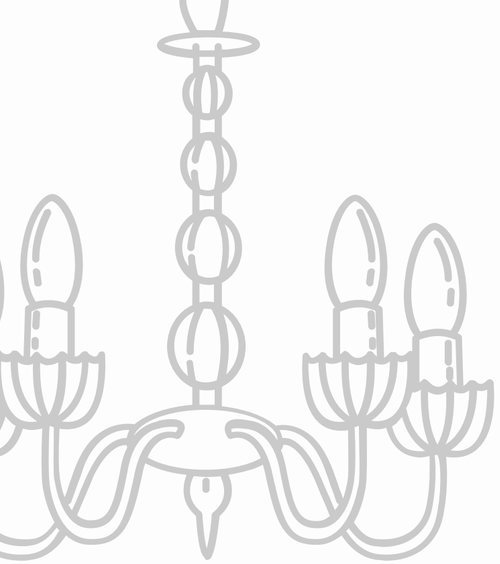
IKEA

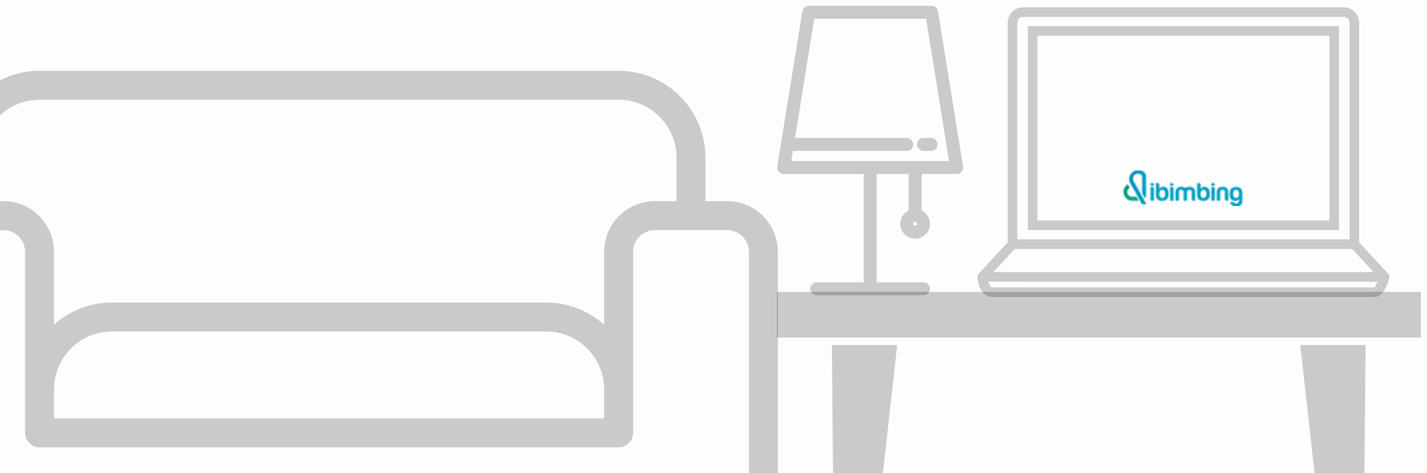
PRODUCT ANALYSIS

&

PRICE PREDICTION

LAKSMI AMALIA WULANDIARI





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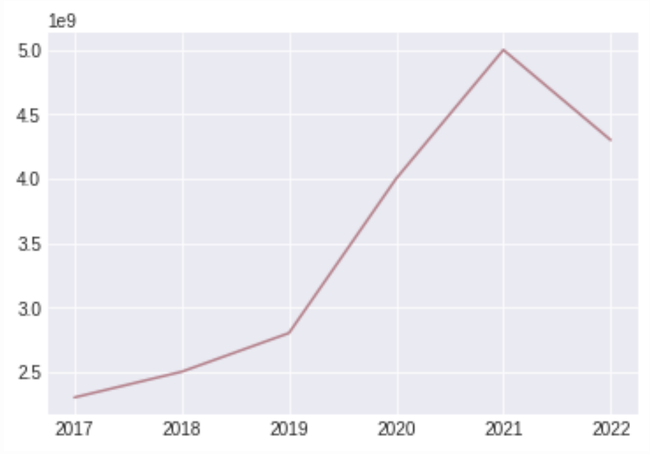
BACKGROUND

IKEA is a furniture design company that specializes in the sale of flat-packed furniture, kitchen appliances, and other home accessories. **IKEA** is named after the initials of founder **I**ngvar **K**amprad, **E**lmtaryd, the farm on which he grew up, and **A**gunnaryd, the nearby village.

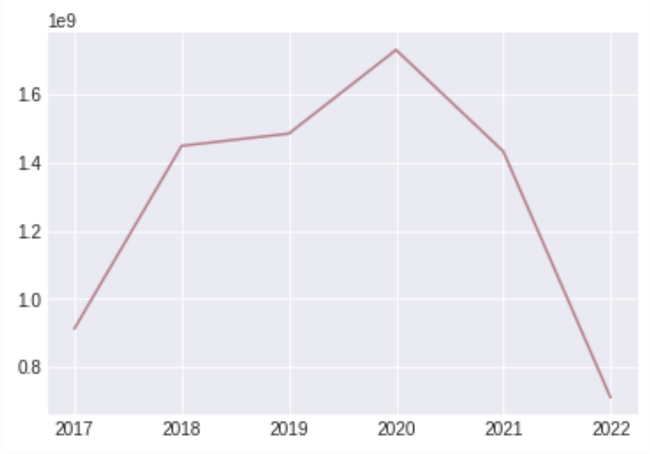
IKEA has vision to create a better everyday life for the many people from their products. This vision goes beyond home furnishing, and to have a positive impact on the world – from the communities to help our customers live a more sustainable life at home.

IKEA constantly challenging themselves and others to make more from less without compromising on quality. Every day, everywhere, **IKEA** do their best to discover and eliminate unnecessary costs, because low prices are impossible without low costs.

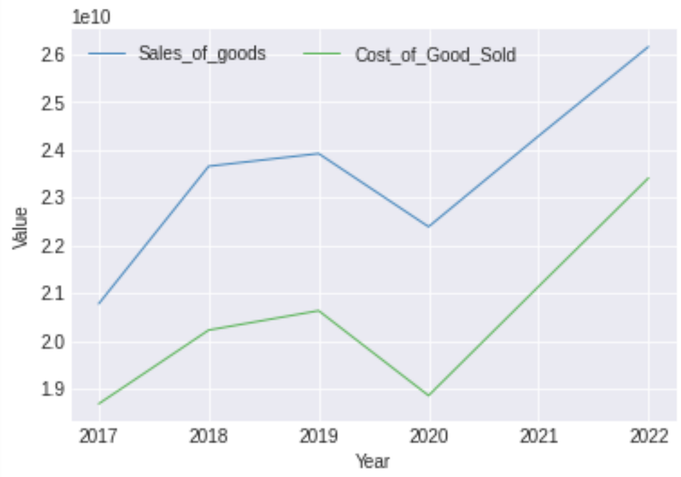
PROBLEM KNOWLEDGE

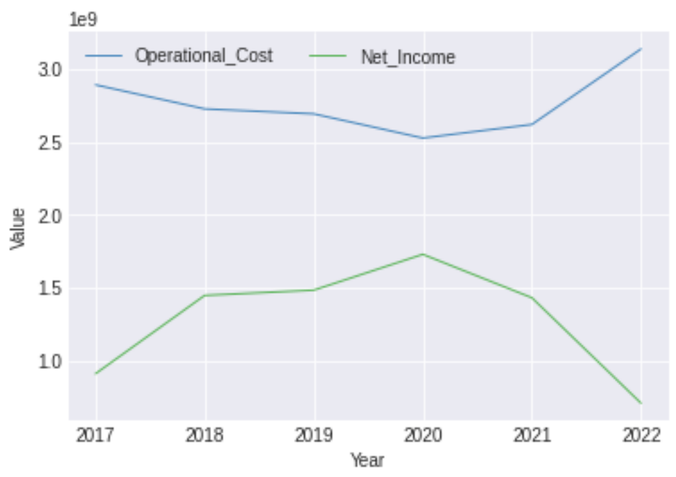


Website Visit



Net Income





Based on **IKEA Financial Report** from 2017-2022, there are some significant rise on **Website Visit** in 2020 and peaked in 2021. But, in 2022, there is a decline on the number of customer who visit the website.

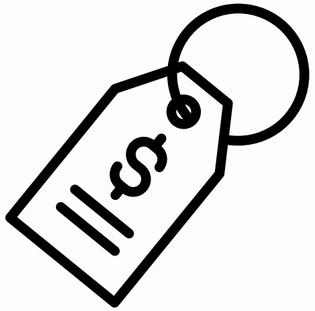
Eventhough in 2021, is the peak number of customer website visit, the net income is much lower than in 2020, that mean in 2021, customer prefer to shop offline than online, because **Sales of Goods** in 2021 way much more than in 2020.

The trend for **Sales of Goods** are almost the same with **Cost of Good Sold**, but over the year the range between it became smaller, that means there are an increase in **Cost of Good Sold** over the year.

Operational Cost is peaked in 2022, because **IKEA** grew in its number of co-workers during FY22, and particularly effected by the consequences of the war in Ukraine that led to one-time costs in relation to writing down assets and provisioning of cost.

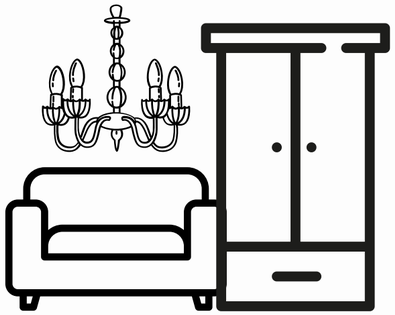
DATA EXPLANATION

For this analysis we divide the product information into 3 categories:



Price

- price
- old_price



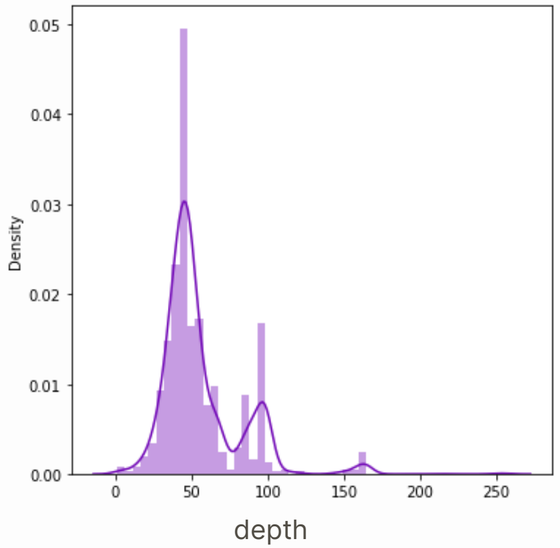
Product Description

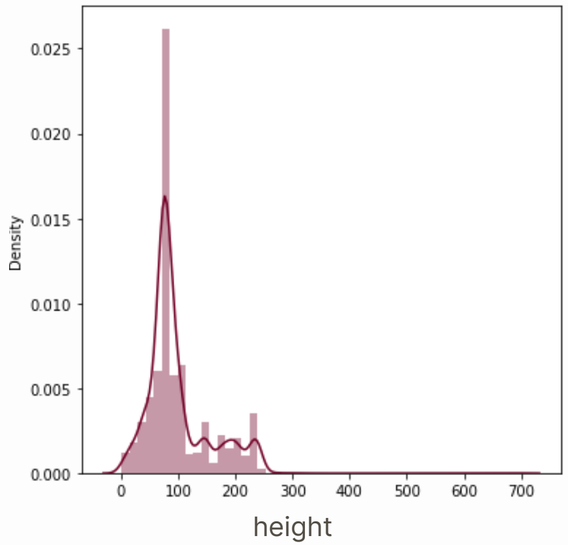
- name
- category
- short_description
- designer
- depth
- height
- width

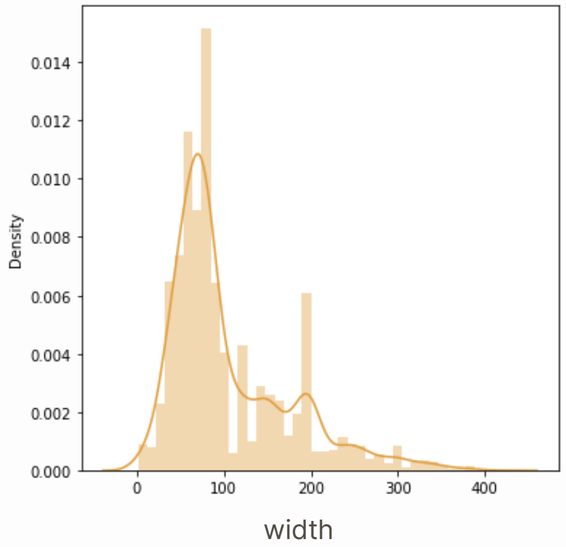
Product Status

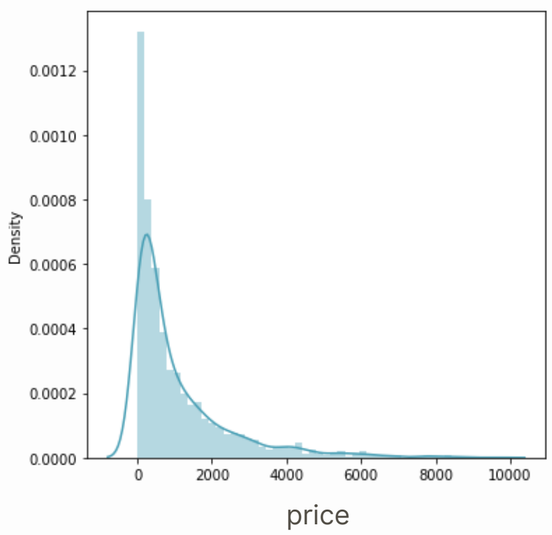
- sellable_online
- link
- other_colors

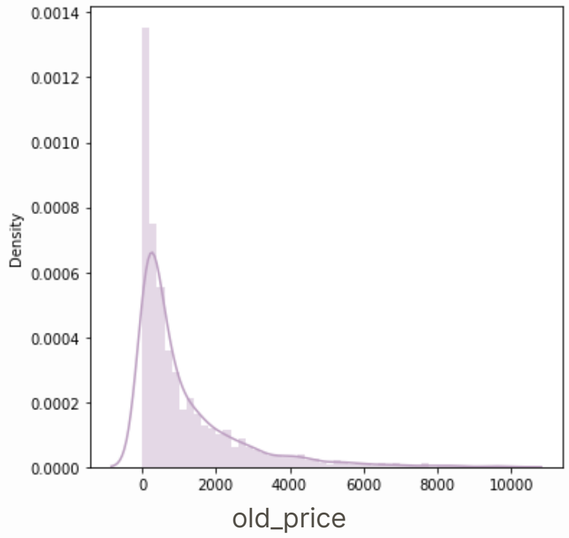
DISTRIBUTION PLOT



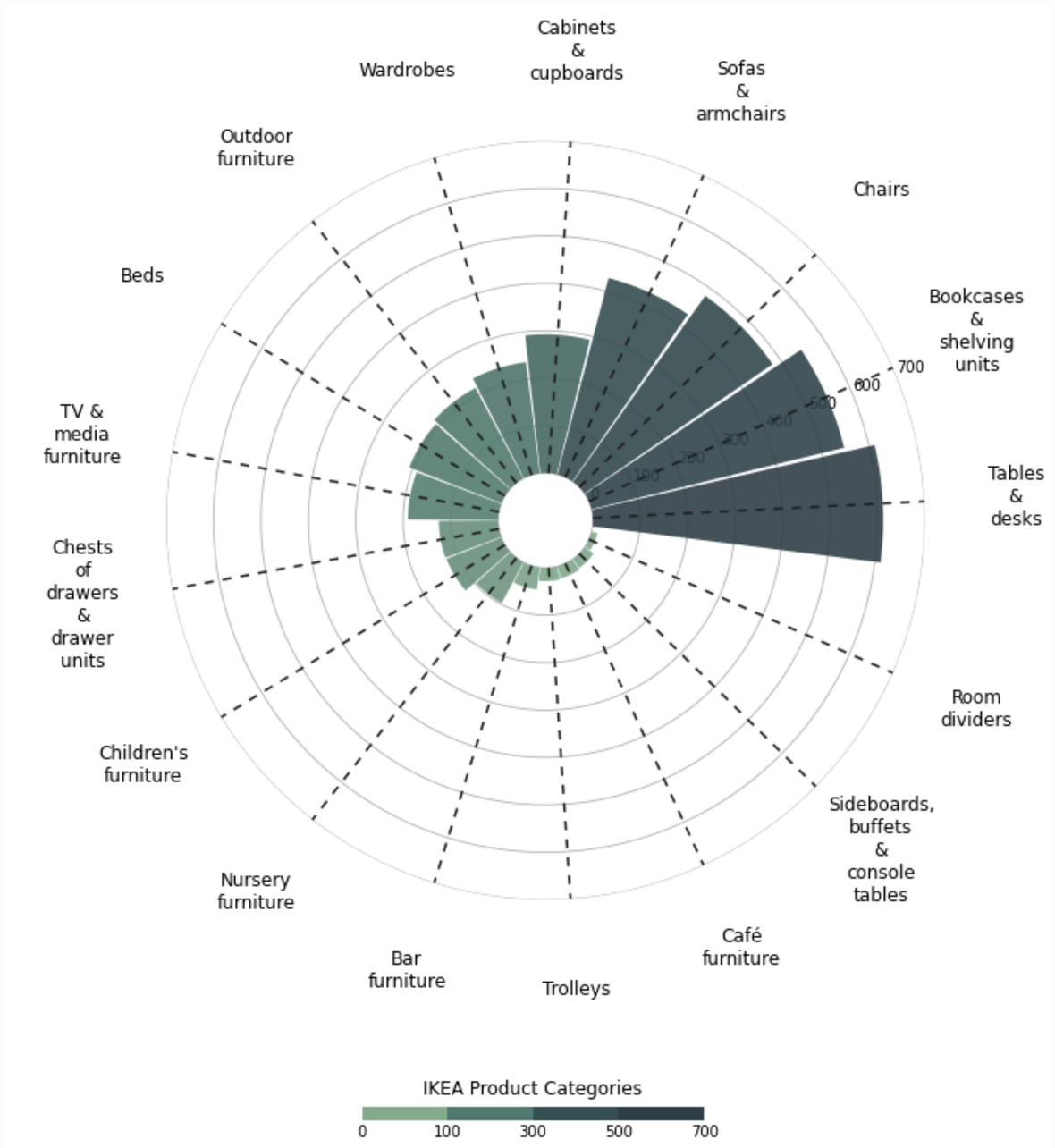








From 5 charts, each column [**depth, height, width, price** and **old_price**], are skewed to the right, which means the **mean** is greater than the **median**, and dominated with product with lower price, and smaller size.



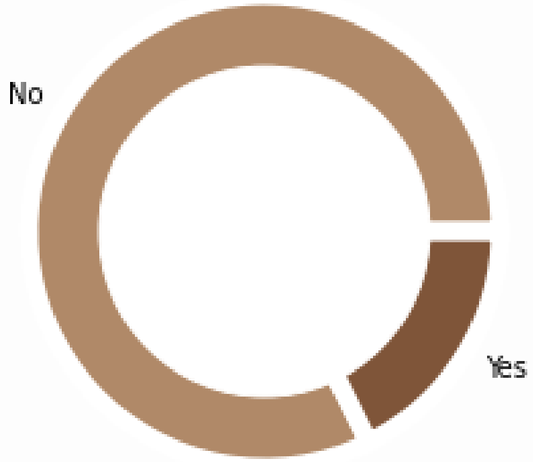
WHAT IS THE MOST PRODUCED PRODUCT CATEGORIES?

1 Table and Desks

2 Bookcases & Shelving Units

3 Chairs

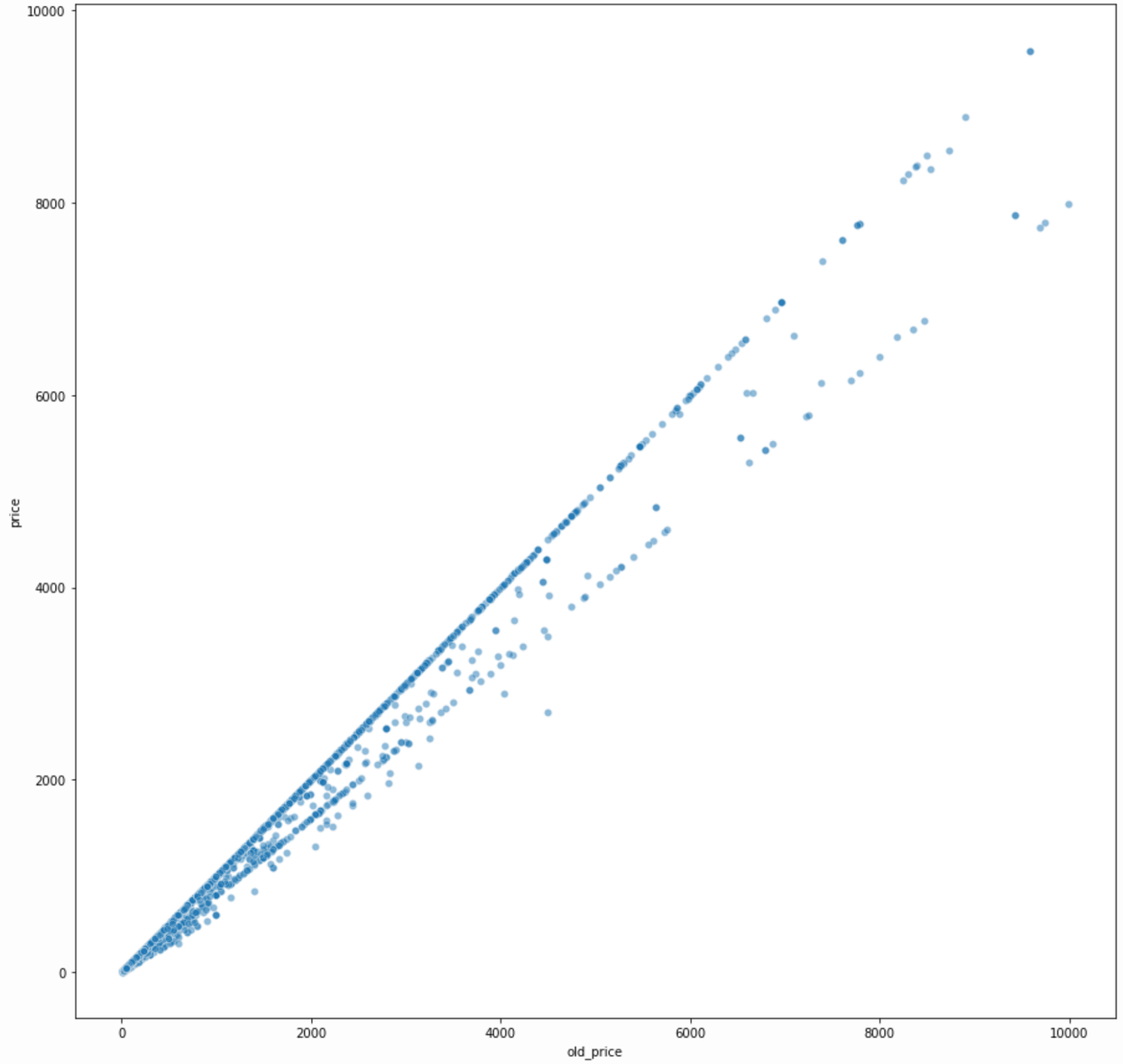
PRODUCT COMPARISON ON PRICE, COLORS, AND ONLINE AVAILABILITY



01 Composition between product that has other colors and not is almost the same

02 Most of the product has no price differences, or has no old_price

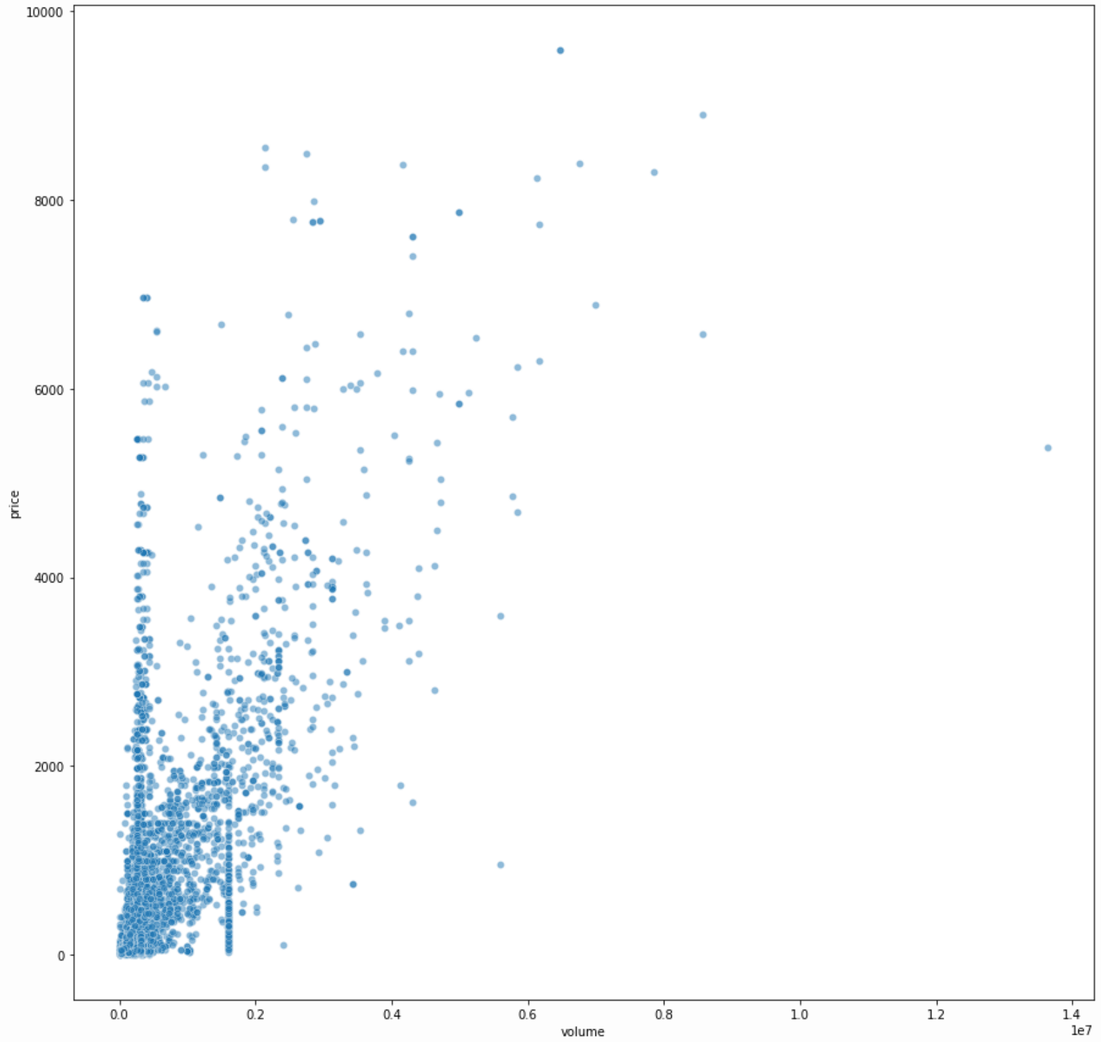
03 Most of the product are available online



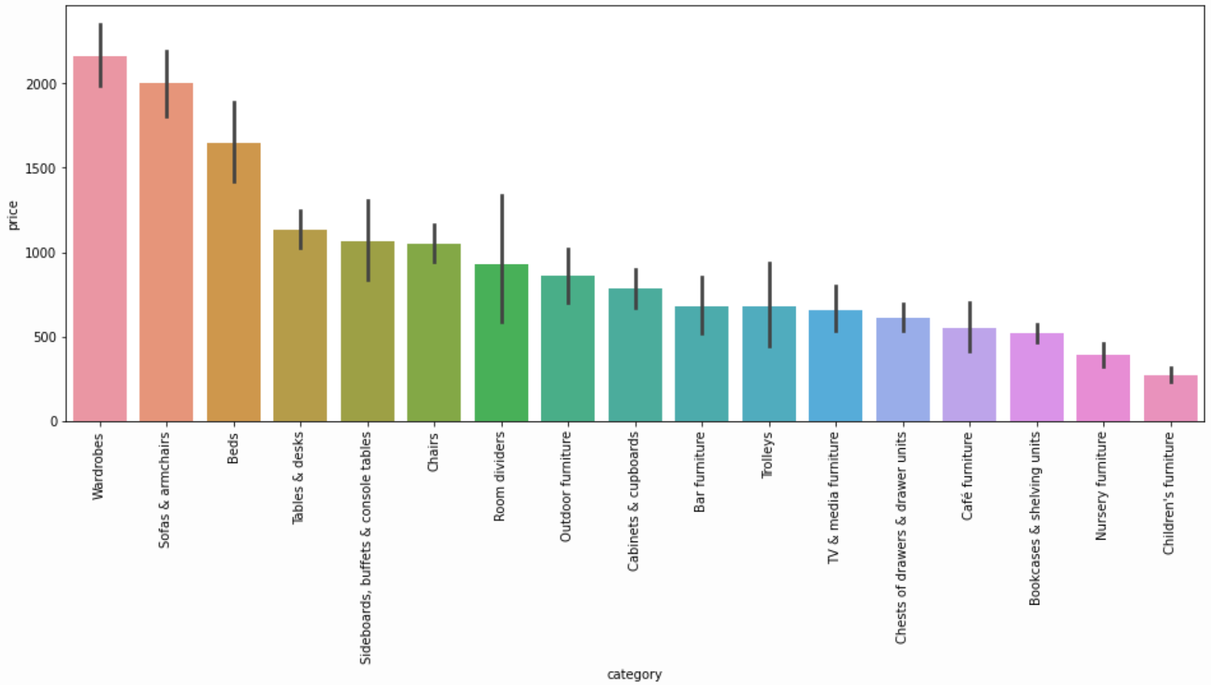
THE RELATIONSHIP BETWEEN PRICE AND OLD PRICE?

There are linear connection between **price** and **old price** of the product. The higher the **price** then the value of **old price** also increase, or has the same value, mean there are no **old_price** for the product.

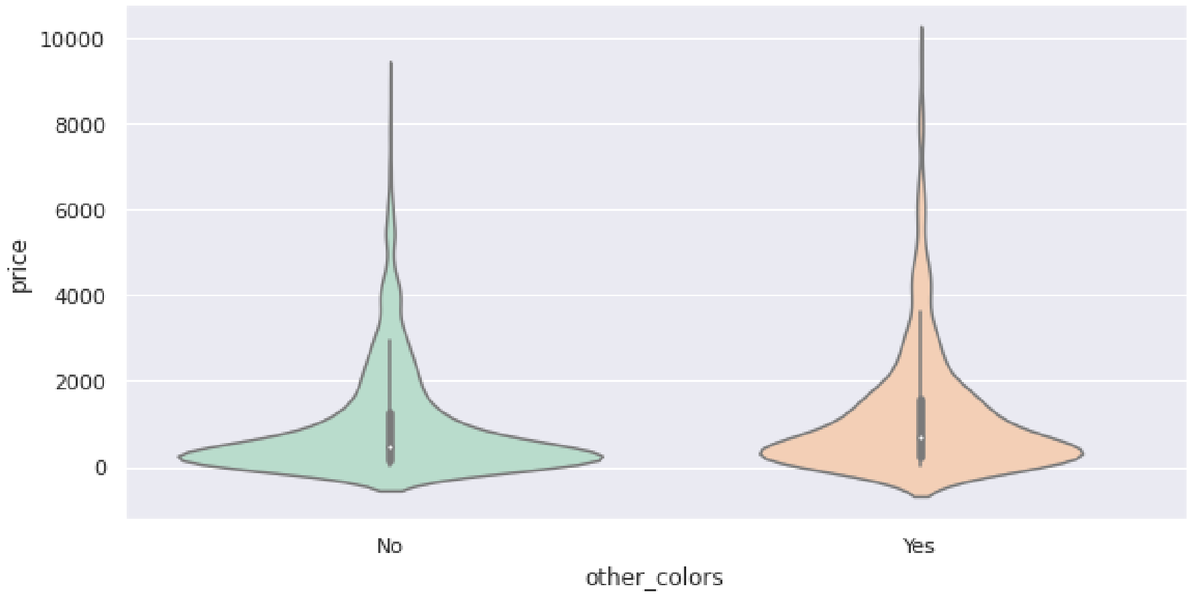
DID PRODUCT VOLUME/DIMENSION AFFECT THE PRICE?



Based on the chart, the size or volume of the products affect the price. The bigger the product, the higher the price will be, like wardrobe, sofa, beds, table and desk.

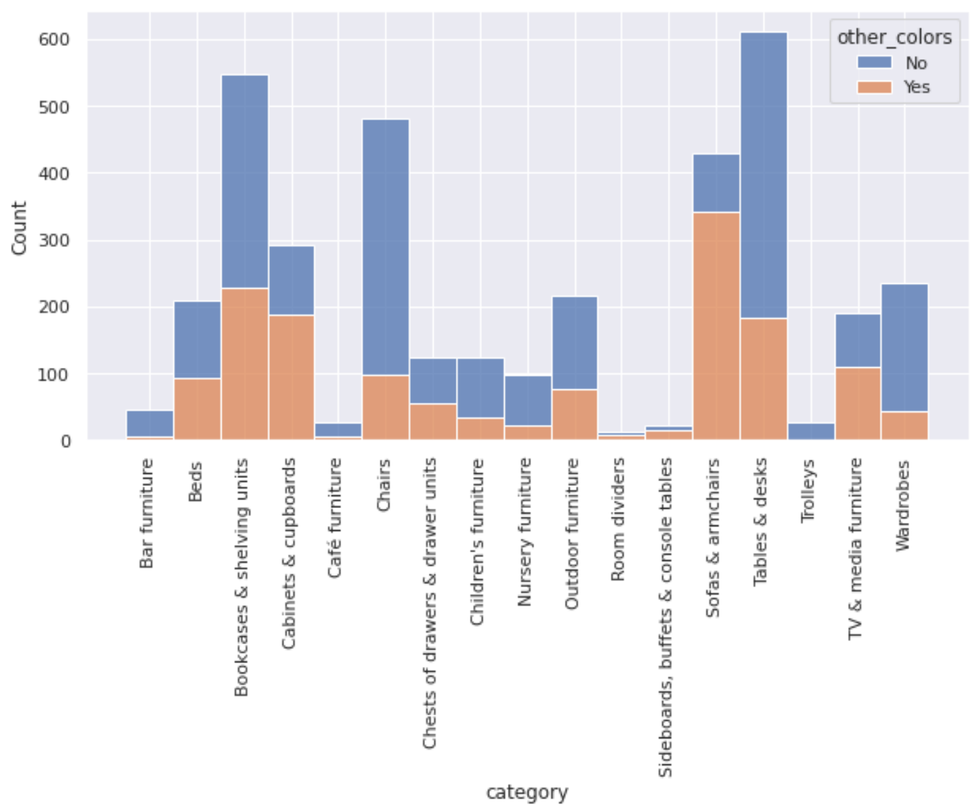


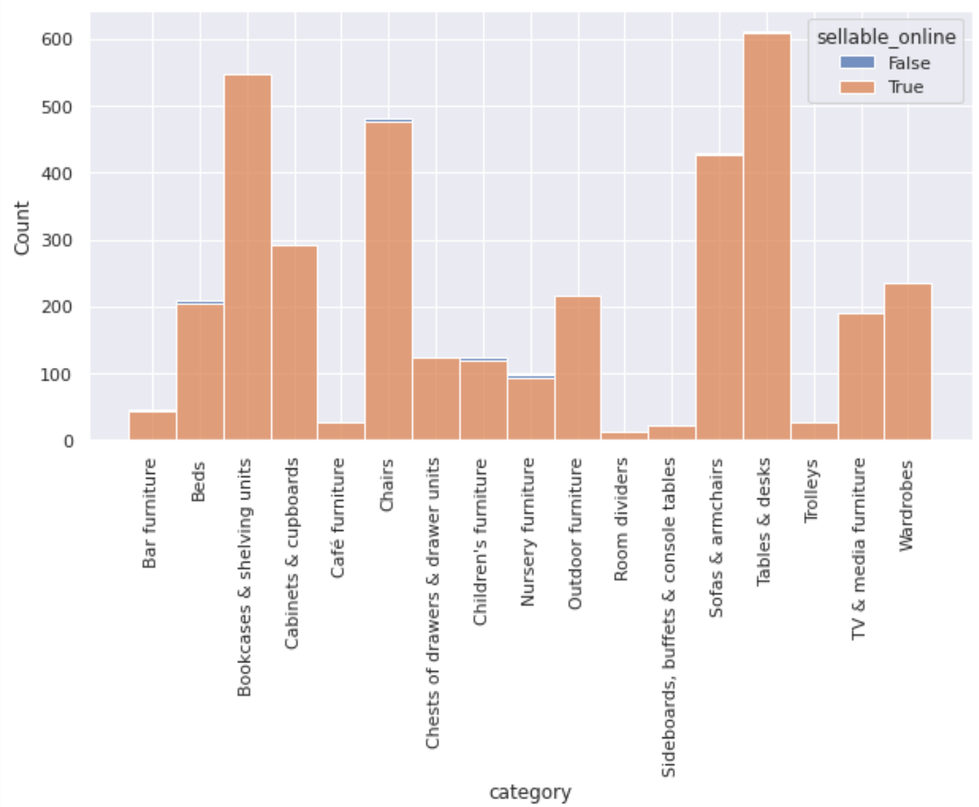
COLORS OR ONLINE AVAILABILITY? WHICH ONE MORE AFFECTED PRODUCT PRICE?



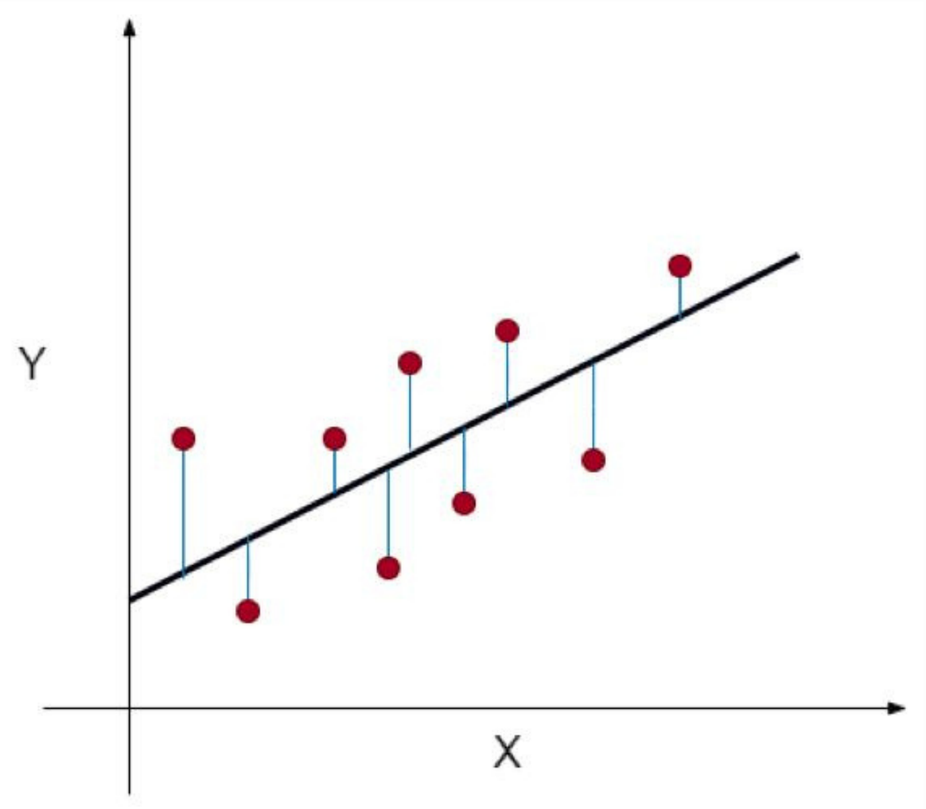
other colors availability kind of affect the product price. Product with more than one color option, has higher product price probability. Product that available online, also has higher product price probability than product that is not available online.

COLORS AND ONLINE AVAILABILITY PROPORTION ON PRODUCT?





Almost all product in IKEA are available online, but the other colors availability of the product is not that much. Probably because IKEA more focused on functional home products at the lowest prices, so they tend to create as many as product types, and not the varieties of colors from one product.



PREDICTING PRODUCT PRICE

LINEAR REGRESSION MODEL

Linear Regression is a supervised machine learning model that attempts to model a linear relationship between dependent variables (Y) and independent variables (X). Every evaluated observation with a model, the target (Y)'s actual value is compared to the target (Y)'s predicted value, and the major differences in these values are called residuals. The Linear Regression model aims to minimize the sum of all squared residuals

Mean Absolute Error [MAE] : mean of the absolute values of the individual prediction errors on over all instances in the test set
Root Mean Square Error [RMSE] : The standard deviation of the residuals (prediction errors)
Mean Absolute Percentage Error [MAPE] : is a measure of prediction accuracy of a forecasting method in statistics

SOURCE : https://linuxhint.com/house-price-prediction-linear-regression/

MODEL EVALUATION

RIDGE

TRAINING		TESTING	
MAE	654.12	MAE	654.33
RMSE	998.69	RMSE	1019.98
MAPE	3.60	MAPE	4.25

VS

LASSO

TRAINING		TESTING	
MAE	654.46	MAE	654.93
RMSE	998.66	RMSE	1019.97
MAPE	3.60	MAPE	4.26

RIDGE and LASSO both almost has the same result for **MAE**, **RMSE** and **MAPE**.Testing error is bigger than the training but the **RMSE** still around average current product price :

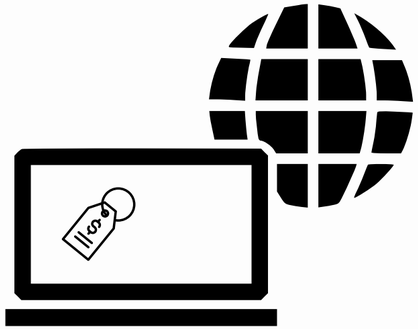
SR 941,76

LINEAR REGRESSION COEFFICIENT

Based on price prediction modeling product, features that affected positively to product price are **sellable_online** [product availability online] and **category** [product category]. While **other_colors** and **price_diff** [price different between current and old price] affected negatively to product price.

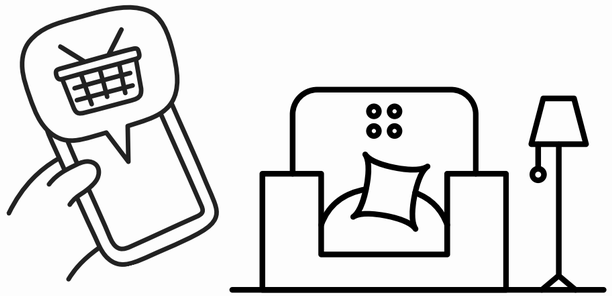
Feature	Method	
	Ridge	Lasso
Intercept	97.78	71.84
name	0.004	0.005
category	21.07	21.09
sellable_online	68.72	97.69
other_colors	-58.97	-60.03
designer	0.69	0.69
volume	0.001	0.001
price_diff	-463.48	-483.31
diff_amount	2.07	2.09

CONCLUSION



IKEA needs to increase their **online selling**, because product that available online has higher product price probability, and it will help increase their **Sales of Goods** with minimum **Operational Cost**.

IKEA needs to focused on creating product with minimalize color option, to help reduced production cost, and optimize product variaties based on customer needs.



IKEA needs to create product that exclusively available online, but with offline product display, so it can attract customer to come to offline store, and also visit the website, for online purchase.

Example : product with this color only available online, or get additional perks if customer buy it online

THANK YOU

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ibimbing