



SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN



HOUSE OF 28

Data Business & Analytics
1D Industry-sponsored Project

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Executive Summary

House of 28 is a multi-faceted company that retails products across 3 categories - fashion, beauty, and home.

House of 28 would like us to determine the different sales trends. They would also want to identify the respective price ranges and the discount ranges of items that are most common among customers. Lastly, they also want us to determine the common sizes for their items and generate a demand forecasting model.

The sales trends would allow House of 28 to have a better sense of the current market sentiment. Furthermore, the respective price and discount ranges of products are important for House of 28 to have a better understanding of their customer's pricing and discount preferences. With these insights, House of 28 would know how to better price and give discounts for their different products. Lastly, they would be able to adjust their inventory based on the forecasted demand from the sizing demand. This would ensure that they would have sufficient stock to meet the high demand and at the same time make sure not to overstock.

Currently, House of 28 is only able to gather insights on pricing, discounts and sizing based on the customer's feedback from their physical store. While the feedbacks from their online stores are only taken from the company's experiences regarding their navigation on their website.

Firstly, we did data cleaning by using Excel to remove price and quantity that are zero in values and compute discount percentages. Next, we use Excel to determine the different sizes from the barcode column and using SQL, we proceed to create a new table with the new columns to include size and size type datasets. Next, we applied Tableau analytics to visualise trends on revenue, price, discount, and quantity sold. Lastly, we used R, to apply different forecasting models to predict the quantity of apparel items will be sold monthly in 2022 based on various sizes.

For the sales analysis, we found out that between 2019 and 2021, 1-Apparel is the single most profitable category throughout the three years, with a total revenue of 1.4M. Furthermore, over 80% of total revenue comes from Singapore, United States and Hong Kong. However, we also discovered that sales for House of 28 started consistently declining from the start of 2021. From 100K of sales in Q1 2022 to 21K of sales in Q4 2022.

For the pricing analysis, we noticed that for 1-Apparel category, customers are very responsive to the price range from 138 to 414. While for the discount analysis, we noticed a positive correlation between the discount rate and revenue which indicates that the increase in the quantity sold due to discounts outweighs the decrease in the price of an item sold in the 10% to 40% discount range. Lastly, we also found the most common sizes for different size categories.

In conclusion, based on our insights generated, we can conclude that 1-Apparel and Lady shoes categories are the two main revenue streams for House of 28. By pricing their products and giving appropriate discounts, House of 28 would be able to further achieve higher revenue in 2022.

1. Company Introduction

House of 28 is a multi-faceted company that retails products across 3 categories - fashion, beauty and home. The company manages both online and offline retail stores. The company's main objective is to help elevate many established and/or emerging fashion brands onto a global platform, making them more accessible to consumers around Asia, and the world.

2. Problem Definition

House of 28 would like us to determine the different sales trends. They would also want to identify the respective price ranges and the discount ranges of items that caused the biggest increase in both online and offline sales. Lastly, they want us to determine the common sizes for the different products and generate a demand forecasting model to ensure that there will be sufficient stock available to meet the demand of the customers for a particular month.

3. Methodology

3.1. Data cleaning

We used Excel to remove the items with a negative value in the “quantity” column and zero in the “net sold price” column. We also created a calculated field “discount ratio” as discount amounts against the original price. Based on the “matrix barcode” column, we were able to determine the sizes of the items. The cleaned excel sheet with the new size column was imported into SQL which was used to assign each item with the size type it belongs to.

3.2. Data Analytics

Using Tableau as a data visualization tool, we conducted our analysis with 4 main focuses: sales, price, discount, and stock availability. For sales analysis, we analysed the sales trends across different time periods, categories, and regions. For the price and discount analysis, we determined the popular price ranges and analysed the impact of discounts on sales. Finally, the

stock availability analysis was conducted to identify the current demand trends of the item sizes for the “1-Apparel” category.

3.3. Forecasting

After the data analytics, we also used R to carry out forecasting to predict monthly revenue and stock demand in 2022 based on the 2019-2021 data. We applied Exponential Smoothing, Double Exponential Smoothing, and Holt-Winters prediction models for each dataset, and the one with the lowest weighted average percentage error (WAPE) is chosen as the final model.

4. Main Results

4.1. Sales Analysis

By analysing the sales trends on a quarterly basis from 2019 to 2021, we would like to find out if there is a similar trend in the quarterly sales for all three years. Next, we applied categorical analysis to pinpoint the most profitable categories and item types. We also looked at the company’s regional online sales datasets, to look for expansion opportunities for the company. To help the company benchmark its future sales, we also applied the Holt-Winters model to predict the monthly revenue in 2022.

4.1.1. Quarterly and Yearly analysis

Based on the 2019 to 2021 sales dataset, we carried out the yearly sales analysis. As seen in figure 1, we found out that in 2019, the House of 28 managed to maintain a high revenue of at least \$91,000. In the second quarter of 2020, unfortunately, due to Covid-19, the company’s sales had a huge drop of \$18,000. They were able to gradually recover their sales back to normalcy by the end of 2020. However, in 2021, their sales trend was downward trending.

We first identified that 1-Apparel and 2-Accessories had the largest dropped in sales from Q1 to Q4 in 2021. To further determine the cause of this drop, we analyzed the sales of

Boutique and E-commerce stores separately. As seen in figure 1, 1–Apparel revenue in 2021 in the Boutique dropped by 47.5% while revenue at the E-commerce store dropped only 22.4%. Similarly, the 2 – Accessories sales in 2021 in the Boutique dropped by 54.95% while sales at the E-commerce store dropped by only 38.4%. We were able to infer that the downward trend in 2021 was mainly due to the decline in sales at the physical store.

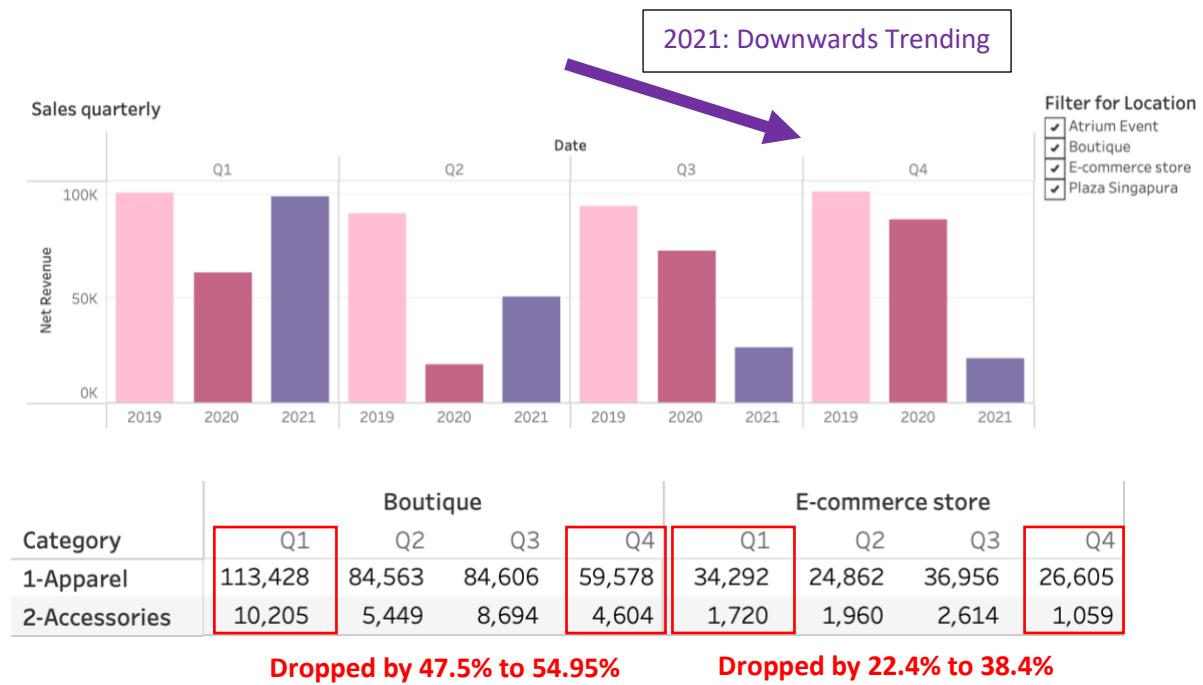


Figure 1: Quarterly Sales Analysis & boutique and e-commerce store sales comparison for 1-Apparel and 2-Accessory

House of 28 can find the reason why 1-Apparel and 2-Accessories dropped by over 47.5% between Q1 and Q4 in their physical stores. This would allow the company to come up with a targeted solution to increase revenues for these 2 most affected categories.

4.1.2. Categorical analysis

Based on the three years of datasets, we found out that 1-Apparel sales contributed the most of the sales in the three years, with a total sale of \$1.4 million. This is followed by the “Lady Shoes” category with a total sale of \$0.8 million. We also managed to find out that the top 3 items sold were “1DR-Dress”, “1TO-Top”, and “3FL-Flats” as seen in Figure 2.

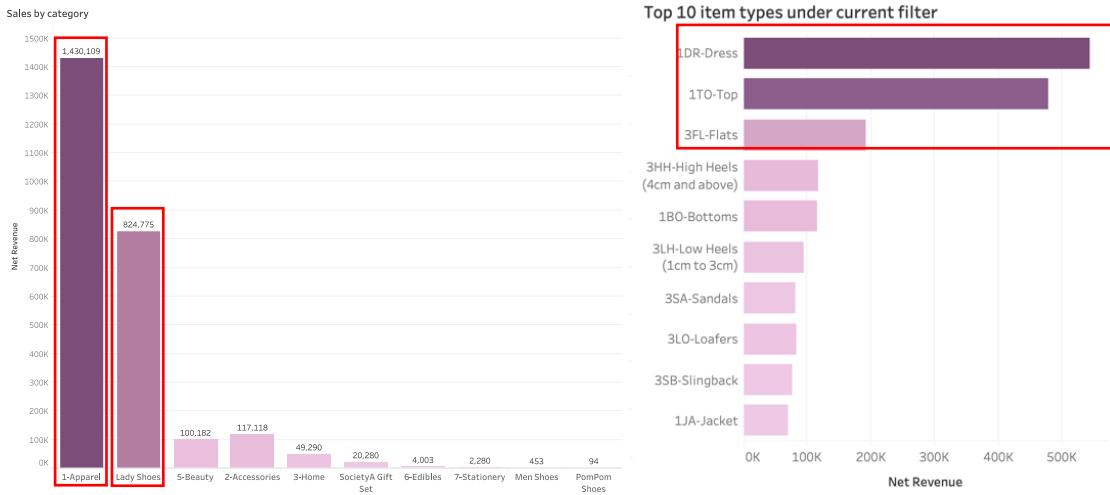


Figure 2: Sales by Category and Item types

House of 28 can focus their resources on the popular items “1DR-Dress”, “1TO-Top”, and “3FL-Flats” to increase their efficiency in transforming resources into sales and revenue.

4.1.3. Regional Analysis

For the regional analysis, we applied data segmentation, A-B-C analysis, and found out that over 80% of the company’s revenue comes from Singapore, the United States, and Hong Kong. By comparing the order sales of the 3rd region, Hong Kong, and the 4th country Japan, we observed a huge drop in the total revenues of orders, from 40,908 to 9459 as seen in figure 3.

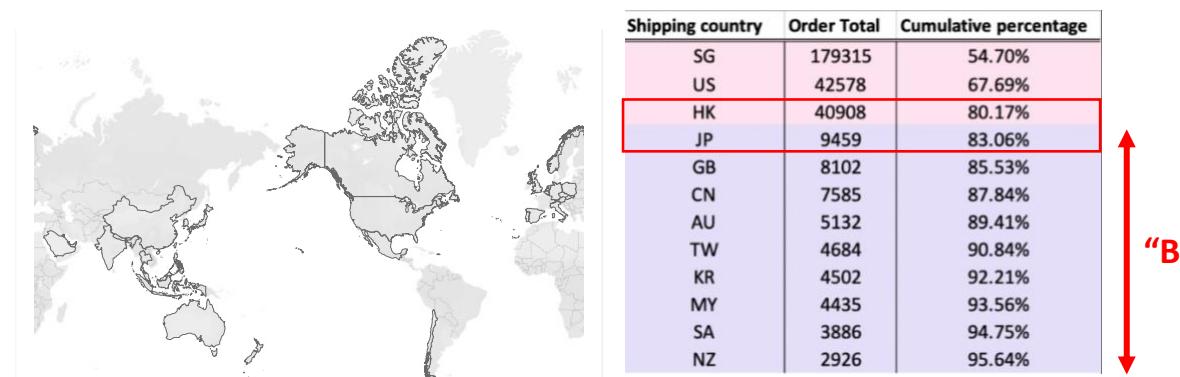


Figure 3: Regional Sales plot and “A-B-C” Analysis

The huge difference in the number of orders between the 3rd and 4th country in figure 3 is because advertising was only done for Singapore, the United States, as well as Hong Kong, and the results in figure 3 show us that these countries contribute to the majority of the revenue. Thus, advertising results in relatively higher revenue. Based on the A-B-C analysis, the House

of 28 can consider implementing advertising for the "B Tier" to increase their total orders to be on the same level as the top three countries.

4.1.4. Revenue forecasting

By comparing the WAPE values of all the prediction modes, the Holt-Winters model was chosen with the lowest WAPE to predict the monthly revenue for House of 28 in 2022.

Forecasting model	Exponential Smoothing	Double Smoothing	Full Holt Winters
WAPE	18.72652	20.4813	18.26099

Figure 4: WAPE Values for All Tested Models, Holt-Winters was chosen with the lowest WAPE in yellow

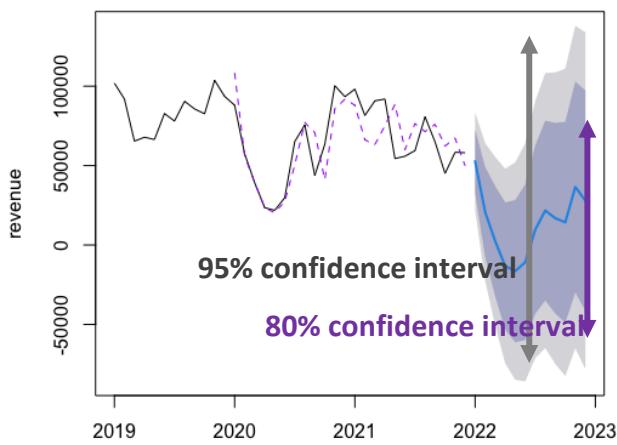


Figure 5: Monthly revenue forecasting (in blue line)

Month	Predicted revenue	95% Confidence interval	Actual revenue
Jan-22	73.595 K	[40.496 K, 106.693 K]	79 K
Feb-22	42.118 K	[0, 86.178 K]	50 K

Figure 6: Forecasted vs Actual Sales

According to our Holt-Winters model, we predicted that in January 2022, the sales will be \$73,595, and the actual sales provided by House of 28 were \$79,000. Our model had an accuracy of over 93% in predicting the monthly sales for the year 2022 as seen in Figure 6. This forecasting model sets a benchmark for the company as a reference to see if it meets the monthly revenue expectations. When the monthly revenue falls below the predicted revenue the company can change their pricing or discount strategies to improve the sales.

4.2. Price Analysis

Besides the sales analysis, we also carried out price analysis to find the price ranges that the customers are most responsive to so that House of 28 can better structure the product pricing and adjust their supplier collaborations based on the price ranges with the highest demand.

From the tree map, as seen in Figure 7, for the 1-Apparel category, customers are more responsive to the \$138 to \$414 price range, and for the Lady shoes category, the price range only covers 0 to 138, but this short range contributes to 32% of total revenue.

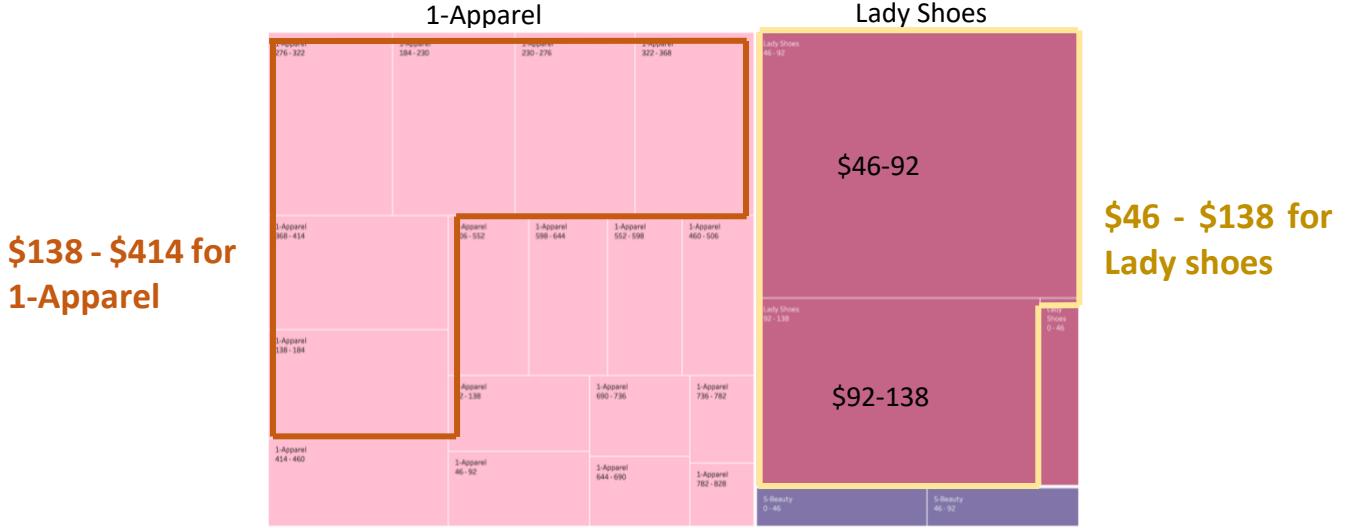


Figure 7: Tree Map of revenue against price range

Diving deeper into the 1-Apparel, we found out that the price ranges from \$138 to \$414 only cover 15% of the price range width but managed to contribute to over 28% of total revenue in the 1-Apparel category as seen in figure 8. And the products with prices from 138 to 414 cover 44% of total quantity sold, and prices above 800 only cover 0.4% of total quantity sold.

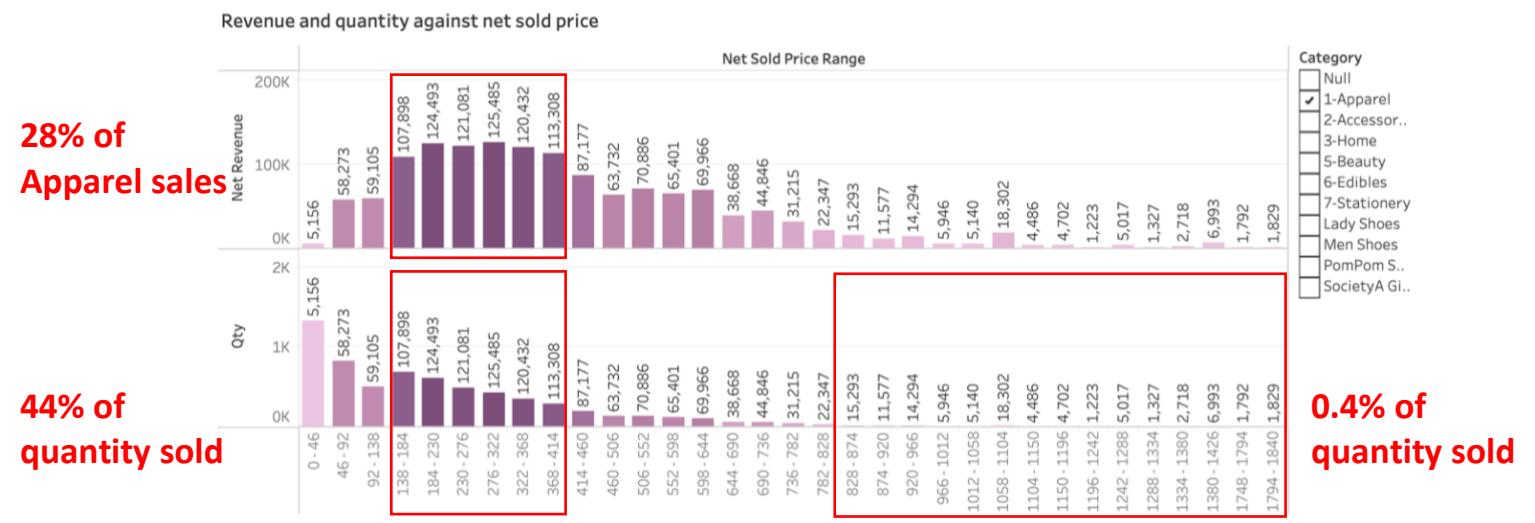
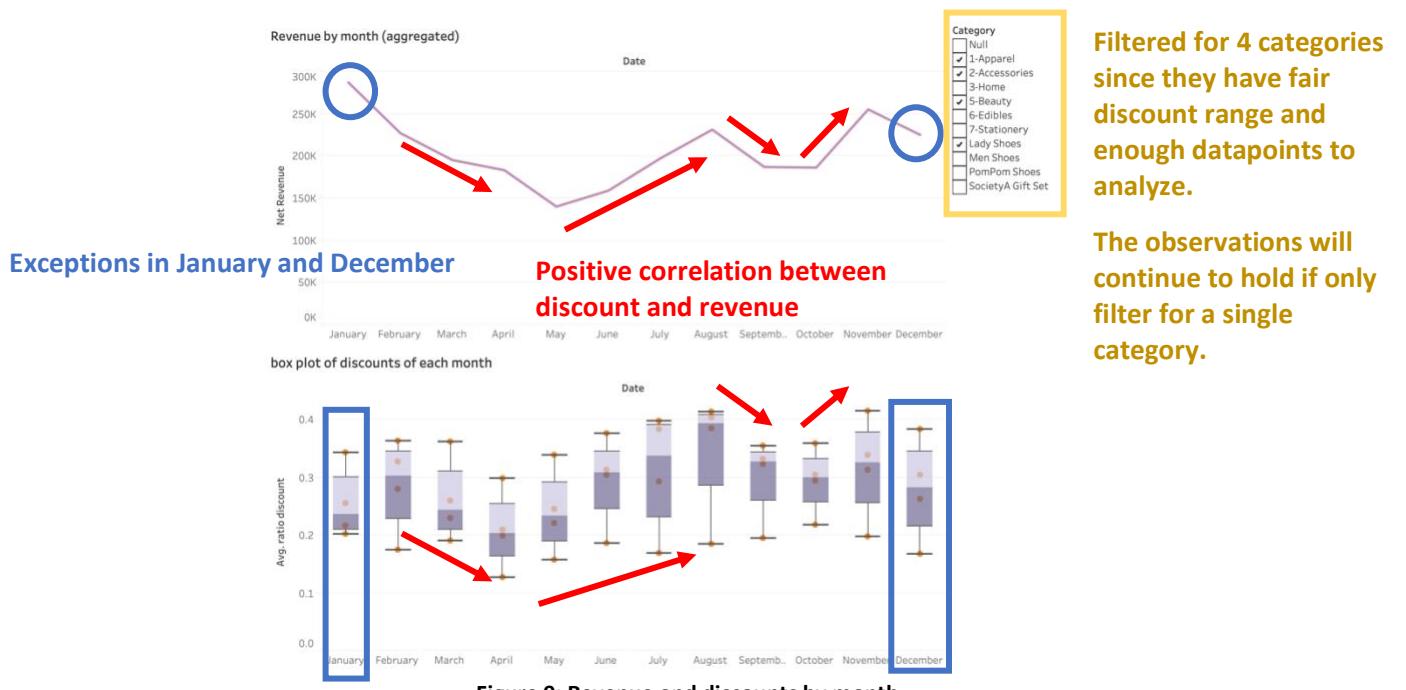


Figure 8: Revenue & Quantity against price range

House of 28 could collaborate with more apparel brands whose price range is between \$100 to \$400. Also, they can introduce more products for the lady shoes with diverse price ranges with prices from \$46-138 to provide more options for customers.

4.3. Discount Analysis

To figure out the impact of discount on sales, we did the discount analysis using the following comparative plot as shown in Figure 9. We firstly noticed a positive correlation between the discount rate and revenue: when the discount decreases from February to April, the revenue drops also; when the discount ratio raises from April to August, the revenue rises accordingly, and similarly for August to November. This indicates that the increase in the quantity sold due to discounts outweighs the decrease in the price of an item sold. Additionally, two exceptions are observed during January and December, when the discounts are low but revenues remain to be high due to the festival effect.



Based on the positive correlation between discount percentages and revenue, when the company notices a drop in revenue, House of 28 can immediately introduce discounts in the following month to offset the sales loss. We also observed that January and December are the

two peak purchase months. House of 28 can potentially have higher revenue by increasing the product prices or giving less discounts while still maintaining the quantity of products sold.

4.4. Stock Availability Analysis

We carried out a stock availability analysis to find the common sizes for each size type. This would allow the House of 28 to allocate the resources to the more common sizes.

4.4.1. Current Stock Trend

In figure 10, the red boxes indicate the most common sizes for each of the categories, Alpha, European, Numeric and Kids.

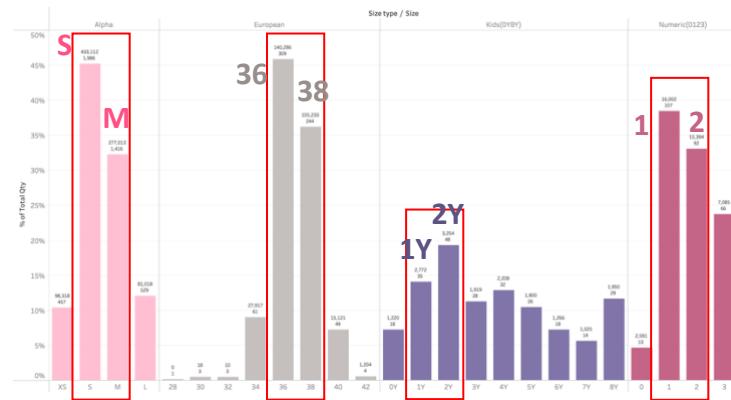


Figure 10: Percentage of total quantity vs size

4.4.2. Demand forecasting

We used the least weighted average percentage errors (WAPE) to determine the most suitable forecasting method for each size as seen in the yellow boxes in figure 11.

WAPE of forecasting method	XS	S	M	L	Freesize
Exponential smoothing (ES)	59.815	34.648	46.682	61.435	78.946
Double exponential smoothing (DS)	61.771	41.050	64.923	81.493	106.637
Holt Winters (HW)	64.054	38.696	42.416	58.729	90.914

Figure 11: WAPE of forecasting method

Size	XS	S	Freesize
forecasted monthly demand	13	52	8

Figure 12: Forecasted monthly demand for xs, s and Freesize

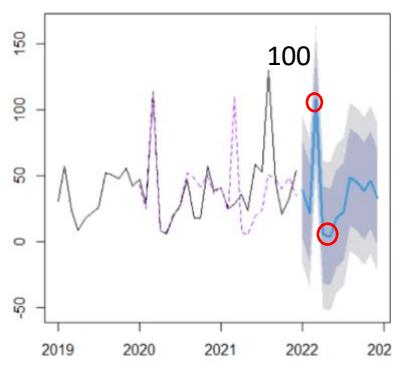


Figure 13: Forecasted demand for size M

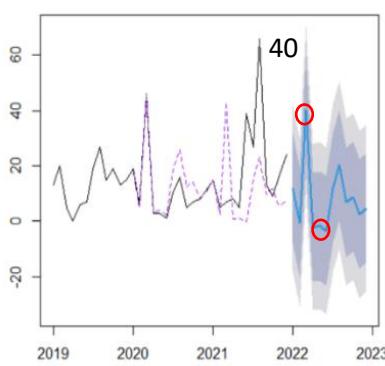


Figure 14: Forecasted demand for size L

In figure 12, we applied exponential smoothing on sizes XS, S and Freesize. As indicated in figures 13, 14, the Holt Winters model for sizes M and L shows that the demand follows a seasonality trend with an extremely high demand in Q1 and an extremely low demand in Q2. Based on the forecasted demand, House of 28 can look for more suppliers before Q1 and reduce suppliers before Q2. This would help them to prepare and predict how many suppliers they need to reach out to before Q1 and Q2.

5. Assumptions and limitations

We assumed that the annual pricing, discount, and stock strategies are constant. For the Holt-Winters model, we assumed that the seasonality period is 12 months. The forecasting results for Exponential Smoothing predicted that the quantity sold for XS, S, and free size would be constant, which is not possible so more data points could be included which may generate a more meaningful model. The scope of analysis is centred around House of 28 alone so for future work, we could conduct the similar analysis on an industry level.

6. Conclusion

Based on our sales analysis, House of 28 can focus on increasing sales for 1-Apparel and 2-Accessories and apply discounts between 10% and 40% in March, April, and May. They can also allocate more resources to other countries such as Japan, United Kingdom, and China to expand their business internationally. According to our pricing analysis, they can collaborate with more apparel brands whose price range is between \$100 to \$400 and consider introducing more shoe products of diverse price ranges. When the company notices a drop in revenue, they can immediately introduce discounts in the following month to offset the sales loss. House of 28 can potentially have higher revenue by increasing the product prices or giving fewer discounts while still maintaining the quantity of products sold. Based on the forecasted demand, they can look for more suppliers before Q1 and reduce suppliers before Q2 for sizes M and L.

Appendix

Appendix A. Datasets

1	Location	Brand	Date	Category	Item Type	Item Code	Matrix Barcode	Item Name	Grand Tot Grand Total		Grand Total		Grand Total	
									Qty	Sold Unit Price	Item Discount Amount	Sales Discount Amount	Net Sold Price	
3	Azum Event	Show Accessories	12/01/2019	Lady Shoes	Show Accessories	99795FC2483		Ball of Cushion	1	\$ 5.00	\$ 0.00	\$ 2.44	\$ 2.44	
4	Azum Event	Show Accessories	12/01/2019	Lady Shoes	Show Accessories	99795FC2484	JF70300E250	Fluff Ball	1	\$ 4.00	\$ 0.00	\$ 1.88	\$ 1.88	
5	Azum Event	Show Accessories	12/01/2019	Lady Shoes	Show Accessories	99795FC2484	JF70300E250	Heel Liner	1	\$ 1.00	\$ 0.00	\$ 0.46	\$ 0.46	
6	Azum Event	SPUR	07/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	JF4957NA	JF70300E250	Dorsay Pumps	1	\$ 119.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
7	Azum Event	SPUR	07/01/2019	Lady Shoes	SDN-Sneakers	JF4957NA	JF70300E250	Cilia Ruby Overlay	1	\$ 139.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
8	Azum Event	SPUR	07/01/2019	Lady Shoes	SFL-Flats	JH70300V	JH70300V250	SPUR Lady Shoes	1	\$ 99.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 99.00
9	Azum Event	SPUR	07/01/2019	Lady Shoes	SFL-Flats	JH90079K	JH90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 99.00
10	Azum Event	SPUR	07/01/2019	Lady Shoes	SFL-Flats	JL90079K	JL90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 99.00
11	Azum Event	SPUR	07/01/2019	Lady Shoes	SFL-Flats	JL90079K	JL90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 99.00
12	Azum Event	SPUR	07/01/2019	Lady Shoes	SLD-Loafers	J98119E	J98119E250	SPUR Lady Shoes	1	\$ 89.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 84.00
13	Azum Event	SPUR	07/01/2019	Lady Shoes	SFL-Flats	JF90079K	JF90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 99.00
14	Azum Event	SPUR	07/01/2019	Lady Shoes	SFL-Flats	JF90079K	JF90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 99.00
15	Azum Event	SPUR	07/01/2019	Lady Shoes	SPL-Plimsolls	JF4717V	JF4717V250	Cilia Zenz Crazy Conduary	1	\$ 129.00	\$ 0.00	\$ 4.42	\$ 4.42	\$ 124.58
16	Azum Event	SPUR	07/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	JF70300E	JF70300E250	Dorsay Pumps	1	\$ 119.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
17	Azum Event	SPUR	06/01/2019	Lady Shoes	SDA-Sandals	L73794Q	L73794Q250	Cross over strap	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
18	Azum Event	SPUR	06/01/2019	Lady Shoes	SDS-Wedges	F58117K	F58117K250	SPUR Lady Shoes	1	\$ 99.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 99.00
19	Azum Event	SPUR	06/01/2019	Lady Shoes	SDA-Sandals	L73794P	L73794P250	Cross over strap	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
20	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	JL90079K	JL90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 99.00
21	Azum Event	SPUR	06/01/2019	Lady Shoes	SHH-High Heels (4cm and above)	JF5548K	JF5548K250	Acid EL Ginn Heels	1	\$ 129.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 124.00
22	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	JF90079K	JF90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 99.00
23	Azum Event	SPUR	06/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	JF70300E	JF70300E250	Dorsay Pumps	1	\$ 119.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
24	Azum Event	SPUR	06/01/2019	Lady Shoes	SDA-Sandals	L73794R	L73794R250	Cross over strap	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
25	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	LS9911RE	LS9911RE250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 99.00
26	Azum Event	SPUR	06/01/2019	Lady Shoes	SLD-Loafers	J52210D	J52210D250	SPUR Lady Shoes	1	\$ 139.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 139.00
27	Azum Event	SPUR	06/01/2019	Lady Shoes	SHH-High Heels (4cm and above)	JF5548K	JF5548K250	Acid EL Vnu Coloreto Heels	1	\$ 119.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 119.00
28	Azum Event	SPUR	06/01/2019	Lady Shoes	SDA-Sandals	H54138W	H54138W107	Maha Minimal Sandals	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
29	Azum Event	SPUR	06/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	JF70300E	JF70300E250	Dorsay Pumps	1	\$ 119.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
30	Azum Event	SPUR	06/01/2019	Lady Shoes	SPL-Plimsolls	JF4717V	JF4717V250	Cilia Zenz Crazy Conduary	1	\$ 129.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 124.00
31	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	JF70300E	JF70300E250	Dorsay Pumps	1	\$ 119.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
32	Azum Event	SPUR	06/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	JF70300V	JF70300V250	Crozy Pumps	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
33	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	JF70300V	JF70300V250	Crozy Pumps	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
34	Azum Event	SPUR	06/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	JF70300E	JF70300E250	Dorsay Pumps	1	\$ 119.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
35	Azum Event	SPUR	06/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	L73794K	L73794K250	Half Block Slingback	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
36	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	JF90079K	JF90079K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 99.00
37	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	FT7519K	FT7519K250	SPUR Lady Shoes	1	\$ 99.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 99.00
38	Azum Event	SPUR	06/01/2019	Lady Shoes	SHH-High Heels (4cm and above)	L73794K	L73794K250	T point sharp	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
39	Azum Event	SPUR	06/01/2019	Lady Shoes	SPL-Wedges	F58117K	F58117K250	SPUR Lady Shoes	1	\$ 99.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 99.00
40	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	JF90079K	JF90079K250	Rabbit Pompon	1	\$ 109.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 109.00
41	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	H77005L	H77005L250	Striped Ballet Flats	1	\$ 89.00	\$ 0.00	\$ 4.42	\$ 4.42	\$ 84.58
42	Azum Event	SPUR	06/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	L73794K	L73794K250	Squaren Flats	1	\$ 99.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 99.00
43	Azum Event	SPUR	06/01/2019	Lady Shoes	SFL-Flats	JF70300K	JF70300K250	Half Block Slingback	1	\$ 109.00	\$ 0.00	\$ 4.50	\$ 4.50	\$ 104.50
44	Azum Event	SPUR	06/01/2019	Lady Shoes	SLH Low Heels (1cm to 3cm)	JF70300K	JF70300K250	SPUR Lady Shoes	1	\$ 129.00	\$ 0.00	\$ 4.42	\$ 4.42	\$ 124.58

Figure 15: All category sales 2019-2021

1	Daily Sales - Cynidi	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	35

Daily Sales - 2021																		
Location	Brand	Date	Sales No.	Category	Item Code	Item Name	Qty	Sold Item Price	Item Discount Amount	Sales Discount Amount	Net Sold Price							
3 Ngu Ann City 03/14A	ARM-ANNKN	11/06/2021	15001884	5-Beauty	GPA-AG-RESPR01	RENEW Organic Room and Linen Spray	1	\$38.00	\$3.80	\$0.00	\$34.20							
4 Ngu Ann City 03/14A	ARM-Aromatica	11/06/2021	15001885	5-Beauty	GSE-ARM-ARMC01-MC	RENEW Organic Room and Linen Spray	1	\$38.00	\$3.80	\$0.00	\$34.20							
5 Ngu Ann City 03/14A	ARM-Aromatica	11/06/2021	15001887	5-Beauty	GSE-ARM-ARMC02-NC	Reviving Rose Infusion Cream 140g	1	\$20.00	\$2.00	\$0.00	\$18.00							
6 Ngu Ann City 03/14A	ARM-Aromatica	09/04/2021	15001702	5-Beauty	GSE-ARM-ARMC03-NC	Tee Tree Balancing Foaming Cleanser (180g)	1	\$29.00	\$2.90	\$0.00	\$26.10							
7 Ngu Ann City 03/14A	ARM-Aromatica	15/04/2021	15001709	5-Beauty	GSE-ARM-ARMTN01-NC	Reviving Rose Infusion Treatment Toner 200ml	1	\$55.00	\$5.50	\$0.00	\$44.00							
8 Ngu Ann City 03/14A	ARM-Aromatica	17/04/2021	15001748	5-Beauty	GSE-ARM-ARMOI-NC	Reviving Rose Infusion Cream 50ml	1	\$75.00	\$7.50	\$0.00	\$60.00							
9 Ngu Ann City 03/14A	ARM-Aromatica	20/04/2021	15001758	5-Beauty	GSE-ARM-ARMOI-NC	Reviving Rose Infusion Cream 50ml	1	\$75.00	\$7.50	\$0.00	\$60.00							
10 Ngu Ann City 03/14A	ARM-Aromatica	23/04/2021	15001775	5-Beauty	GSE-ARM-ARMC01-NC	Reviving Rose Infusion Cream 140g	1	\$32.00	\$3.20	\$0.00	\$25.60							
11 Ngu Ann City 03/14A	ARM-Aromatica	27/04/2021	15001808	5-Beauty	GSE-ARM-ARMSES-NC	Reviving Rose Infusion Serum 100ml	1	\$55.00	\$5.50	\$0.00	\$44.00							
12 Ngu Ann City 03/14A	ARM-Aromatica	28/04/2021	15001813	5-Beauty	GSE-ARM-ARMOI-NC	Reviving Rose Infusion Cream 50ml	1	\$75.00	\$7.50	\$0.00	\$60.00							
13 Ngu Ann City 03/14A	ARM-Aromatica	29/04/2021	15001814	5-Beauty	GSE-ARM-ARMC06-NC	Tee Tree Balancing Foaming Cleanser (180g)	1	\$29.00	\$2.90	\$0.00	\$26.10							
14 Ngu Ann City 03/14A	ARM-Aromatica	01/05/2021	15001800	5-Beauty	GSE-ARM-ARMOI-NC	Tee Tree Calming Gel (300ml)	1	\$24.95	\$3.74	\$0.00	\$21.21							
15 Ngu Ann City 03/14A	ARM-Aromatica	02/05/2021	15001805	5-Beauty	GSE-ARM-ARMOI-NC	Tee Tree Calming Gel (300ml)	1	\$24.95	\$0.00	\$0.00	\$24.95							
16 Ngu Ann City 03/14A	ARM-Aromatica	03/05/2021	15001845	5-Beauty	GSE-ARM-ARMC01-NC	Reviving Rose Infusion Foaming Cleanser (180g)	1	\$29.00	\$2.90	\$0.00	\$26.10							
17 Ngu Ann City 03/14A	ARM-Aromatica	04/05/2021	15001846	5-Beauty	GSE-ARM-ARMC02-NC	Reviving Rose Infusion Foaming Cleanser (180g)	1	\$29.00	\$2.90	\$0.00	\$26.10							
18 Ngu Ann City 03/14A	ARM-Aromatica	17/05/2021	15001853	5-Beauty	GSE-ARM-ARMC03-NC	Tee Tree Calming Gel (300ml)	1	\$24.95	\$3.74	\$0.00	\$21.21							
19 Ngu Ann City 03/14A	ARM-Aromatica	31/05/2021	15001900	5-Beauty	GSE-ARM-ARMC04-NC	Tee Tree Balancing Foaming Cleanser (180g)	1	\$29.00	\$3.90	\$0.00	\$26.10							
20 Ngu Ann City 03/14A	ARM-Aromatica	04/06/2021	15001973	5-Beauty	GSE-ARM-ARMC120-NC	Natural Coconut Oil (300ml)	1	\$9.00	\$0.00	\$0.00	\$9.00							
21 Ngu Ann City 03/14A	ARM-Aromatica	03/09/2021	15002400	5-Beauty	GSE-ARM-ARMTN01-NC	Reviving Rose Infusion Treatment Toner 300ml	1	\$55.00	\$5.50	\$0.00	\$49.50							
22 Ngu Ann City 03/14A	ARM-Aromatica	03/11/2021	15002759	5-Beauty	GSE-ARM-ARMC03-NC	Natural Coconut Oil Cleaning (300ml)	1	\$9.00	\$0.00	\$0.00	\$9.00							
23 Ngu Ann City 03/14A	AUD-Audite	03/05/2021	15001801	5-Beauty	GSE-AUJ-1000B-NC	Eyes Lifter (Invigorating Eye Serum)-15ml	1	\$138.00	\$12.80	\$0.00	\$115.20							
24 Ngu Ann City 03/14A	AUD-Audite	13/07/2021	15002133	5-Beauty	GSE-AUJ-1000B-NC	Eyes Lifter (Invigorating Eye Serum)-15ml	1	\$138.00	\$0.00	\$0.00	\$138.00							
25 Ngu Ann City 03/14A	BGC-Beige	20/01/2021	15001970	5-Beauty	GSE-BGC-RO-NC	Regenerating Oil (15ml)	1	\$89.00	\$0.00	\$0.00	\$89.00							
26 Ngu Ann City 03/14A	BGC-Beige	25/01/2021	15001408	5-Beauty	GSE-BGC-RO-TL-NC	Treatment Lotion (100ml)	1	\$75.00	\$7.50	\$0.00	\$67.50							
27 Ngu Ann City 03/14A	BGC-Beige	03/03/2021	15001448	5-Beauty	GSE-BGC-RO-NC	Regenerating Oil (15ml)	1	\$89.00	\$0.00	\$0.00	\$89.00							
28 Ngu Ann City 03/14A	BGC-Beige	03/03/2021	15001449	5-Beauty	GSE-BGC-CE-NC	Concealing Emulsion (70ml)	1	\$65.00	\$0.00	\$0.00	\$65.00							
29 Ngu Ann City 03/14A	BGC-Beige	03/03/2021	15001551	5-Beauty	GSE-BGC-CE-NC	Regenerating Oil (15ml)	1	\$89.00	\$0.00	\$0.00	\$89.00							
30 Ngu Ann City 03/14A	BGC-Beige	03/03/2021	15001557	5-Beauty	GSE-BGC-CE-NC	Concealing Emulsion (70ml)	1	\$65.00	\$0.00	\$0.00	\$65.00							
31 Ngu Ann City 03/14A	BGC-Beige	12/03/2021	15001811	5-Beauty	GSE-BGC-RO-NC	Regenerating Oil (15ml)	1	\$89.00	\$0.00	\$0.00	\$89.00							
32 Ngu Ann City 03/14A	BGC-Beige	26/03/2021	15001440	5-Beauty	GSE-BGC-RO-NC	Regenerating Oil (15ml)	1	\$89.00	\$0.00	\$0.00	\$89.00							
33 Ngu Ann City 03/14A	BGC-Beige	31/03/2021	15001469	5-Beauty	GSE-BGC-RHW-NC	Refreshing Hand Wash (200g)	1	\$55.00	\$5.50	\$0.00	\$50.00							
34 Ngu Ann City 03/14A	BGC-Beige	31/03/2021	15001469	5-Beauty	GSE-BGC-RHW-NC	Refreshing Hand Wash (200g)	1	\$55.00	\$5.50	\$0.00	\$50.00							
35 Ngu Ann City 03/14A	BGC-Beige	31/03/2021	15001485	5-Beauty	GSE-BGC-CHNC-NC	Classic Hand & Nail Cream (40ml)	1	\$39.00	\$0.00	\$0.00	\$39.00							
36 Ngu Ann City 03/14A	BGC-Beige	02/04/2021	15001470	5-Beauty	GSE-BGC-CC-NC	Comforting Cream (50ml)	1	\$65.00	\$0.00	\$0.00	\$65.00							
37 Ngu Ann City 03/14A	BGC-Beige	03/04/2021	15001477	5-Beauty	GSE-BGC-RHW-NC	Refreshing Hand Wash (200g)	1	\$55.00	\$5.50	\$0.00	\$50.00							
38 Ngu Ann City 03/14A	BGC-Beige	03/04/2021	15001677	5-Beauty	GSE-BGC-RHW3-NC	Refreshing Hand Wash (200g)	1	\$55.00	\$16.00	\$0.00	\$38.00							
39 Ngu Ann City 03/14A	BGC-Beige	03/04/2021	15001679	5-Beauty	GSE-BGC-CHNC-NC	Classic Hand & Nail Cream (40ml)	1	\$39.00	\$0.00	\$0.00	\$39.00							
40 Ngu Ann City 03/14A	BGC-Beige	03/04/2021	15001682	5-Beauty	GSE-BGC-RHW-NC	Refreshing Hand Wash (200g)	1	\$55.00	\$5.50	\$0.00	\$50.00							
41 Ngu Ann City 03/14A	BGC-Beige	04/04/2021	15001683	5-Beauty	GSE-BGC-RHW-NC	Refreshing Hand Wash (200g)	1	\$55.00	\$5.50	\$0.00	\$50.00							
42 Ngu Ann City 03/14A	BGC-Beige	04/04/2021	15001683	5-Beauty	GSE-BGC-CHNC-NC	Classic Hand & Nail Cream (40ml)	1	\$39.00	\$0.00	\$0.00	\$39.00							
43 Ngu Ann City 03/14A	BGC-Beige	04/04/2021	15001685	5-Beauty	GSE-BGC-TL-NC	Treatment Lotion (100ml)	2	\$150.00	\$0.00	\$0.00	\$150.00							

Beauty Home SPUR Shoe +

Figure 17: Daily sales Beauty, Home and SPUR Shoe 2021

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
1	Type																							
2	1BO-Bottoms	1-Apparel																						
3	1BS-Bodysuit	1-Apparel																						
4	1BZ-Bazer	1-Apparel																						
5	1CA-Cardigan	1-Apparel																						
6	1CO-Coat	1-Apparel																						
7	1CP-Cape Top	1-Apparel																						
8	1DR-Dress	1-Apparel																						
9	1DR-Long Dress	1-Apparel																						
10	1JA-Jacket	1-Apparel																						
11	1JU-Jumpsuit	1-Apparel																						
12	1OU-Outer	1-Apparel																						
13	1RD-Romper	1-Apparel																						
14	1SK-Skirt	1-Apparel																						
15	1SK-Skirts	1-Apparel																						
16	1SO-Sock	1-Apparel																						
17	1ST-Set	1-Apparel																						
18	1SW-Swimwear	1-Apparel																						
19	1TO-Top	1-Apparel																						
20	1TO-Top (Onesie)	1-Apparel																						
21	2-Accessories																							
22	2BA-Bangle	2-Accessories																						
23	2BE-Belt	2-Accessories																						
24	2BG-Bag	2-Accessories																						
25	2BG-Clutch	2-Accessories																						
26	2BH-Brooch	2-Accessories																						
27	2BR-Bracelets	2-Accessories																						
28	2BU-Buttonaire	2-Accessories																						
29	2CH-Card Holder	2-Accessories																						
30	2CO-Collar	2-Accessories																						

Figure 18: Glossary of Category Codes

Figure 19: SocietyA website sales 2019-2021

Figure 20: SPUR shoes website sales 2019-2021

Appendix B. SQL and EXCEL data manipulation.

```

CREATE TABLE sizes0SML AS SELECT Location,
    Brand,
    Date,
    Category,
    "Item type",
    "Item code",
    "Matrix barcode",
    "Item name",
    Qty,
    "Sold item price",
    "Item discount amount",
    "Sales discount amount",
    "Net sold price",
    "total revenue",
    "ratio discount",
    size,
    size2,
    size1
FROM sizes0
WHERE size1= "XS" OR size1="S" OR size1="M" OR size1="L"
    
```

Figure 21: SQL code to create table

```

CREATE TABLE combinedsizetable AS SELECT * FROM sizeF
UNION ALL
SELECT * FROM sizes00123
UNION ALL
SELECT * FROM sizes0SML
UNION ALL
SELECT * FROM sizes0Y8Y
UNION ALL
SELECT * FROM sizes2842
UNION ALL
    
```

Figure 24: SQL code to combine all sizes to one table

```

SELECT *
FROM sizes0SML;
ALTER TABLE sizes0SML
ADD sizetype string
    
```

Figure 22: SQL code to alter table

```

UPDATE sizes0SML
SET sizetype= 'Euro(SML)'
    
```

Figure 23: SQL code add size type column

	Location	Brand	Date	Sale No	Sales	Category	Item Type	Item Code	Item N Item Code	Matrix Barcode	Grand Grand Excise	Excise	Grand Total	
											Qty	Unit	Unit Sales	
7	Ngrie Ann	All-Apink	9/1/2021	15601322	1	Apparel	LDR-Dress	IDR-AI-00540-CL	Coral O CL-Coral A	3 BLU484W0001	1	\$49.00	\$228.50	
8	Ngrie Ann	All-Apink	16/1/2021	15601346	3	Apparel	LTD-Top	IDR-AI-BLS48-WH	Corrett Wh-Wine	3 BLU484W0003	1	\$39.00	\$146.50	
9	Ngrie Ann	All-Apink	16/1/2021	15601347	1	Apparel	LTD-Top	IDR-AI-BLS48-WH	Corrett Wh-Wine	3 BLU484W0001	1	\$39.00	\$146.50	
10	Ngrie Ann	All-Apink	29/1/2021	630104	3	Apparel	LDR-Dress	IDR-AI-00644-PE	Violette RT-Apink	3 D0044P0003	3	\$49.00	\$147.00	
11	Ngrie Ann	All-Apink	27/1/2021	15601420	2	Clothe	1-Apink	LDR-Dress	IDR-AI-00579-CL	Padewi CL-Coral A	3 D00579U0002	3	\$49.00	\$228.50
12	Ngrie Ann	All-Apink	27/1/2021	15601421	1	Clothe	1-Apink	LDR-Dress	IDR-AI-00579-CL	Padewi CL-Coral A	3 D00579U0001	1	\$49.00	\$228.50
13	Ngrie Ann	All-Apink	8/2/2021	15601481	3	Apparel	LDR-Dress	IDR-AI-00575-CL	Padewi CL-Coral A	3 D00575U0003	3	\$49.00	\$228.50	
14	Ngrie Ann	All-Apink	8/2/2021	15601479	3	Apparel	LTD-Top	IDR-AI-BLS48-WH	Corrett Wh-Wine	3 BLU484W0003	1	\$39.00	\$146.50	
15	Ngrie Ann	All-Apink	17/2/2021	15601520	1	Apparel	LDR-Dress	IDR-AI-00644-PE	Violette RT-Apink	3 BLU484W0001	1	\$39.00	\$147.00	
16	Ngrie Ann	All-Apink	18/2/2021	15601522	3	Apparel	LTD-Top	IDR-AI-BLS48-WH	Corrett Wh-Wine	3 BLU484W0003	3	\$39.00	\$146.50	
17	Ngrie Ann	All-Apink	3/3/2021	15602239	Ms. P1-Apink	LDR-Dress	IDR-AI-00686-NA	Marijor NA-Navy	3 DO0686N001	1	\$419.00	\$272.35		
18	Ngrie Ann	All-Apink	12/8/2021	15602378	1	Apparel	LDR-Dress	IDR-AI-00686-NA	Marijor NA-Navy	3 DO0686N001	1	\$409.00	\$271.75	
19	Ngrie Ann	All-Apink	12/8/2021	15602378	1	Apparel	LDR-Dress	IDR-AI-00686-NA	Marijor NA-Navy	3 DO0686N001	1	\$409.00	\$271.75	
20	Ngrie Ann	All-Apink	12/8/2021	15602378	1	Apparel	LTD-Top	IDR-AI-BLS48-WH	Wanda PU-Purple	3 P00686PU0001	1	\$249.00	\$249.00	
21	Ngrie Ann	All-Apink	12/7/2021	15602378	1	Apparel	LTD-Top	IDR-AI-BLS48-WH	Wanda PU-Purple	3 P00686PU0001	1	\$179.00	\$179.00	
22	Ngrie Ann	All-Apink	14/8/2021	15602379	Grab 11-Apink	LTD-Top	IDR-AI-BLS48-WH	Wanda PU-Purple	3 P00686PU0001	1	\$179.00	\$179.00		
23	Ngrie Ann	All-Apink	14/8/2021	15602379	Grab 11-Apink	LTD-Top	IDR-AI-BLS48-WH	Wanda PU-Purple	3 P00686PU0001	1	\$179.00	\$179.00		
24	Ngrie Ann	All-Apink	14/8/2021	15602379	Grab 11-Apink	LTD-Top	IDR-AI-BLS48-WH	Wanda PU-Purple	3 P00686PU0001	1	\$179.00	\$179.00		
25	Ngrie Ann	All-Apink	14/8/2021	15602379	Grab 11-Apink	LTD-Top	IDR-AI-BLS48-WH	Wanda PU-Purple	3 P00686PU0001	1	\$179.00	\$179.00		
26	Ngrie Ann	All-Apink	14/8/2021	15602379	Grab 11-Apink	LTD-Top	IDR-AI-BLS48-WH	Wanda PU-Purple	3 P00686PU0001	1	\$179.00	\$179.00		
27	Ngrie Ann	All-Apink	4/10/2021	15602587	3	Apparel	LDR-Dress	IDR-AI-00577-WH	Nicole WH-White	3 D00577W0003	3	\$419.00	\$229.50	
28	Ngrie Ann	All-Apink	20/1/2021	630113	1	Apparel	11A-Jacket	IDR-AIN-PA151023-CL	Sprangl GD-Gold	3 PA151023GD0001	1	\$169.00	\$169.00	
29	Ngrie Ann	All-Apink	20/1/2021	630113	1	Apparel	11A-Skirt	IDR-AIN-PA151022-CL	Sprangl GD-Gold	3 PA151022GD0001	1	\$169.00	\$169.00	

Figure 25: Excel spreadsheet highlighting matrix and matrix barcode

Appendix C. Tableau Dashboards and Github repository

We have made an interactive dashboard for every analysis focus, with functioning filters and dynamic visualisation. The dashboard can be found in this Github repository:

<https://github.com/Chen-Yijia/House-of-28-Fashion-trend-analysis.git>

Here are the screenshots of the available dashboards we have.

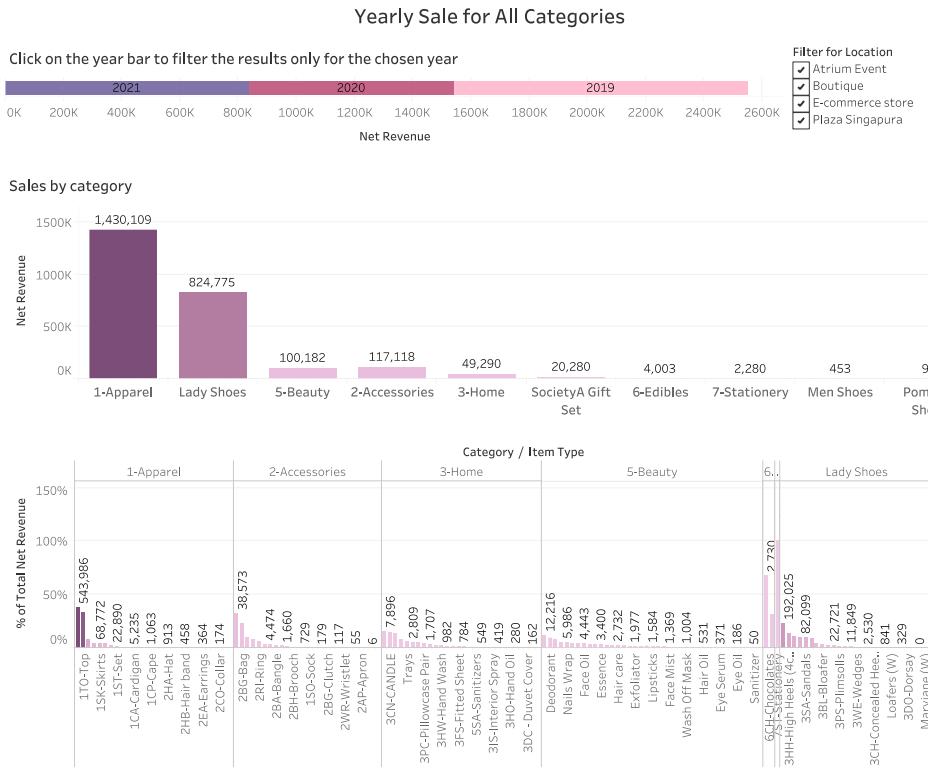


Figure 26: category sales yearly dashboard

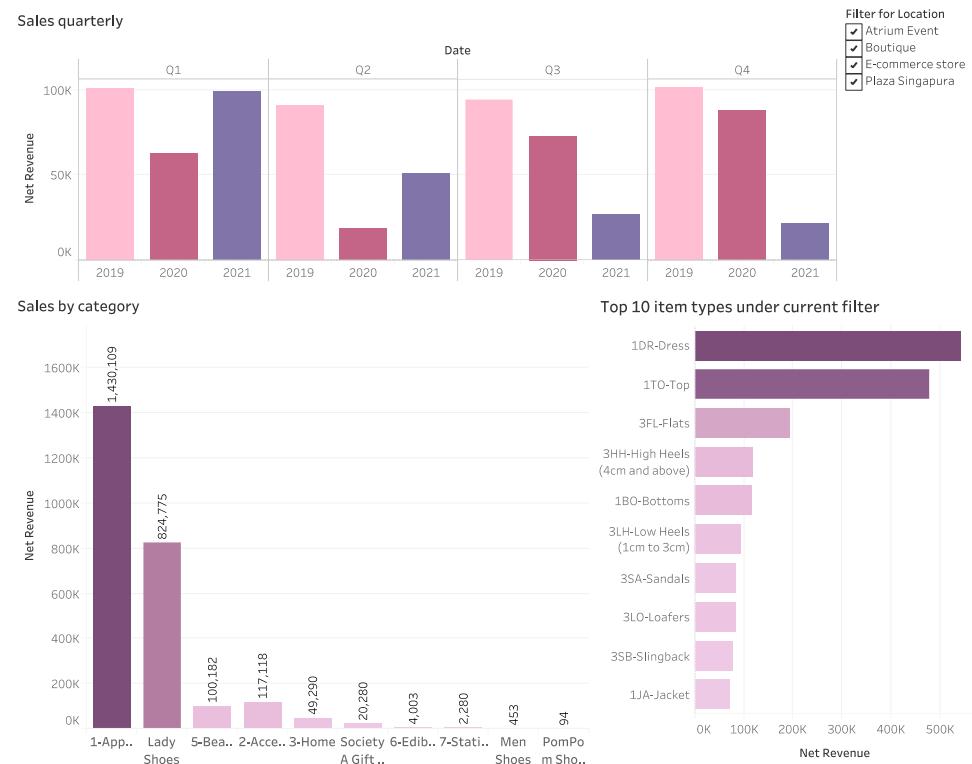


Figure 27: category/item type sales quarterly dashboard

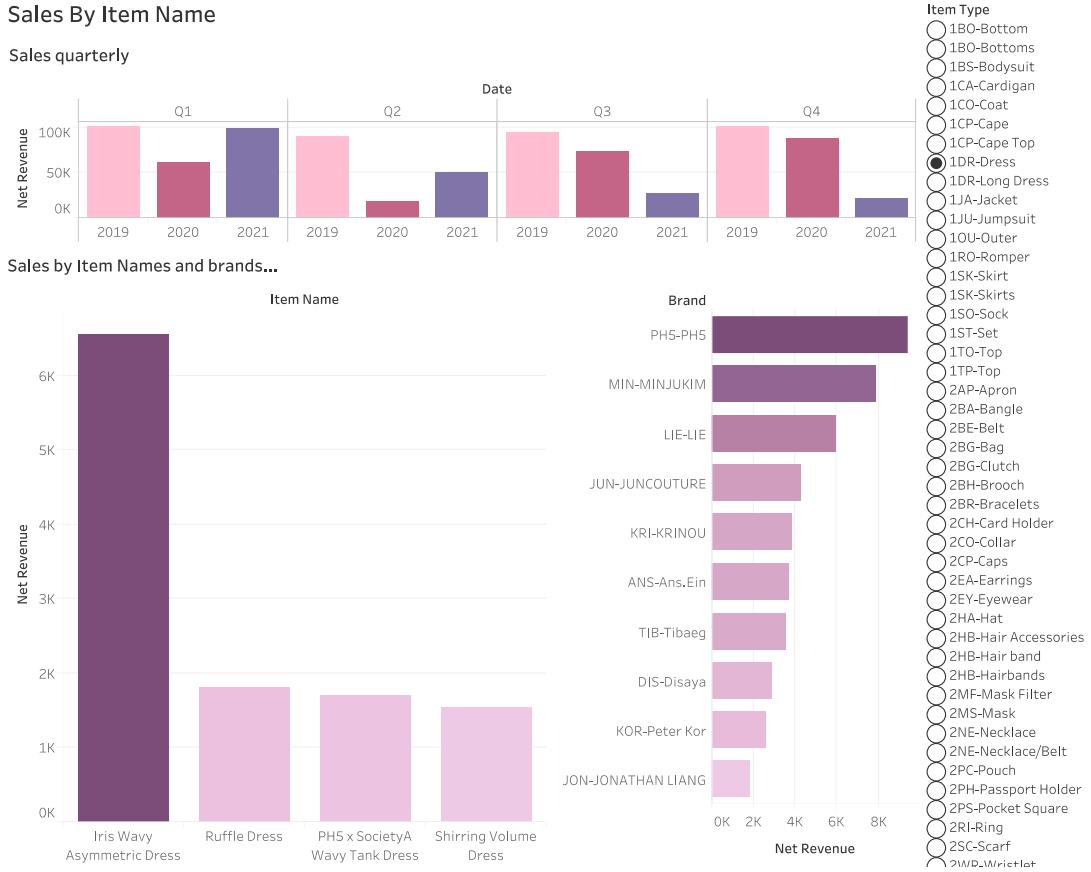


Figure 28: item name/ brand sales quarterly dashboard

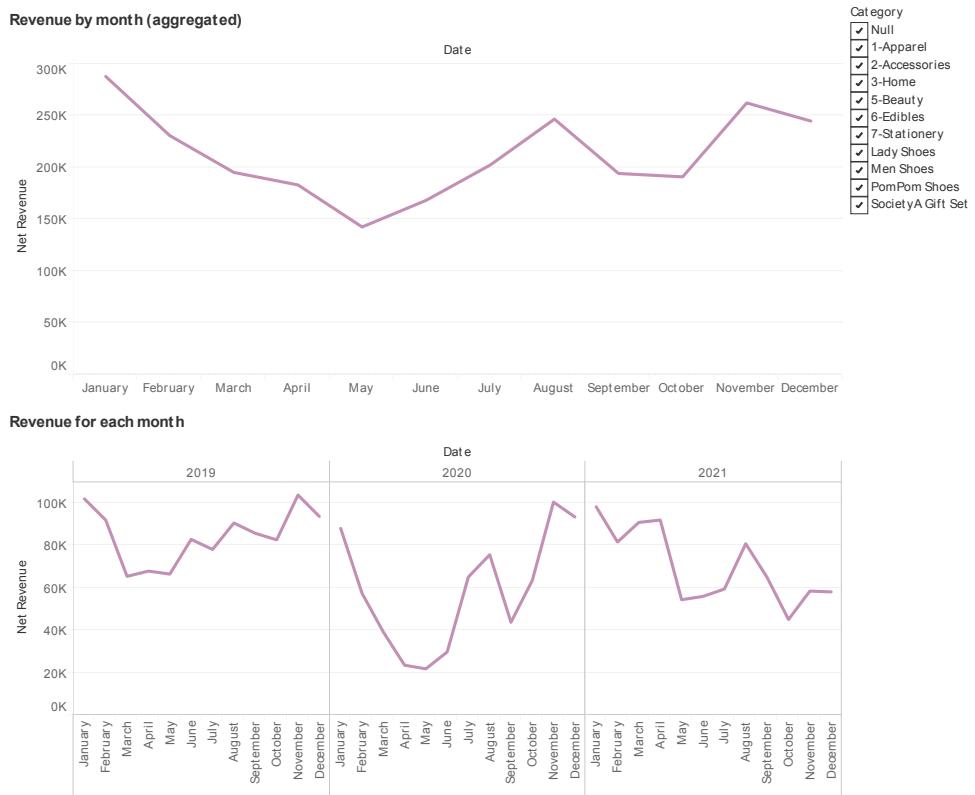
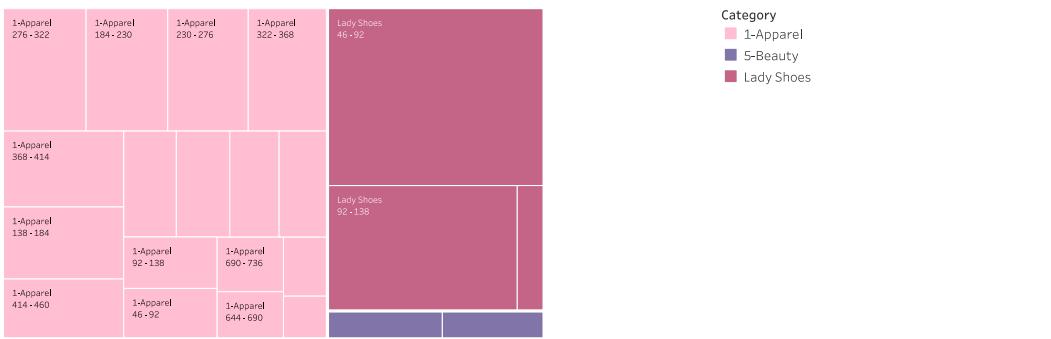


Figure 29: monthly sales dashboard

Tree map of revenue against net sold price



Revenue and quantity against net sold price

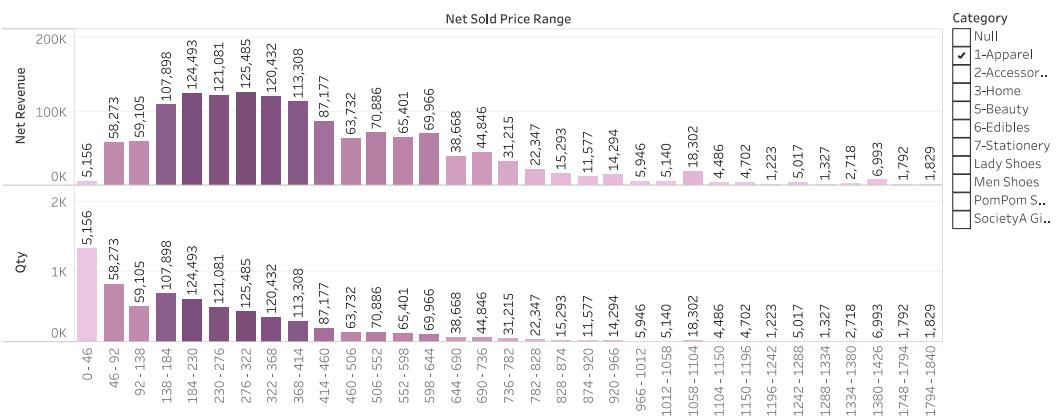
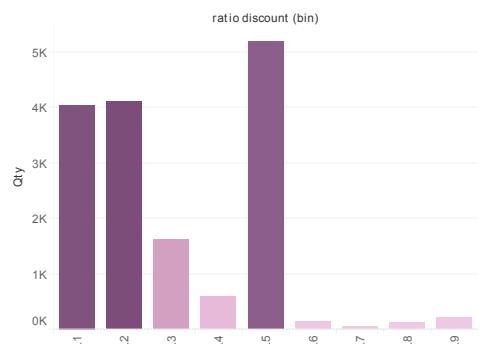
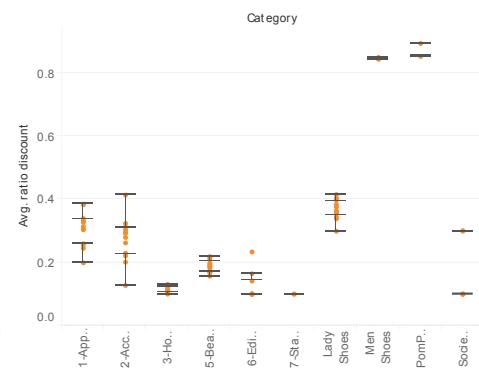


Figure 30: price analysis dashboard

quantity against discount ratio



box plot of average discount ratio for each category



quantity by discount for each category

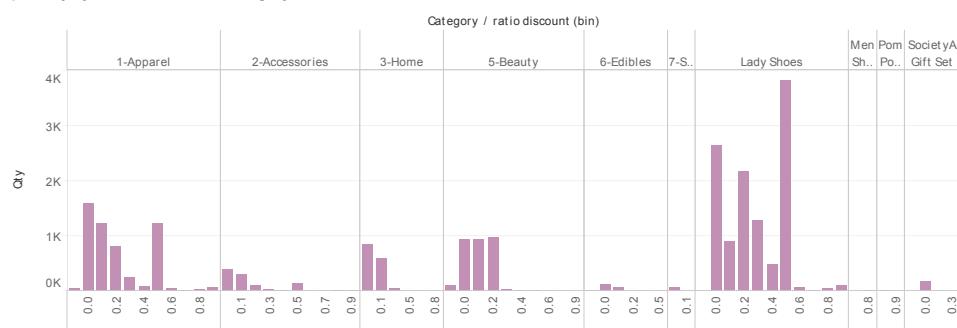


Figure 31: discount analysis dashboard

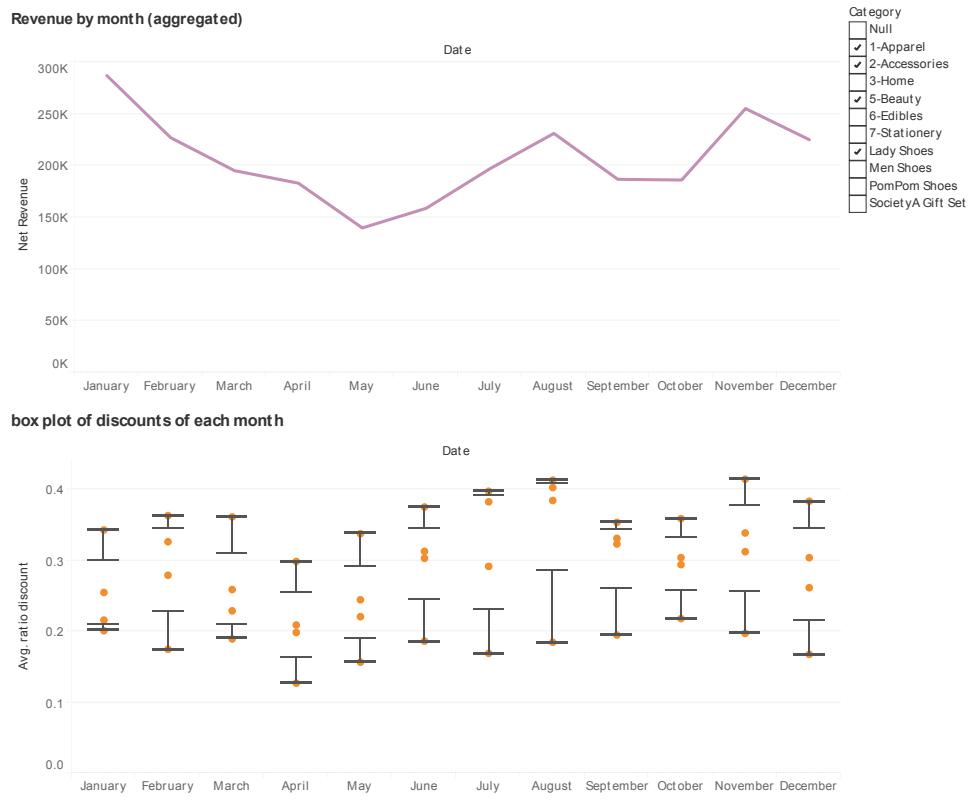


Figure 32: revenue and discount comparative dashboard

Appendix D. Forecasting results

1		Point.Forecast	Lo.80	Hi.80	Lo.95	Hi.95
2	Jan-22	13.99689726	-5.8841175	33.877912	-16.408491	44.402285
3	Feb-22	13.99689726	-5.8841175	33.877912	-16.408491	44.402286
4	Mar-22	13.99689726	-5.8841176	33.877912	-16.408491	44.402286
5	Apr-22	13.99689726	-5.8841176	33.877912	-16.408491	44.402286
6	May-22	13.99689726	-5.8841176	33.877912	-16.408491	44.402286
7	Jun-22	13.99689726	-5.8841177	33.877912	-16.408491	44.402286
8	Jul-22	13.99689726	-5.8841177	33.877912	-16.408491	44.402286
9	Aug-22	13.99689726	-5.8841178	33.877912	-16.408491	44.402286
10	Sep-22	13.99689726	-5.8841178	33.877912	-16.408491	44.402286
11	Oct-22	13.99689726	-5.8841179	33.877912	-16.408492	44.402286
12	Nov-22	13.99689726	-5.8841179	33.877912	-16.408492	44.402286
13	Dec-22	13.99689726	-5.8841179	33.877912	-16.408492	44.402286

Figure 33: 2022 monthly forecasted sales for size XS in 1-Apparel category

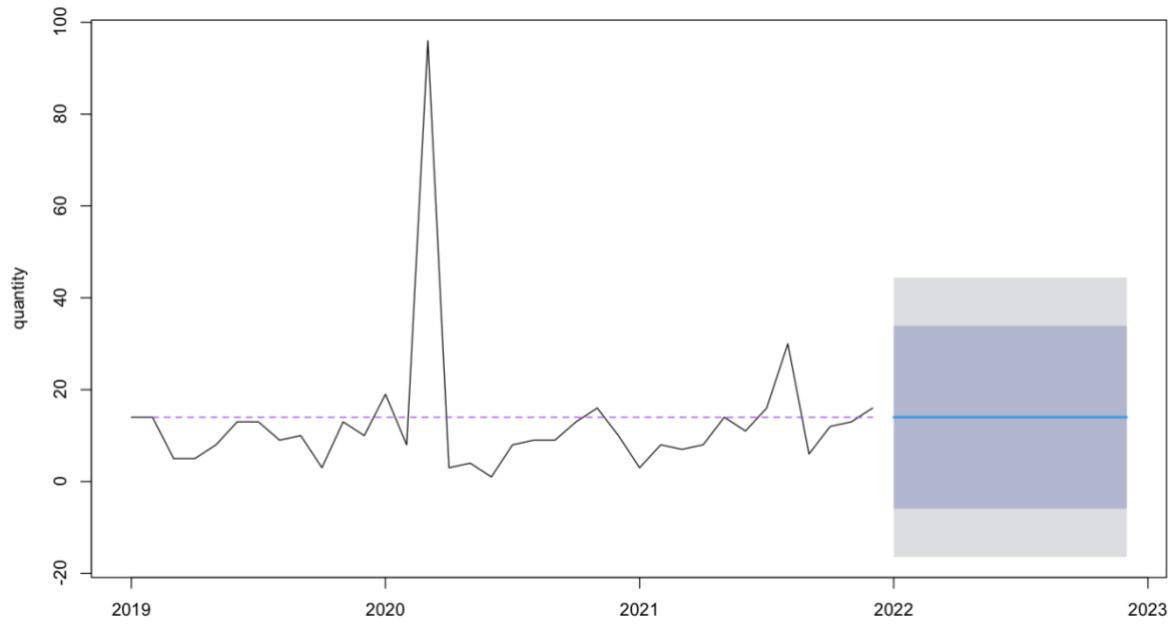


Figure 34: 2022 Exponential Smoothing plot for size XS in 1-Apparel category

	A	B	C	D	E	F
1		Point.Forecast	Lo.80	Hi.80	Lo.95	Hi.95
2	Jan-22	52.00752459	12.8334225	91.1816267	-7.9040945	111.919144
3	Feb-22	52.00752459	12.8334224	91.1816267	-7.9040946	111.919144
4	Mar-22	52.00752459	12.8334223	91.1816268	-7.9040947	111.919144
5	Apr-22	52.00752459	12.8334223	91.1816269	-7.9040949	111.919144
6	May-22	52.00752459	12.8334222	91.181627	-7.904095	111.919144
7	Jun-22	52.00752459	12.8334221	91.1816271	-7.9040951	111.919144
8	Jul-22	52.00752459	12.833422	91.1816272	-7.9040953	111.919144
9	Aug-22	52.00752459	12.8334219	91.1816273	-7.9040954	111.919145
10	Sep-22	52.00752459	12.8334218	91.1816273	-7.9040955	111.919145
11	Oct-22	52.00752459	12.8334217	91.1816274	-7.9040956	111.919145
12	Nov-22	52.00752459	12.8334217	91.1816275	-7.9040958	111.919145
13	Dec-22	52.00752459	12.8334216	91.1816276	-7.9040959	111.919145

Figure 35: 2022 monthly forecasted sales for size S in 1-Apparel category

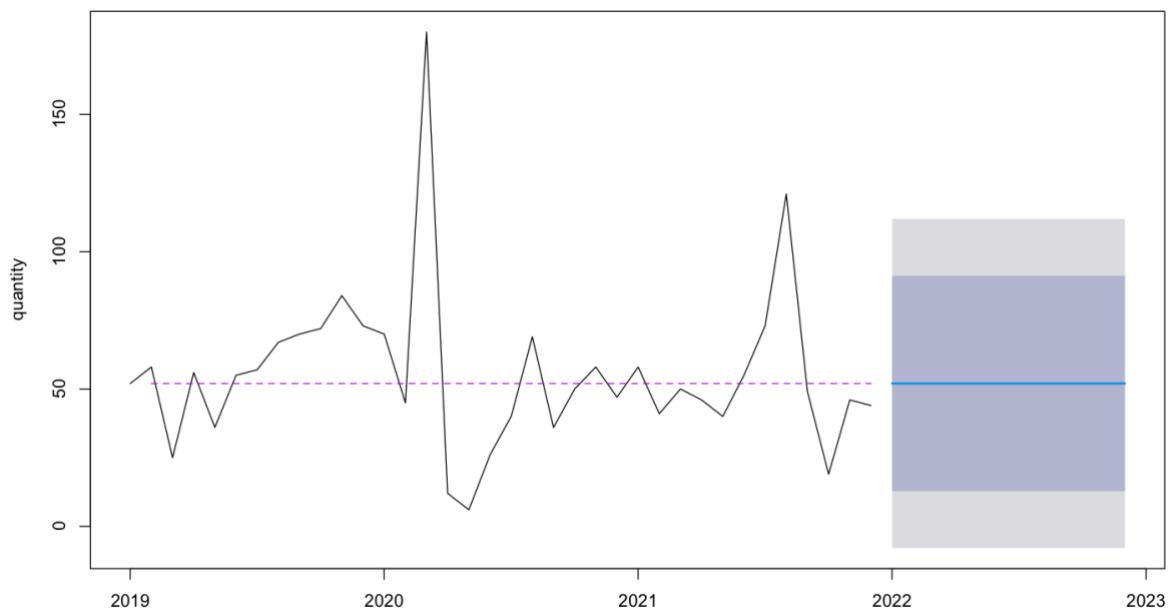


Figure 36: 2022 Exponential Smoothing plot for size S in 1-Apparel category

	Point.Fore	Lo.80	Hi.80	Lo.95	Hi.95
Jan-22	39.6657	2.969825	76.36157	-16.4558	95.78719
Feb-22	21.69192	-15.004	58.38779	-34.4296	77.81341
Mar-22	108.1348	71.43894	144.8307	52.01332	164.2563
Apr-22	5.619367	-31.0765	42.31524	-50.5021	61.74086
May-22	3.687257	-33.0086	40.38313	-52.4342	59.80875
Jun-22	17.63015	-19.0657	54.32602	-38.4913	73.75164
Jul-22	22.6147	-14.0812	59.31058	-33.5068	78.7362
Aug-22	48.97426	12.27839	85.67013	-7.14723	105.0958
Sep-22	45.25049	8.554615	81.94636	-10.871	101.372
Oct-22	38.36004	1.664172	75.05591	-17.7614	94.48153
Nov-22	46.67793	9.982062	83.3738	-9.44356	102.7994
Dec-22	33.07916	-3.61671	69.77503	-23.0423	89.20065

Figure 37: 2022 monthly forecasted sales for size M in 1-Apparel category

	Point.Forecast	Lo.80	Hi.80	Lo.95	Hi.95
Jan-22	11.92540793	-7.78155	31.63237	-18.2138	42.0646
Feb-22	-0.477272727	-20.1842	19.22969	-30.6165	29.66192
Mar-22	40.16171329	20.45475	59.86867	10.02252	70.30091
Apr-22	-2.157634033	-21.8646	17.54933	-32.2968	27.98156
May-22	-1.685314685	-21.3923	18.02165	-31.8245	28.45388
Jun-22	-3.546328671	-23.2533	16.16063	-33.6855	26.59287
Jul-22	12.13432401	-7.57264	31.84128	-18.0049	42.27352
Aug-22	20.23164336	0.524683	39.9386	-9.90755	50.37084
Sep-22	6.870629371	-12.8363	26.57759	-23.2686	37.00982
Oct-22	8.801282051	-10.9057	28.50824	-21.3379	38.94048
Nov-22	2.565268065	-17.1417	22.27223	-27.5739	32.70446
Dec-22	4.704254079	-15.0027	24.41121	-25.4349	34.84345

Figure 38: 2022 monthly forecasted sales for size L in 1-Apparel category

1		Point.Forecast	Lo.80	Hi.80	Lo.95	Hi.95
2	Jan-22	8.122451941	-15.270812	31.5157159	-27.654458	43.8993618
3	Feb-22	8.122451941	-15.471735	31.7166388	-27.961743	44.2066469
4	Mar-22	8.122451941	-15.670961	31.9158652	-28.266433	44.5113373
5	Apr-22	8.122451941	-15.868533	32.1134371	-28.568594	44.8134975
6	May-22	8.122451941	-16.064491	32.3093953	-28.868286	45.1131897
7	Jun-22	8.122451941	-16.258875	32.5037785	-29.165569	45.4104732
8	Jul-22	8.122451941	-16.45172	32.6966242	-29.460501	45.7054052
9	Aug-22	8.122451941	-16.643064	32.8879683	-29.753137	45.9980407
10	Sep-22	8.122451941	-16.832941	33.0778453	-30.043529	46.2884325
11	Oct-22	8.122451941	-17.021385	33.2662885	-30.331728	46.5766315
12	Nov-22	8.122451941	-17.208426	33.4533298	-30.617783	46.8626865
13	Dec-22	8.122451941	-17.394096	33.6390001	-30.901741	47.1466447

Figure 39: 2022 monthly forecasted sales for size Freesize in 1-Apparel category

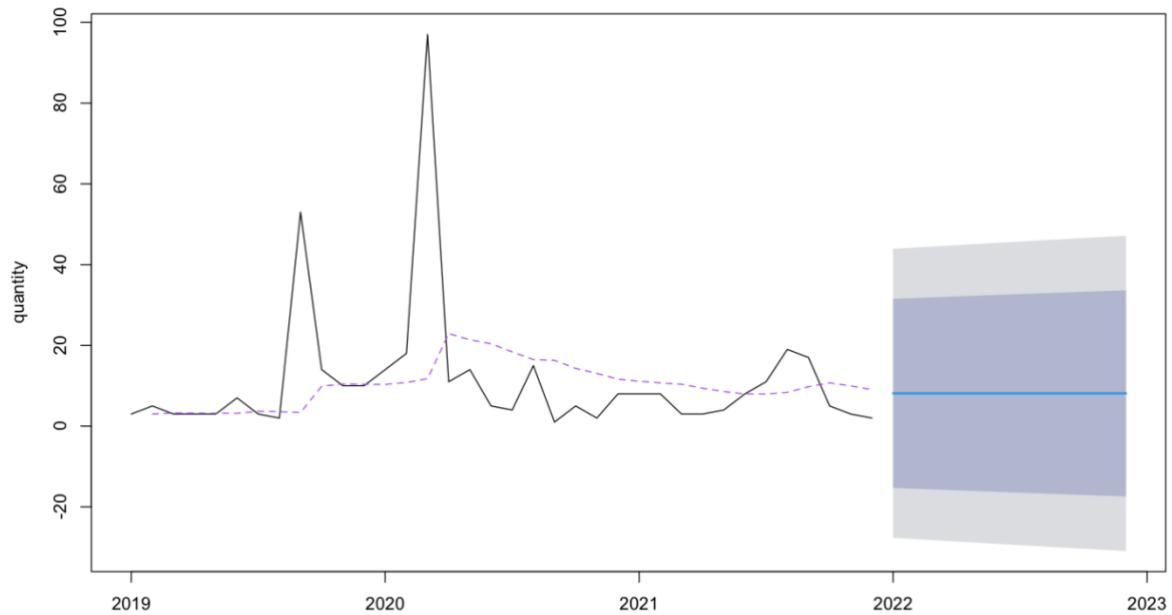


Figure 40: 2022 Exponential Smoothing plot for size Freesize in 1-Apparel category

	Point.Foreca	Lo.80	Hi.80	Lo.95	Hi.95
Jan-22	73595.0552	51952.8348	95237.2755	40496.1354	106693.975
Feb-22	42118.0817	13308.5624	70927.6009	-1942.2758	86178.4392
Mar-22	23423.6082	-11095.823	57943.0389	-29369.305	76216.5217
Apr-22	8354.67637	-31055.903	47765.2561	-51918.604	68627.9568
May-22	10023.2445	-33735.143	53781.6322	-56899.434	76945.9234
Jun-22	9314.43773	-38397.188	57026.063	-63654.196	82283.0718
Jul-22	32505.8392	-18855.643	83867.3218	-46044.77	111056.448
Aug-22	44302.8658	-10465.78	99071.5118	-39458.55	128064.282
Sep-22	39753.9339	-18221.986	97729.8538	-48912.584	128420.452
Oct-22	37181.4188	-23833.415	98196.2529	-56132.717	130495.555
Nov-22	59510.987	-4398.4229	123420.397	-38230.021	157251.995
Dec-22	50782.9302	-15895.517	117461.378	-51192.955	152758.816

Figure 41: 2022 monthly forecasted revenue