Partly

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# Market Factors: OE Oil, Battery, Tyres  
# Market worth (10% to account for incomplete control)  
X <- 20000000000   
  
# SKUs  
Y <- 3000  
  
# Brands in Market (for option 3)  
Z <- 30   
  
# G-Codes  
Q <- 563  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i],image\_number[i]))  
}

## Option 1: 0.48% (Total: 14 SKUs)  
## Option 2: 0.93% (Total: 28 SKUs)  
## Option 3: 0.01% (Total: 0 SKUs)  
## Option 4: 4.54% (Total: 136 SKUs)  
## Option 5: 3.30% (Total: 99 SKUs)  
## Option 6: 90.74% (Total: 2722 SKUs)

# Market Factors: AM Oil, Battery, Tyres  
# Market worth (10% to account for incomplete control)  
X <- 15000000000   
  
# SKUs  
Y <- 97000  
  
# Brands in Market (for option 3)  
Z <- 1000   
  
# G-Codes  
Q <- 563  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i],image\_number[i]))  
}

## Option 1: 1.78% (Total: 1726 SKUs)  
## Option 2: 1.92% (Total: 1866 SKUs)  
## Option 3: 0.01% (Total: 10 SKUs)  
## Option 4: 4.43% (Total: 4299 SKUs)  
## Option 5: 3.22% (Total: 3126 SKUs)  
## Option 6: 88.63% (Total: 85973 SKUs)

# Market Factors: OE Service Parts  
# Market worth (10% to account for incomplete control)  
X <- 10000000000   
  
# SKUs  
Y <- 25000   
  
# Brands in Market (for option 3)  
Z <- 30   
  
# G-Codes  
Q <- 9375  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 0.31% (Total: 77 SKUs)  
## Option 2: 0.66% (Total: 164 SKUs)  
## Option 3: 0.01% (Total: 3 SKUs)  
## Option 4: 4.56% (Total: 1139 SKUs)  
## Option 5: 3.31% (Total: 829 SKUs)  
## Option 6: 91.15% (Total: 22788 SKUs)

# Market Factors: AM Service Parts  
# Market worth (10% to account for incomplete control)  
X <- 10000000000   
  
# SKUs  
Y <- 975000   
  
# Brands in Market (for option 3)  
Z <- 7500   
  
# G-Codes  
Q <- 9375  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 1.66% (Total: 16140 SKUs)  
## Option 2: 1.87% (Total: 18248 SKUs)  
## Option 3: 0.01% (Total: 105 SKUs)  
## Option 4: 4.44% (Total: 43287 SKUs)  
## Option 5: 3.23% (Total: 31481 SKUs)  
## Option 6: 88.79% (Total: 865738 SKUs)

# Market Factors: OE Wear Parts  
# Market worth (10% to account for incomplete control)  
X <- 10000000000  
  
# SKUs  
Y <- 500000   
  
# Brands in Market (for option 3)  
Z <- 30   
  
# G-Codes  
Q <- 262500  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 0.24% (Total: 1198 SKUs)  
## Option 2: 0.53% (Total: 2642 SKUs)  
## Option 3: 0.01% (Total: 55 SKUs)  
## Option 4: 4.57% (Total: 22833 SKUs)  
## Option 5: 3.32% (Total: 16606 SKUs)  
## Option 6: 91.33% (Total: 456666 SKUs)

# Market Factors: AM Wear Parts  
# Market worth (10% to account for incomplete control)  
X <- 16500000000   
  
# SKUs  
Y <- 9500000   
  
# Brands in Market (for option 3)  
Z <- 7500   
  
# G-Codes  
Q <- 262500  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 1.26% (Total: 120163 SKUs)  
## Option 2: 1.67% (Total: 158508 SKUs)  
## Option 3: 0.01% (Total: 1029 SKUs)  
## Option 4: 4.47% (Total: 424365 SKUs)  
## Option 5: 3.25% (Total: 308629 SKUs)  
## Option 6: 89.34% (Total: 8487306 SKUs)

# Market Factors: OE Crash Parts  
# Market worth (10% to account for incomplete control)  
X <- 25000000000   
  
# SKUs  
Y <- 8500000   
  
# Brands in Market (for option 3)  
Z <- 30   
  
# G-Codes  
Q <- 7671250  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2/ sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 0.24% (Total: 20358 SKUs)  
## Option 2: 0.53% (Total: 44912 SKUs)  
## Option 3: 0.01% (Total: 941 SKUs)  
## Option 4: 4.57% (Total: 388166 SKUs)  
## Option 5: 3.32% (Total: 282303 SKUs)  
## Option 6: 91.33% (Total: 7763320 SKUs)

# Market Factors: AM Crash Parts  
# Market worth (10% to account for incomplete control)  
X <- 2500000000  
  
# SKUs  
Y <- 1500000   
  
# Brands in Market (for option 3)  
Z <- 200   
  
# G-Codes  
Q <- 7671250  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 0.25% (Total: 3734 SKUs)  
## Option 2: 0.58% (Total: 8713 SKUs)  
## Option 3: 0.01% (Total: 166 SKUs)  
## Option 4: 4.56% (Total: 68457 SKUs)  
## Option 5: 3.32% (Total: 49787 SKUs)  
## Option 6: 91.28% (Total: 1369143 SKUs)

# Market Factors: OE Repair Parts  
# Market worth (10% to account for incomplete control)  
X <- 35000000000  
  
# SKUs  
Y <- 40000000  
  
# Brands in Market (for option 3)  
Z <- 30   
  
# G-Codes  
Q <- 24000000  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 0.24% (Total: 95804 SKUs)  
## Option 2: 0.53% (Total: 211350 SKUs)  
## Option 3: 0.01% (Total: 4428 SKUs)  
## Option 4: 4.57% (Total: 1826664 SKUs)  
## Option 5: 3.32% (Total: 1328483 SKUs)  
## Option 6: 91.33% (Total: 36533272 SKUs)

# Market Factors: AM Repair Parts  
# Market worth (10% to account for incomplete control)  
X <- 5000000000   
  
# SKUs  
Y <- 10000000   
  
# Brands in Market (for option 3)  
Z <- 2000  
  
# G-Codes  
Q <- 24000000  
  
# Average age of Car (lifetime ROI)  
years <- 12   
  
# Cost of each photo type and uplifts per photo type  
costs <- c(25, 10, 150, 0.2, 0.5, 0.01)  
uplift\_factors <- c(5, 4.5, 2, 1.1, 2, 1.1)  
  
# base uplift in SKU value over 12 year lifetime  
uplift\_per\_product <- uplift\_factors \* (X / Y) \* years  
  
# Option 3 needs to be adjusted for the number of brands in the market  
uplift\_per\_product[3] <- 2 \* (X / (Y \* Z)) \* years   
  
  
# For option 1 and 2 the modified photos cost less and have a lower uplift, they must also be within their own G-codes.  
costs\_2 <- costs  
uplift\_factors\_2 <- uplift\_factors  
  
for (i in c(1, 2)) {  
 # modified photo uplift and cost  
 cost\_2 <- 1  
 uplift\_factor\_2 <- 3.5  
   
 # implement a cieling of the maximum number of SKUs per G-code  
 num\_prods <- ceiling(Y / Q)  
   
 # calculate the modified costs and uplifts effect on options 1 and 2  
 costs\_2[i] <- costs[i] + (num\_prods - 1) \* cost\_2  
 uplift\_factors\_2[i] <- uplift\_factors[i] + (num\_prods - 1) \* (uplift\_factor\_2 - 1)  
}  
  
# Calculate the uplift in value for modified options 1 and 2 over 12 years  
uplift\_per\_product\_2 <- uplift\_factors\_2 \* (X / Y) \* years  
  
# Calculate lifetime ROI   
roi\_2 <- uplift\_per\_product\_2 / costs\_2  
  
# turn ROI into percentages  
roi\_percent\_2 <- roi\_2 / sum(roi\_2) \* 100  
  
# Number of each image  
image\_number <- (roi\_percent\_2 /100) \* Y  
  
# Print results   
for (i in 1:length(costs)) {  
 cat(sprintf("Option %d: %.2f%% (Total: %.0f SKUs)\n", i, roi\_percent\_2[i], image\_number[i]))  
}

## Option 1: 0.17% (Total: 16644 SKUs)  
## Option 2: 0.37% (Total: 37449 SKUs)  
## Option 3: 0.01% (Total: 1110 SKUs)  
## Option 4: 4.58% (Total: 457710 SKUs)  
## Option 5: 3.33% (Total: 332880 SKUs)  
## Option 6: 91.54% (Total: 9154207 SKUs)

Acknoledgement:ChatGPT has been used to check code.