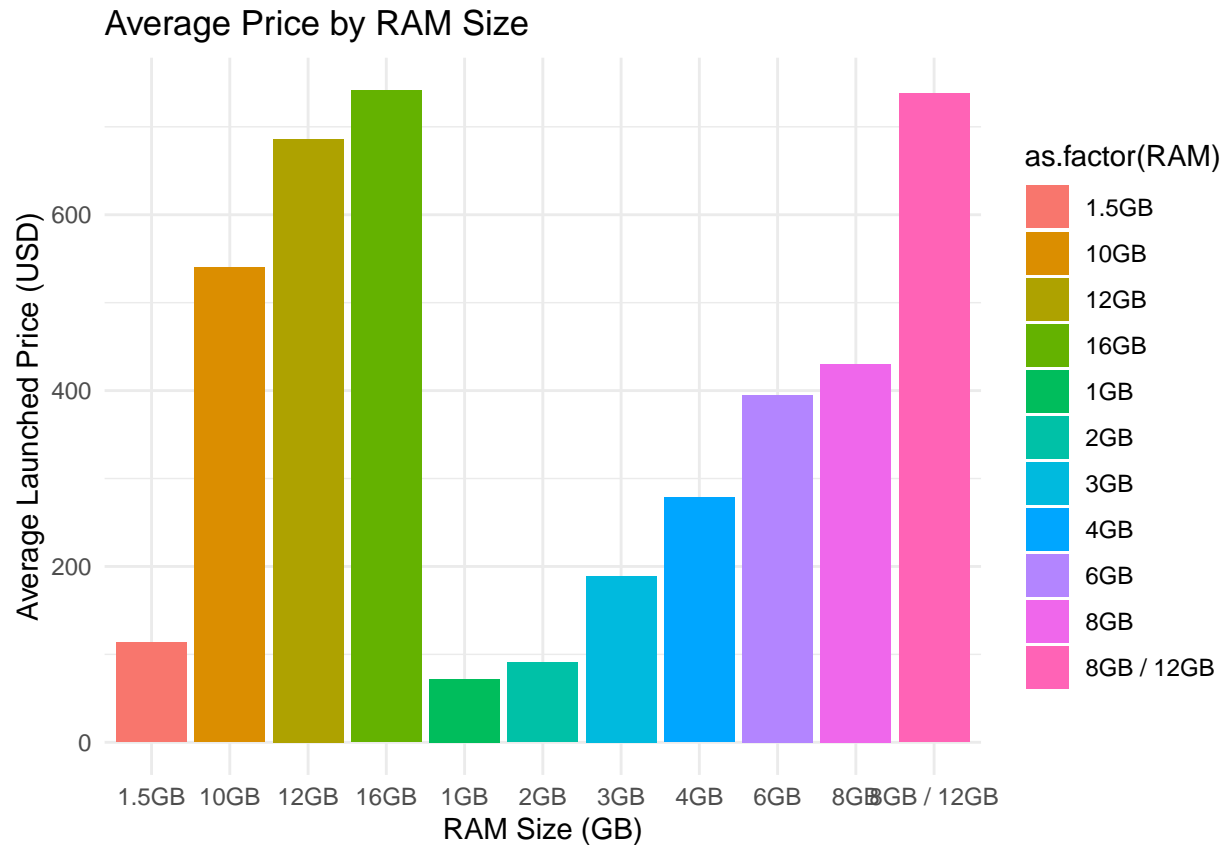

```r
data_summary_INR <- data %>%
  group_by(RAM) %>%
  summarise(Average_Price_INR_USD = mean(Price_INR_USD, na.rm = TRUE))


  ggplot(data_summary_INR, aes(x = as.factor(RAM), y = Average_Price_INR_USD, fill = as.factor(RAM))) +
  geom_bar(stat = "identity") +
  labs(
    title = "Average Price by RAM Size",
    x = "RAM Size (GB)",
    y = "Average Launched Price (USD)"
  ) +
  theme_minimal()
```

Average Price by RAM Size


```r
data_summary_CNY <- data %>%
  group_by(RAM) %>%
  summarise(Average_Price_CNY_USD = mean(Price_CNY_USD, na.rm = TRUE))


ggplot(data_summary_CNY, aes(x = as.factor(RAM), y = Average_Price_CNY_USD, fill = as.factor(RAM))) +
geom_bar(stat = "identity") +
labs(
  title = "Average Price by RAM Size",
  x = "RAM Size (GB)",
  y = "Average Launched Price (USD)"
) +
theme_minimal()
```

Average Price by RAM Size


```
data_summary_AED <- data %>%
  group_by(RAM) %>%
  summarise(Average_Price_AED_USD = mean(Price_AED_USD, na.rm = TRUE))


  ggplot(data_summary_AED, aes(x = as.factor(RAM), y = Average_Price_AED_USD, fill = as.factor(RAM))) +
  geom_bar(stat = "identity") +
  labs(
    title = "Average Price by RAM Size",
    x = "RAM Size (GB)",
    y = "Average Launched Price (USD)"
  ) +
  theme_minimal()
```
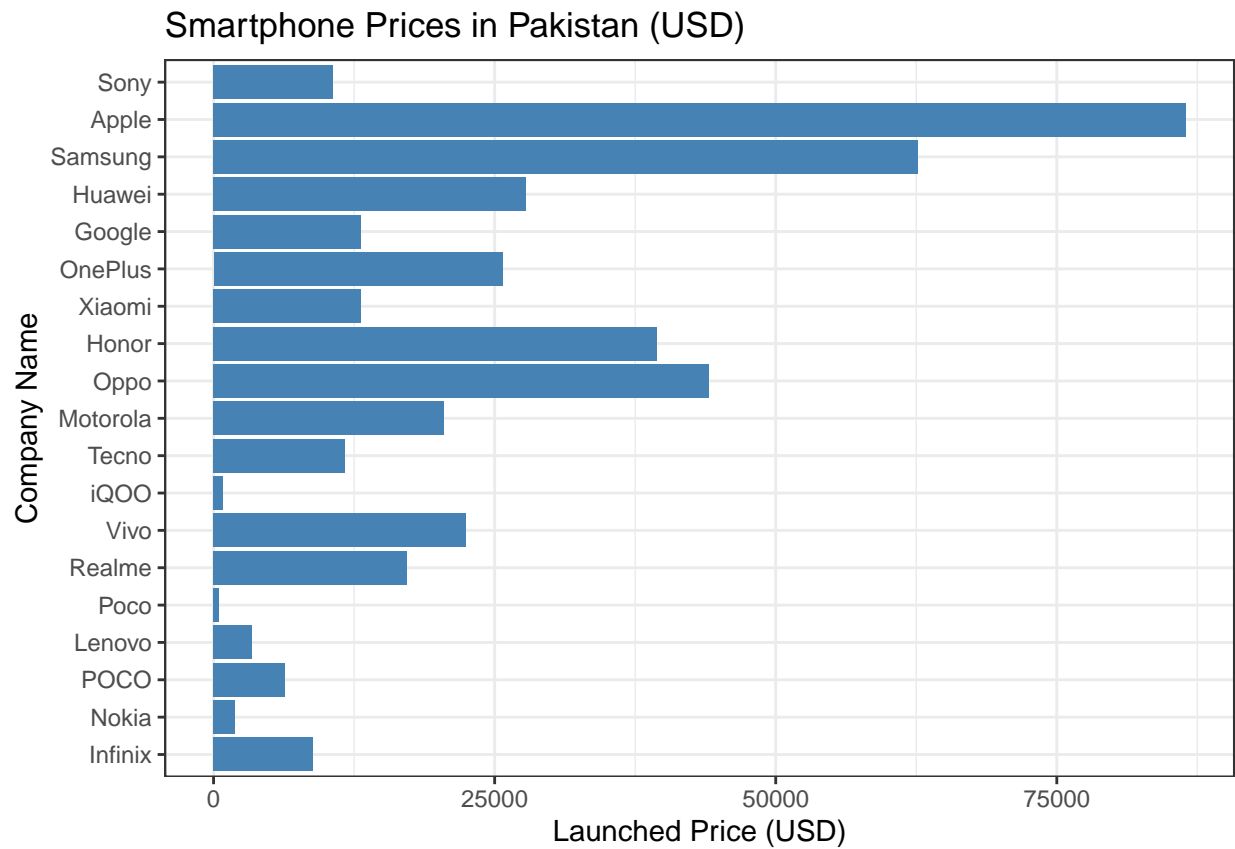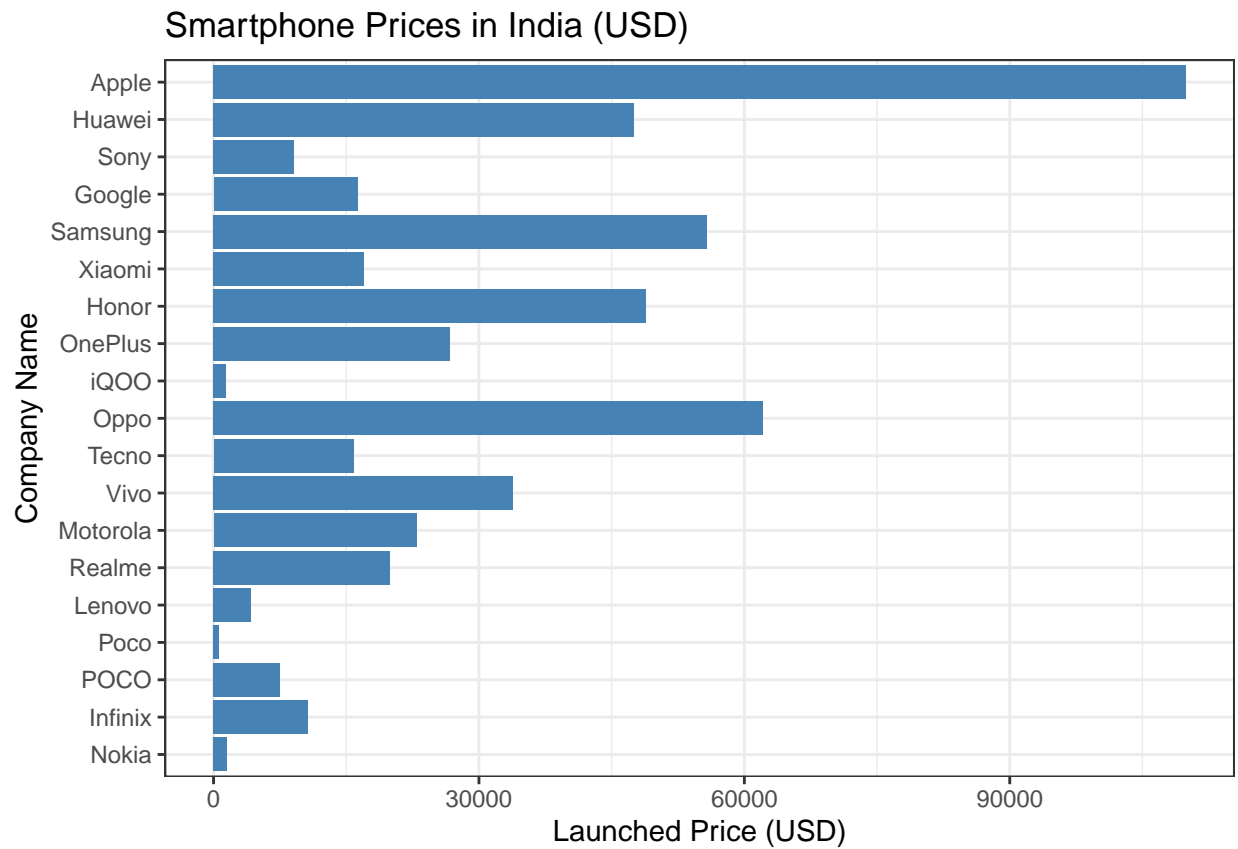
Average Price by RAM Size
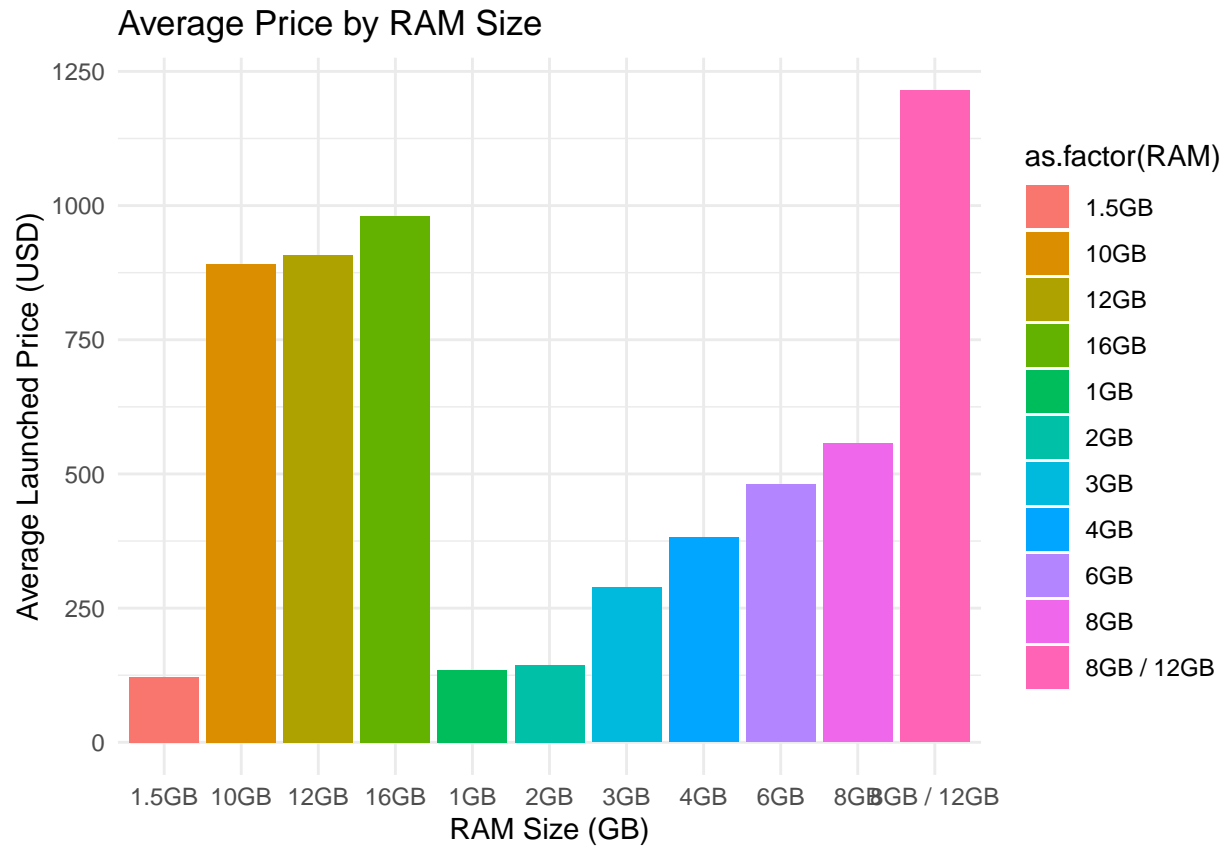

```
ggplot(data, aes(x = Launched.Price.USA.USD, y = reorder(Company.Name, Launched.Price.USA.USD))) +
  geom_bar(stat = "identity", fill = "steelblue") +
  labs(
    x = "Launched Price (USD)",
    y = "Company Name",
    title = "Smartphone Prices in USA (USD)"
  ) +
  theme_bw()
```
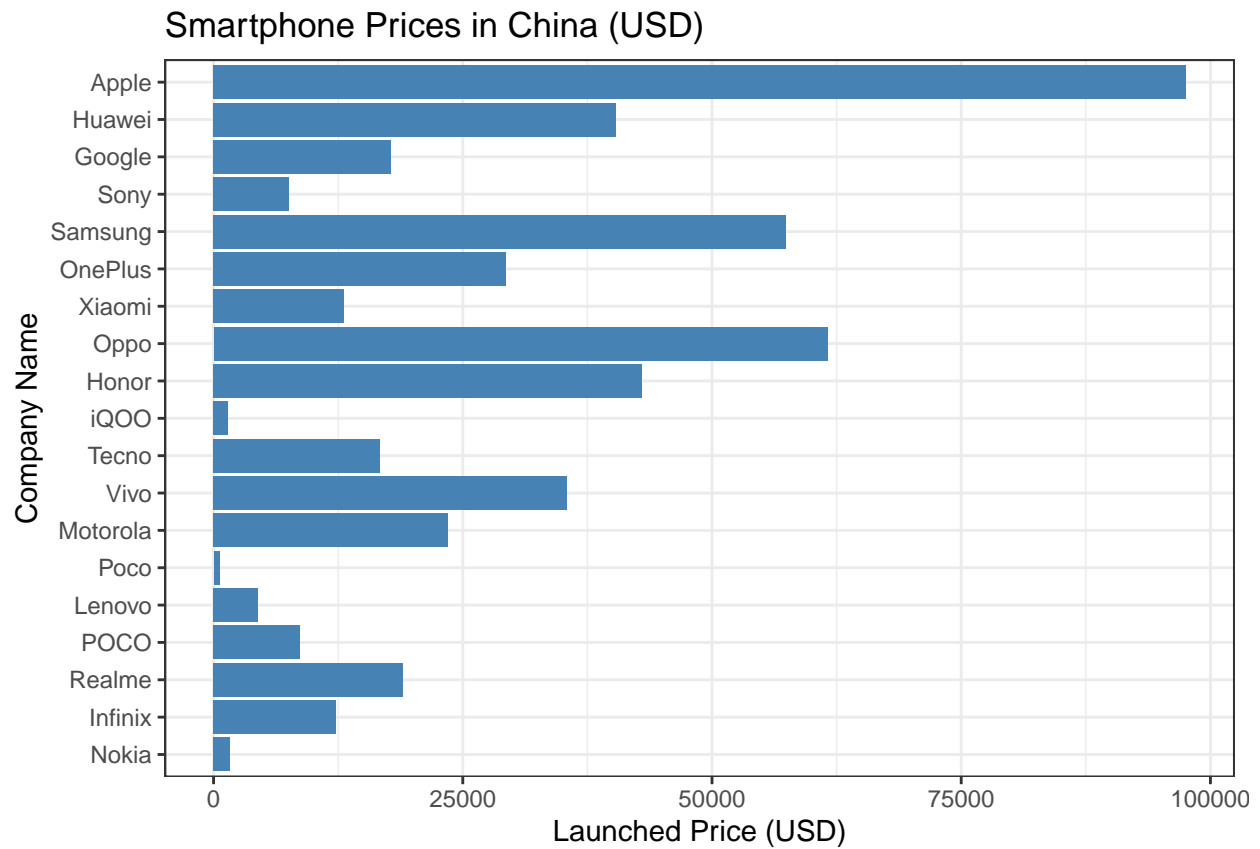
Smartphone Prices in USA (USD)
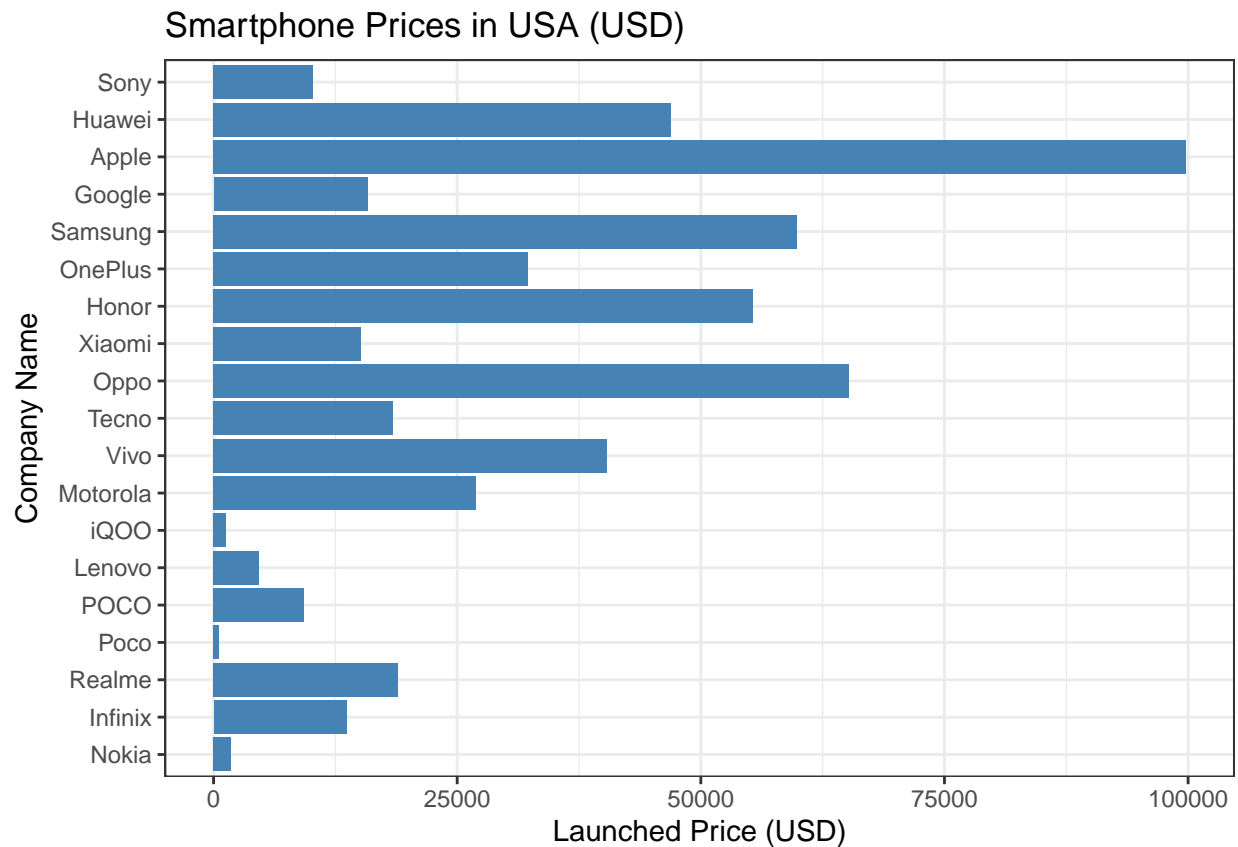

```
ggplot(data, aes(x = Price_PKR_USD, y = reorder(Company.Name, Price_PKR_USD))) +
  geom_bar(stat = "identity", fill = "steelblue") +
  labs(
    x = "Launched Price (USD)",
    y = "Company Name",
    title = "Smartphone Prices in Pakistan (USD)"
  ) +
  theme_bw()
```

Smartphone Prices in Pakistan (USD)


```
ggplot(data, aes(x = Price_INR_USD, y = reorder(Company.Name, Price_INR_USD ))) +
  geom_bar(stat = "identity", fill = "steelblue") +
  labs(
    x = "Launched Price (USD)",
    y = "Company Name",
    title = "Smartphone Prices in India (USD)"
  ) +
  theme_bw()
```

Smartphone Prices in India (USD)

```r
ggplot(data, aes(x = Price_CNY_USD, y = reorder(Company.Name, Price_CNY_USD))) +
  geom_bar(stat = "identity", fill = "steelblue") +
  labs(
    x = "Launched Price (USD)",
    y = "Company Name",
    title = "Smartphone Prices in China (USD)"
  ) +
  theme_bw()
```

Smartphone Prices in China (USD)


```r
ggplot(data, aes(x = Price_AED_USD, y = reorder(Company.Name, Price_AED_USD))) +
  geom_bar(stat = "identity", fill = "steelblue") +
  labs(
    x = "Launched Price (USD)",
    y = "Company Name",
    title = "Smartphone Prices in Dubai (USD)"
  ) +
  theme_bw()
```

Smartphone Prices in Dubai (USD)
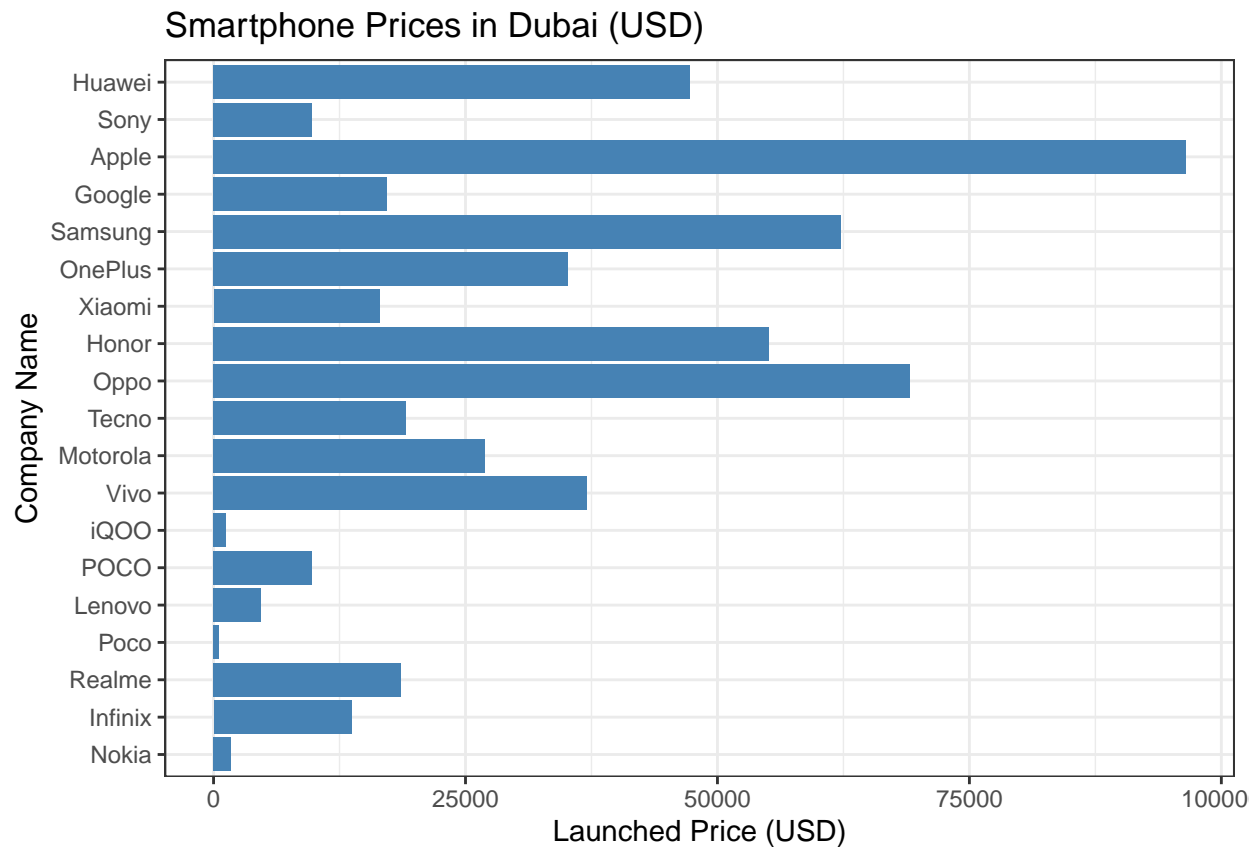

```r
data <- data %>%
  mutate(
    Price_Segment_USA = case_when(
          Launched.Price.USA.USD < 300 ~ "Budget",
          Launched.Price.USA.USD >= 300 & Launched.Price.USA.USD <= 700 ~ "Mid-Range",
          Launched.Price.USA.USD > 700 ~ "Premium"
    )
  )
```
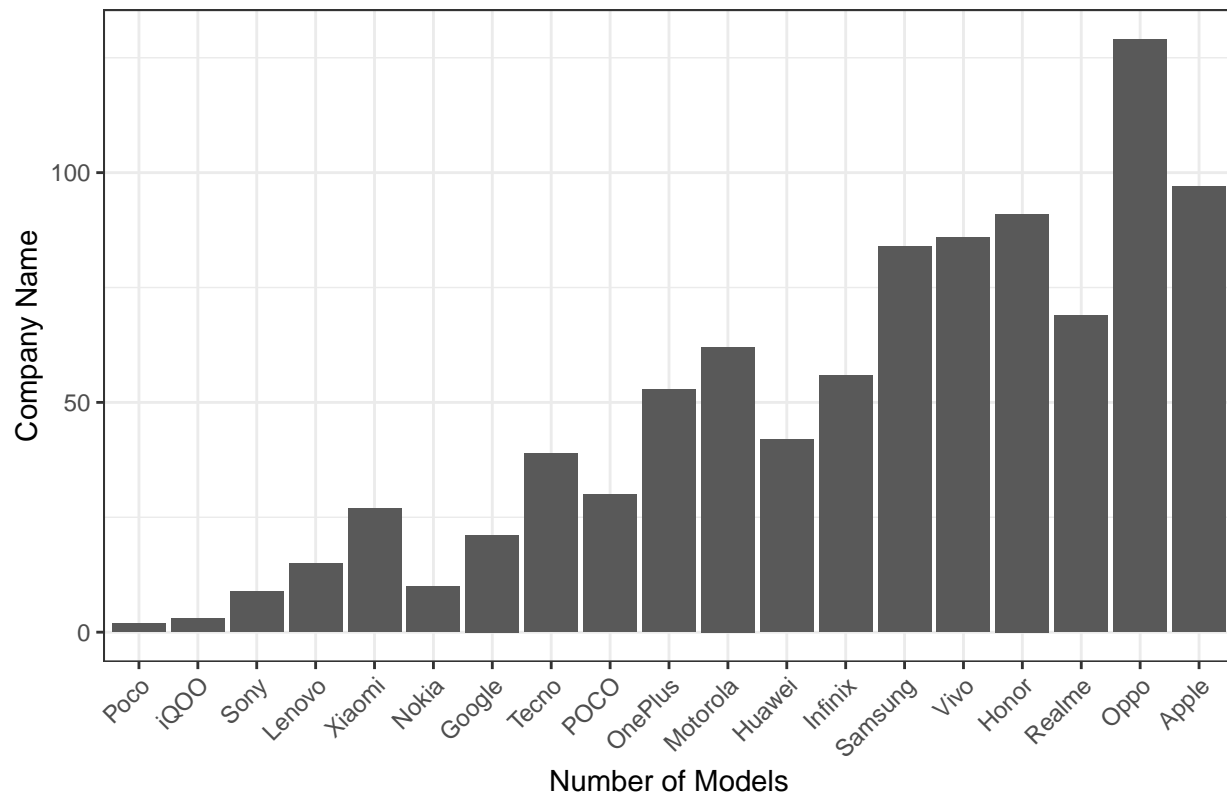
```r
segment_summary_USA <- data %>%
  group_by(Company.Name, Price_Segment_USA ) %>%
  summarise(Model_Count = n(), .groups = "drop")
```

```r
ggplot(segment_summary_USA, aes(x =reorder(Company.Name, Model_Count), y = Model_Count)) +
  geom_bar(stat = "identity") +
  labs(
    x = "Number of Models",
    y = "Company Name",
    title = "Model Distribution Across Segments in USA",
    fill = "Segment"
  ) +
  theme_bw()+
  theme(axis.text.x = element_text(angle = 45, hjust = 1)
  )
```

Model Distribution Across Segments in USA


```r
data <- data %>%
  mutate(
    Price_Segment_PKR = case_when(
      Price_PKR_USD < 300 ~ "Budget",
      Price_PKR_USD >= 300 & Price_PKR_USD <= 700 ~ "Mid-Range",
      Price_PKR_USD > 700 ~ "Premium"
    )
  )
```
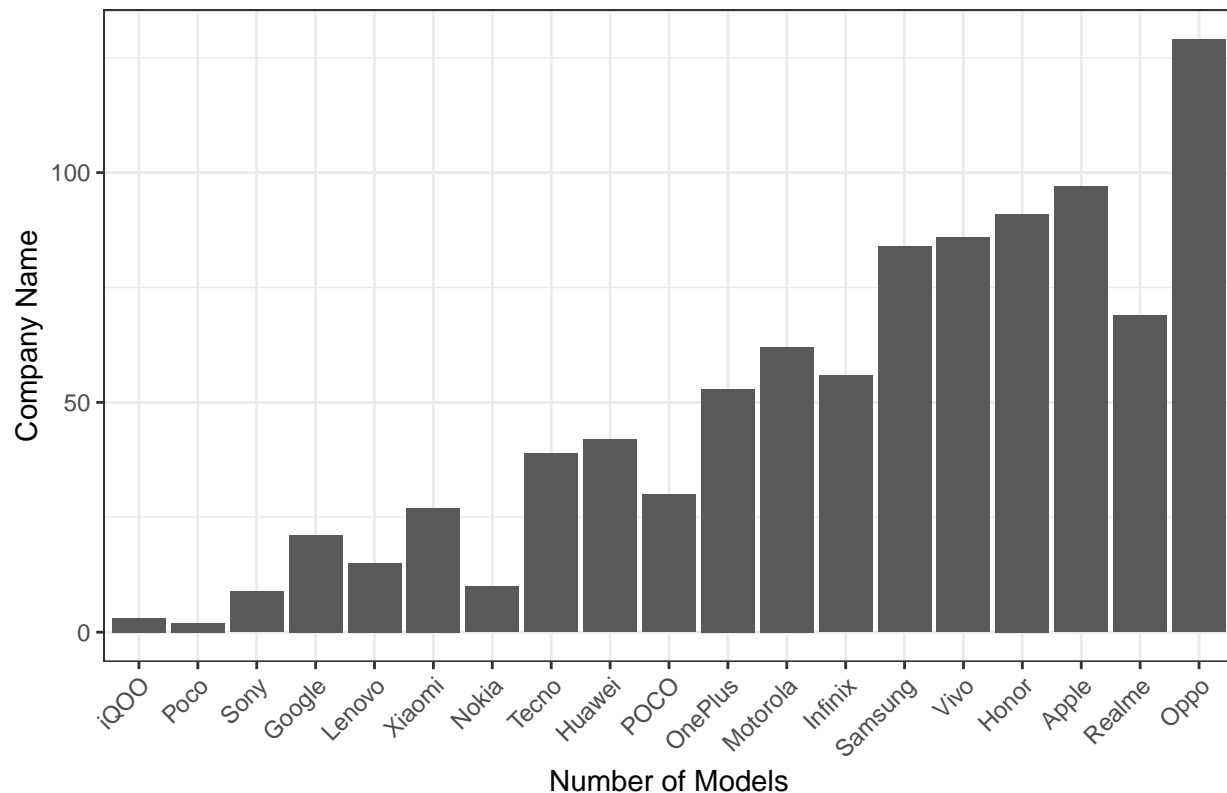
```r
segment_summary_PKR <- data %>%
  group_by(Company.Name, Price_Segment_PKR) %>%
  summarise(Model_Count = n(), .groups = "drop")
```

```r
ggplot(segment_summary_PKR, aes(x =reorder(Company.Name, Model_Count), y = Model_Count) +
  geom_bar(stat = "identity") +
  labs(
    x = "Number of Models",
    y = "Company Name",
    title = "Model Distribution Across Segments in Pakistan",
    fill = "Segment"
  ) +
  theme_bw()+
  theme(axis.text.x = element_text(angle = 45, hjust = 1)
  )
```

Model Distribution Across Segments in Pakistan


```r
data <- data %>%
  mutate(
    Price_Segment_INR = case_when(
      Price_INR_USD < 300 ~ "Budget",
      Price_INR_USD >= 300 & Price_INR_USD <= 700 ~ "Mid-Range",
      Price_INR_USD > 700 ~ "Premium"
    )
  )
```
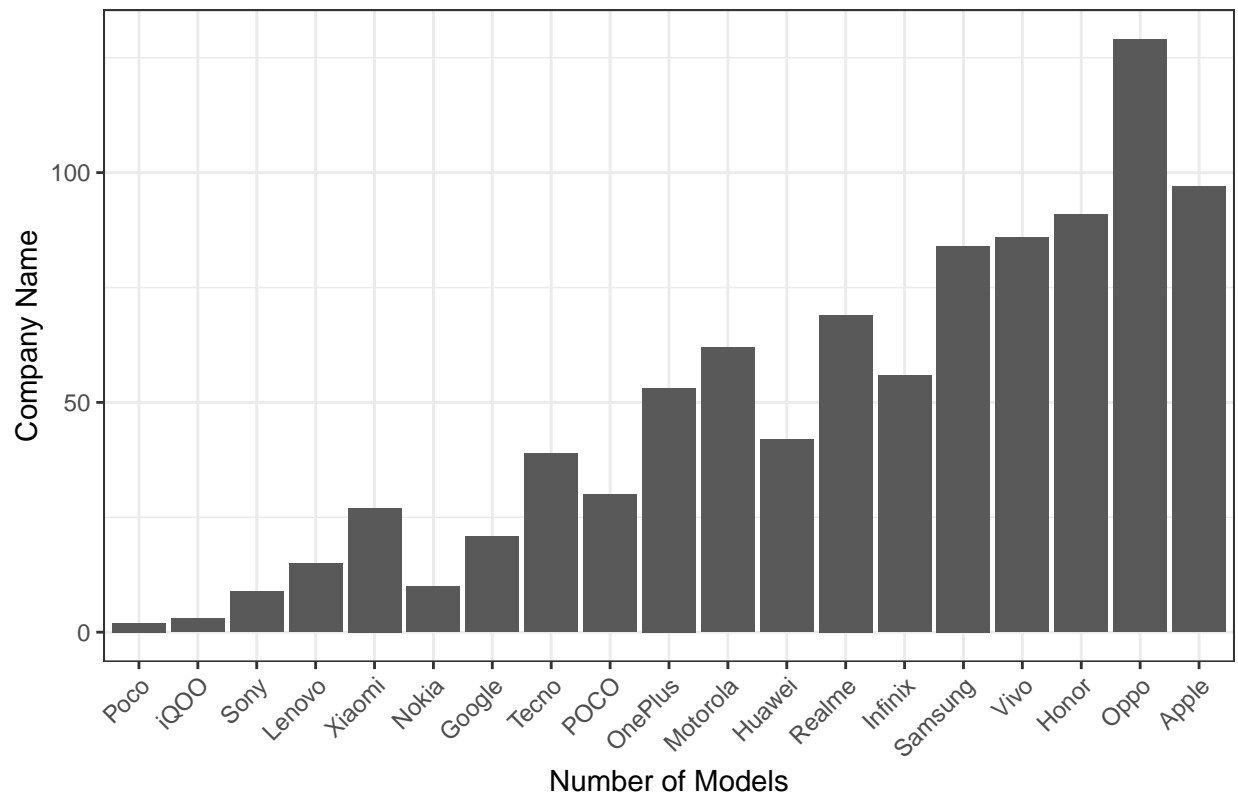
```r
segment_summary_INR <- data %>%
  group_by(Company.Name, Price_Segment_INR ) %>%
  summarise(Model_Count = n(), .groups = "drop")
```

```r
ggplot(segment_summary_INR, aes(x =reorder(Company.Name, Model_Count), y = Model_Count)) +
  geom_bar(stat = "identity") +
  labs(
    x = "Number of Models",
    y = "Company Name",
    title = "Model Distribution Across Segments in India",
    fill = "Segment"
  ) +
  theme_bw()+
  theme(axis.text.x = element_text(angle = 45, hjust = 1)
  )
```

Model Distribution Across Segments in India


```
data <- data %>%
  mutate(
    Price_Segment_CNY = case_when(
      Price_CNY_USD < 300 ~ "Budget",
      Price_CNY_USD >= 300 & Price_CNY_USD <= 700 ~ "Mid-Range",
      Price_CNY_USD > 700 ~ "Premium"
    )
  )
```
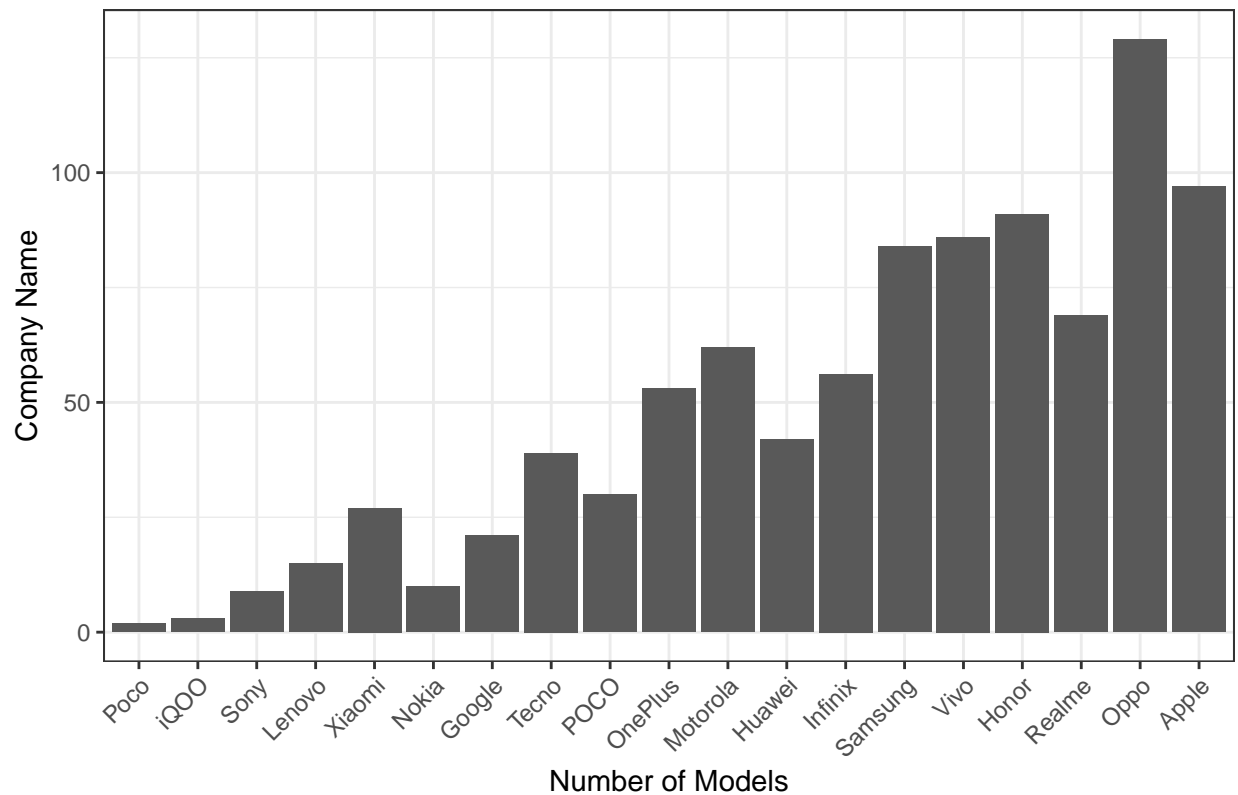
```
segment_summary_CNY <- data %>%
  group_by(Company.Name, Price_Segment_CNY ) %>%
  summarise(Model_Count = n(), .groups = "drop")
```

```
ggplot(segment_summary_CNY, aes(x =reorder(Company.Name, Model_Count), y = Model_Count)) +
  geom_bar(stat = "identity") +
  labs(
    x = "Number of Models",
    y = "Company Name",
    title = "Model Distribution Across Segments in China",
    fill = "Segment"
  ) +
  theme_bw()+
  theme(axis.text.x = element_text(angle = 45, hjust = 1)
  )
```

Model Distribution Across Segments in China


```
data <- data %>%
  mutate(
    Price_Segment_AED = case_when(
      Price_AED_USD < 300 ~ "Budget",
      Price_AED_USD >= 300 & Price_AED_USD <= 700 ~ "Mid-Range",
      Price_AED_USD > 700 ~ "Premium"
    )
  )
```

```
segment_summary_AED <- data %>%
  group_by(Company.Name, Price_Segment_AED ) %>%
  summarise(Model_Count = n(), .groups = "drop")
```

```
ggplot(segment_summary_AED, aes(x =reorder(Company.Name, Model_Count), y = Model_Count)) +
  geom_bar(stat = "identity") +
  labs(
    x = "Number of Models",
    y = "Company Name",
    title = "Model Distribution Across Segments in Dubai",
    fill = "Segment"
  ) +
  theme_bw()+
  theme(axis.text.x = element_text(angle = 45, hjust = 1)
  )
```

## Model Distribution Across Segments in Dubai
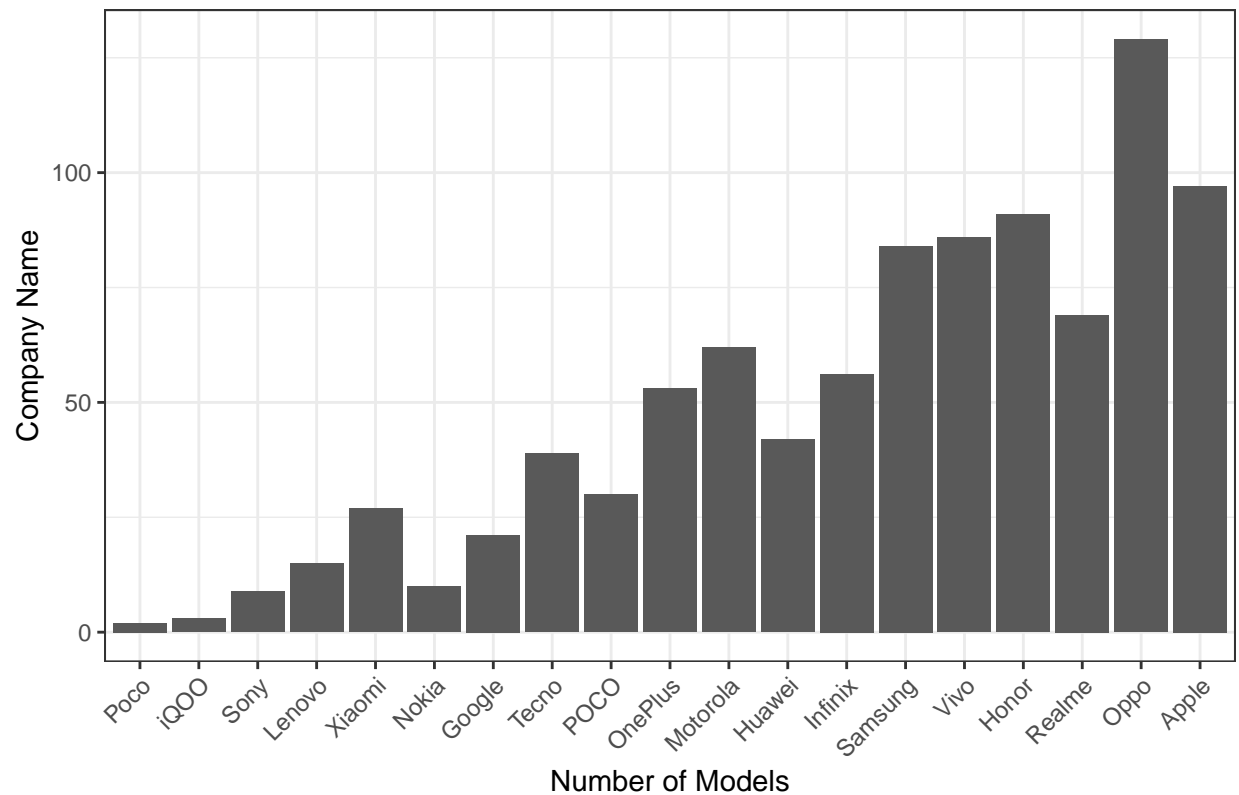

```
data_summary_Pakistan <- data %>%
  group_by(Company.Name) %>%
  summarize(Average_Price_PKR_USD = mean(Price_PKR_USD, na.rm = TRUE))

ggplot(data_summary_Pakistan, aes(x = Average_Price_PKR_USD, y = reorder(Company.Name, Average_Price_PKl
  geom_bar(stat = "identity") +
  labs(
    x = "Average Price (PKR)",
    y = "Company Name",
    title = "Average Smartphone Prices in Pakistan"
  ) +
  theme_bw()
```

Average Smartphone Prices in Pakistan
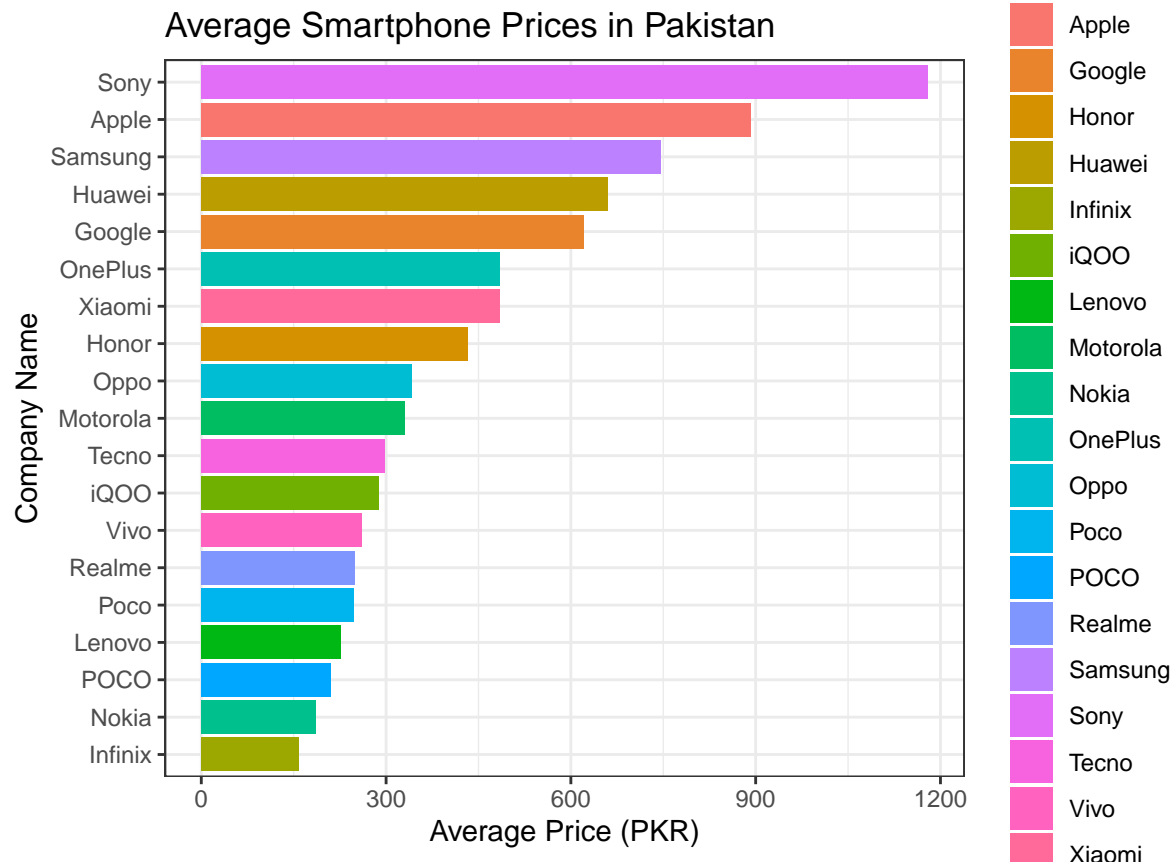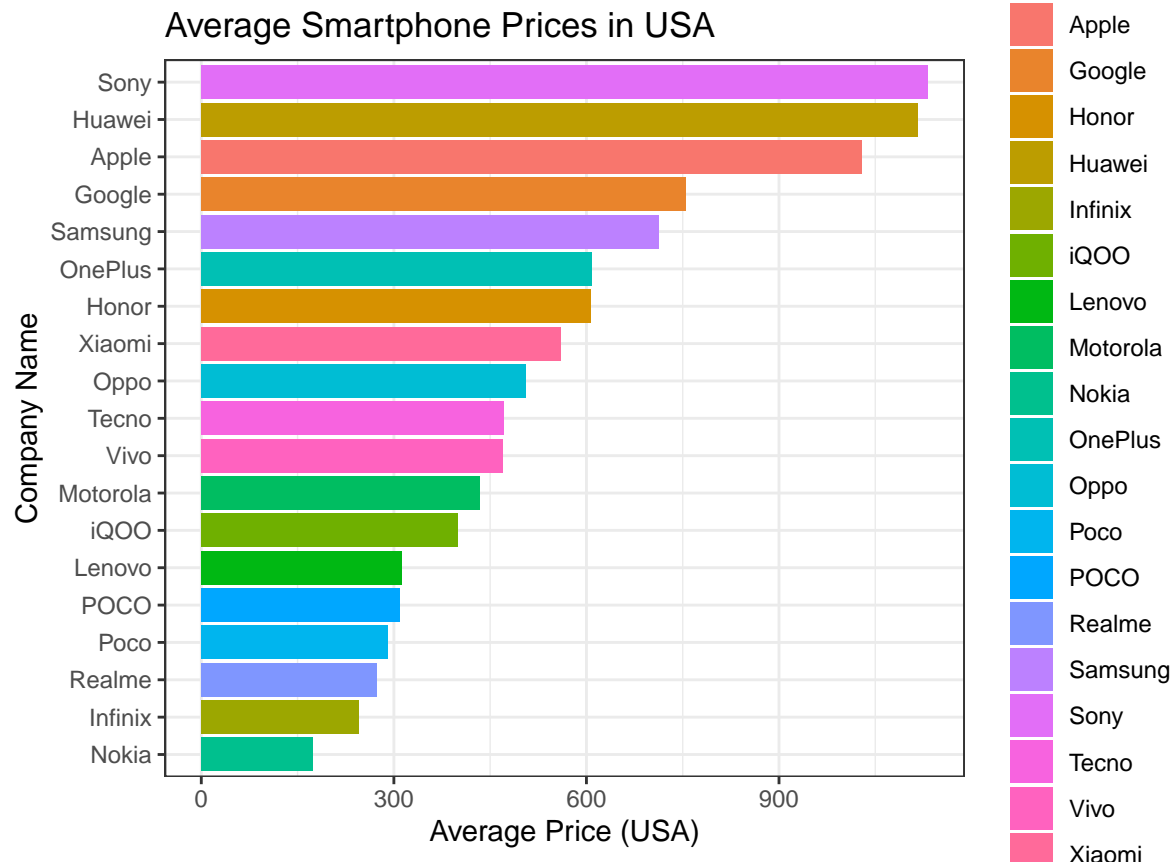


```
data_summary_India <- data %>%
  group_by(Company.Name) %>%
  summarize(Average_Price_INR_USD = mean(Price_INR_USD, na.rm = TRUE))

ggplot(data_summary_India, aes(x = Average_Price_INR_USD, y = reorder(Company.Name, Average_Price_INR_US
  geom_bar(stat = "identity") +
  labs(
    x = "Average Price (INR)",
    y = "Company Name",
    title = "Average Smartphone Prices in India"
  ) +
  theme_bw()
```

Average Smartphone Prices in India
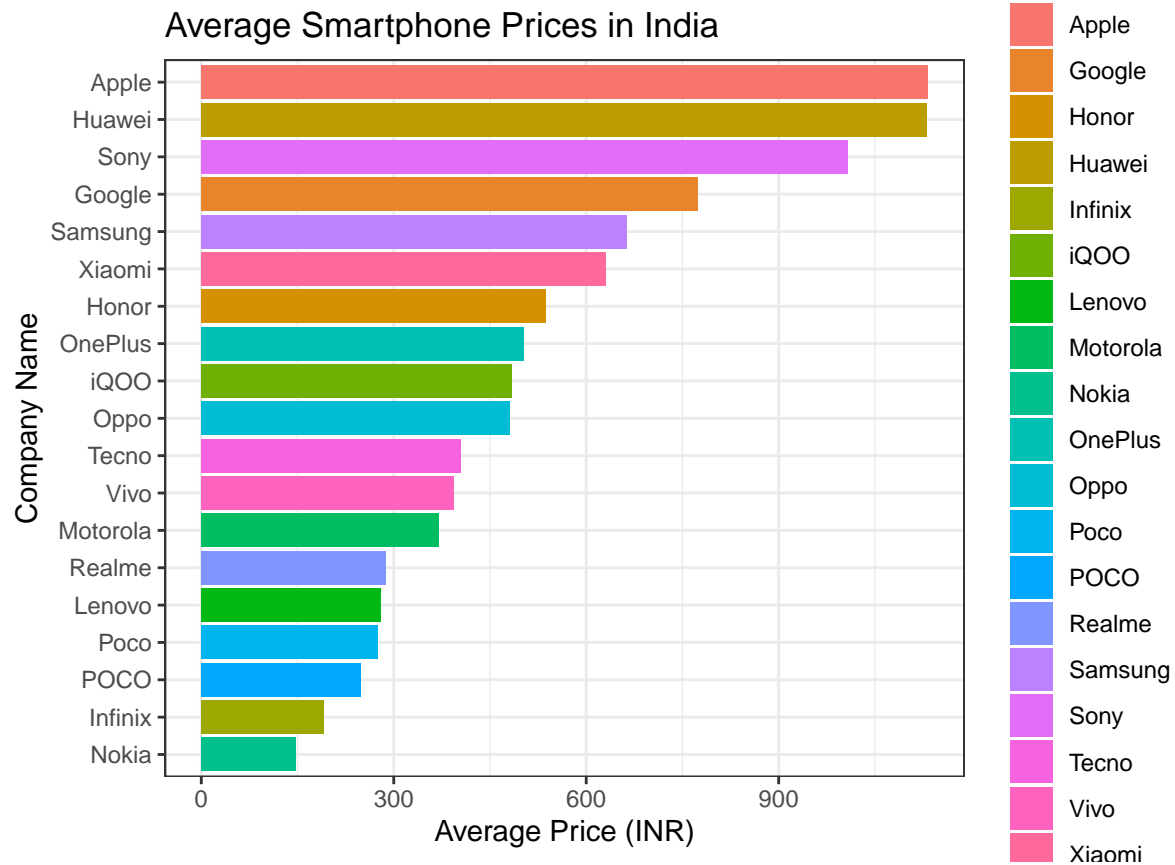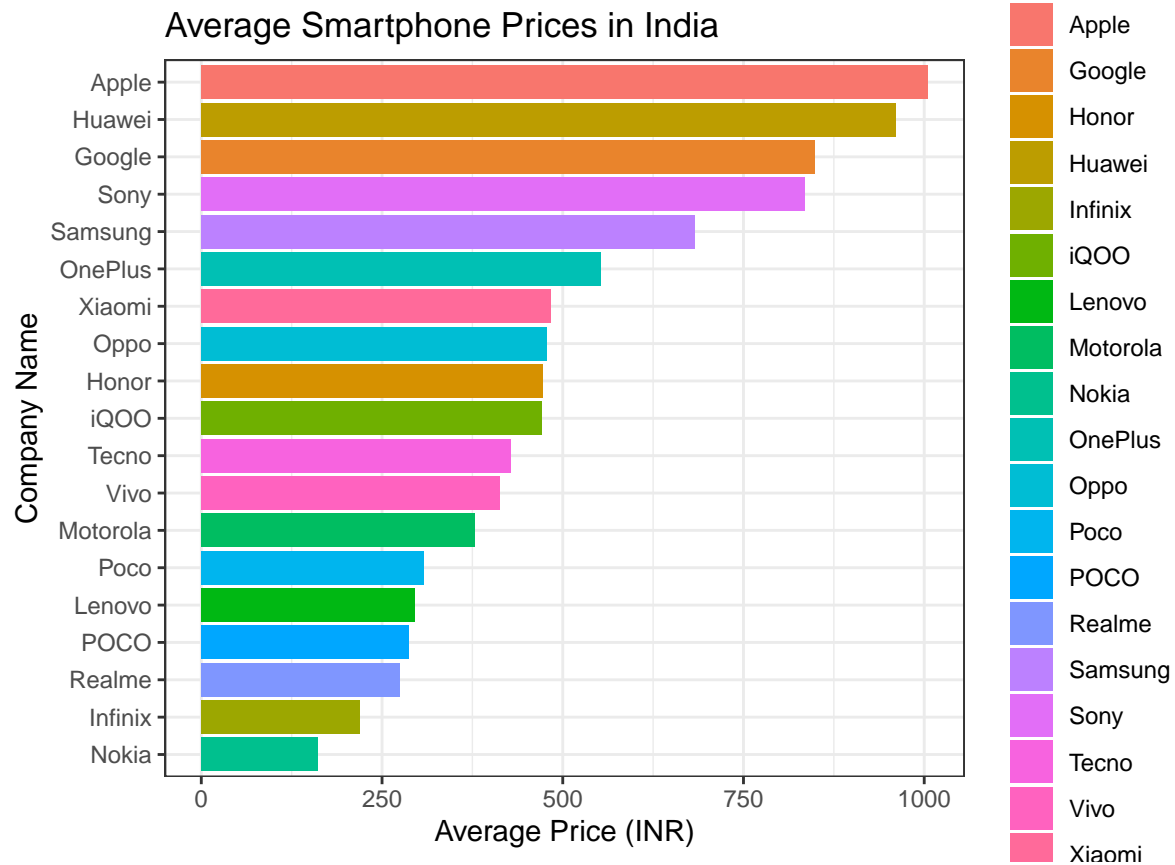


```r
data_summary_USA <- data %>%
  group_by(Company.Name) %>%
  summarize(Average_Price_USD = mean( Launched.Price.USA.USD , na.rm = TRUE))

ggplot(data_summary_USA, aes(x = Average_Price_USD, y = reorder(Company.Name, Average_Price_USD), fill
  geom_bar(stat = "identity") +
  labs(
    x = "Average Price (USA)",
    y = "Company Name",
    title = "Average Smartphone Prices in USA"
  ) +
  theme_bw()
```

Average Smartphone Prices in USA



```
data_summary_China <- data %>%
  group_by(Company.Name) %>%
  summarize(Average_Price_CNY_USD = mean(Price_CNY_USD, na.rm = TRUE))


ggplot(data_summary_China, aes(x = Average_Price_CNY_USD, y = reorder(Company.Name, Average_Price_CNY_US
  geom_bar(stat = "identity") +
  labs(
    x = "Average Price (INR)",
    y = "Company Name",
    title = "Average Smartphone Prices in India"
  ) +
  theme_bw()
```

Average Smartphone Prices in India



```
data_summary_Dubai <- data %>%
  group_by(Company.Name) %>%
  summarize(Average_Price_AED_USD = mean(Price_AED_USD, na.rm = TRUE))

ggplot(data_summary_Dubai, aes(x = Average_Price_AED_USD, y = reorder(Company.Name, Average_Price_AED_US
  geom_bar(stat = "identity") +
  labs(
    x = "Average Price (AED)",
    y = "Company Name",
    title = "Average Smartphone Prices in dubai"
  ) +
  theme_bw()
```

Average Smartphone Prices in dubai
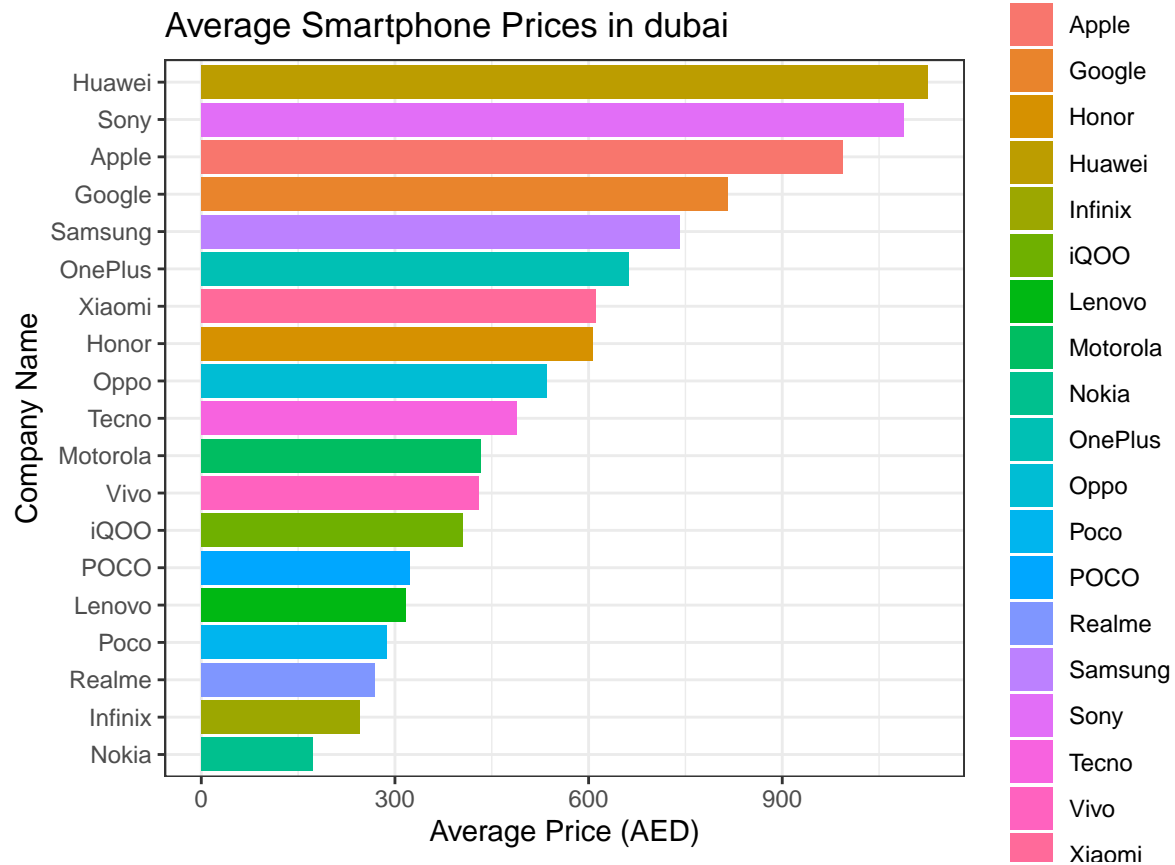
```r
average_prices_region <- data.frame(
  Region = c("Pakistan", "India", "China", "USA", "Dubai"),
  Average_Price = c(
    mean(data$Price_PKR_USD, na.rm = TRUE),
    mean(data$Price_INR_USD, na.rm = TRUE),
    mean(data$Price_CNY_USD, na.rm = TRUE),
    mean(data$Launched.Price.USA.USD, na.rm = TRUE),
    mean(data$Price_AED_USD, na.rm = TRUE)
  )
)
```

```r
ggplot(average_prices_region, aes(x = reorder(Region, Average_Price), y = Average_Price, fill = Region))
  geom_bar(stat = "identity") +
  labs(
    x = "Region",
    y = "Average Price (USD)",
    title = "Average Smartphone Prices Per Region"
  ) +
  theme_bw()
```

Average Smartphone Prices Per Region
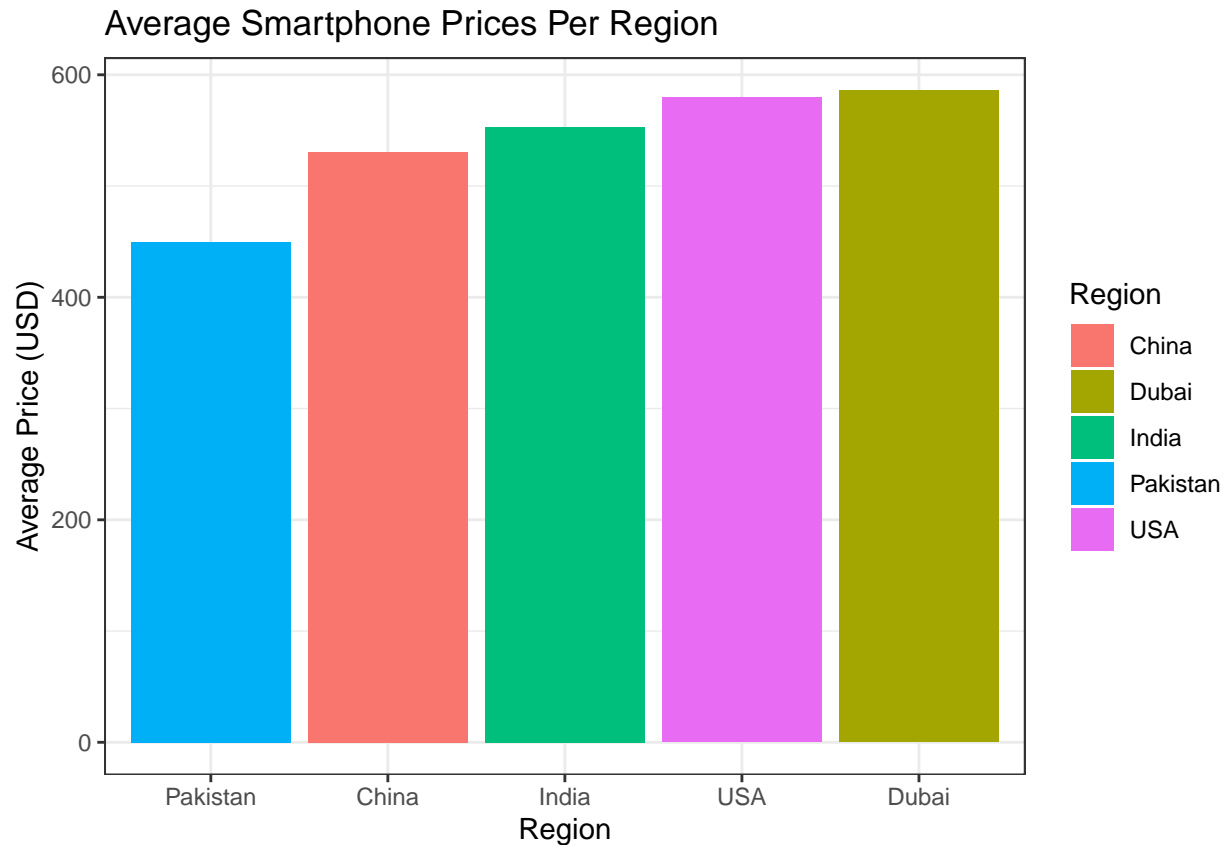

```r
market_share <- data %>%
  group_by(Company.Name) %>%
  summarize(Total_Models = n()) %>%
  mutate(Percentage = Total_Models / sum(Total_Models) * 100)

ggplot(market_share, aes(x = "", y = Percentage, fill = Company.Name)) +
  geom_bar(stat = "identity", width = 1) +
  coord_polar("y") +
  labs(
    title = "Market Share of Smartphone Brands",
    fill = "Brand"
  ) +
  theme_void()
```

Market Share of Smartphone Brands

Brand
- Apple
- Google
- Honor
- Huawei
- Infinix
- iQOO
- Lenovo
- Motorola
- Nokia
- OnePlus
- Oppo
- Poco
- POCO
- Realme
- Samsung
- Sony
- Tecno
- Vivo