Data Warehousing & Business Intelligence(IT)
3rd Year, 1st Semester

Assignment 2

Submitted to

Sri Lanka Institute of Information Technology

IT20035358

K.N.N.D.S Jayarathna.

Weekday Batch

Step 01 - Data source selection

- The data warehouse that was previously imported in Assignment one is the data source for 2nd Assignment.
- One Fact Table and five Dimension Tables are included.
- The Snowflake schema is used to organize the tables.

- DimItem - contains details of all the Item details, the Bran Types, Categories and Brands as well as the insert and modified dates.

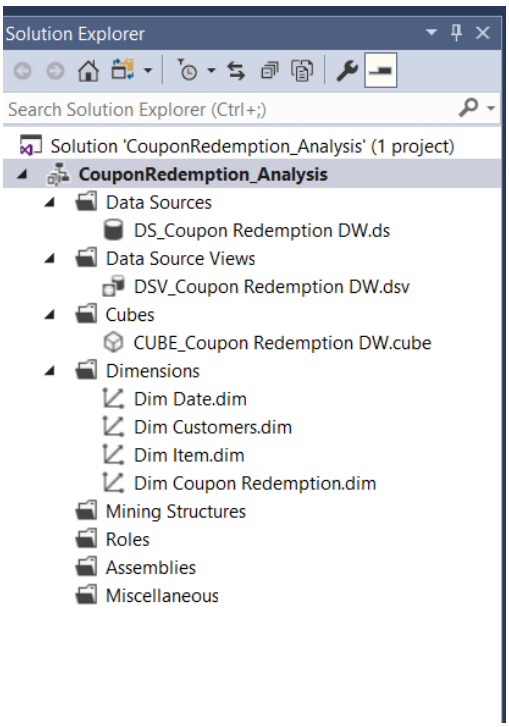
- DimCustomer - contains all the customer data, their IDs, their income bracket, family size, marital status, no of children, if the house is rented and age range. And insert and modified dates.

- DimCouponRedemption - coupon redemption contains information about all coupons provided, including the campaign to which they belonged, their redemption status, and the client to whom they were offered. It also joins the DimCampaign table with a foreign key.

- DimCampaign - provides information about all the campaigns that offered customers coupons to redeem. It includes the campaign date, start and end dates, as well as the campaign id.

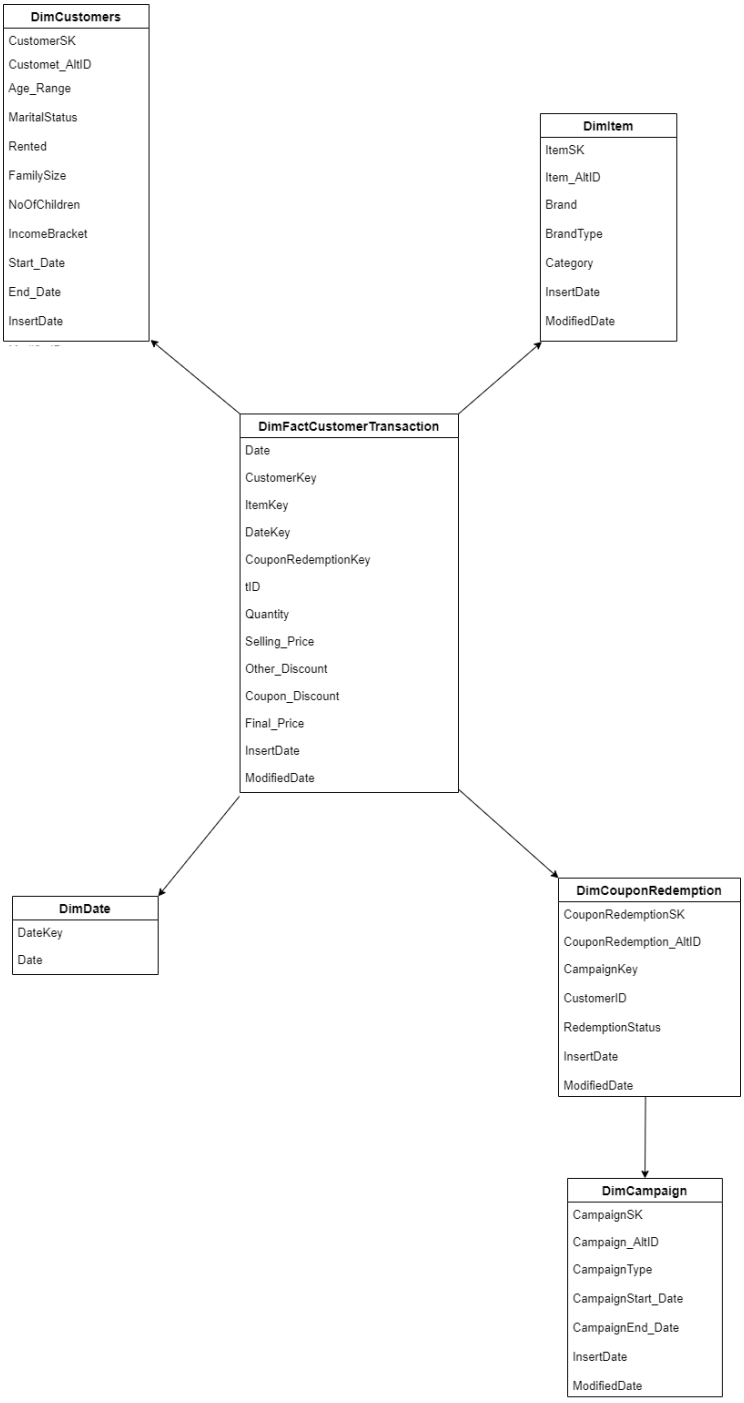
- DimDate - includes date dimension

- FactCustomerTransaction table - includes all of the customer's transactions,It has surrogate keys for all the Dimension tables that are connected.It also has a Date key, which is linked to DimDate's date key.



- First, I created new SSAS project and named it as CouponRedemption_Analysis. The data warehouse was renamed DS_Coupon Redemption DW.ds loaded as the data source.

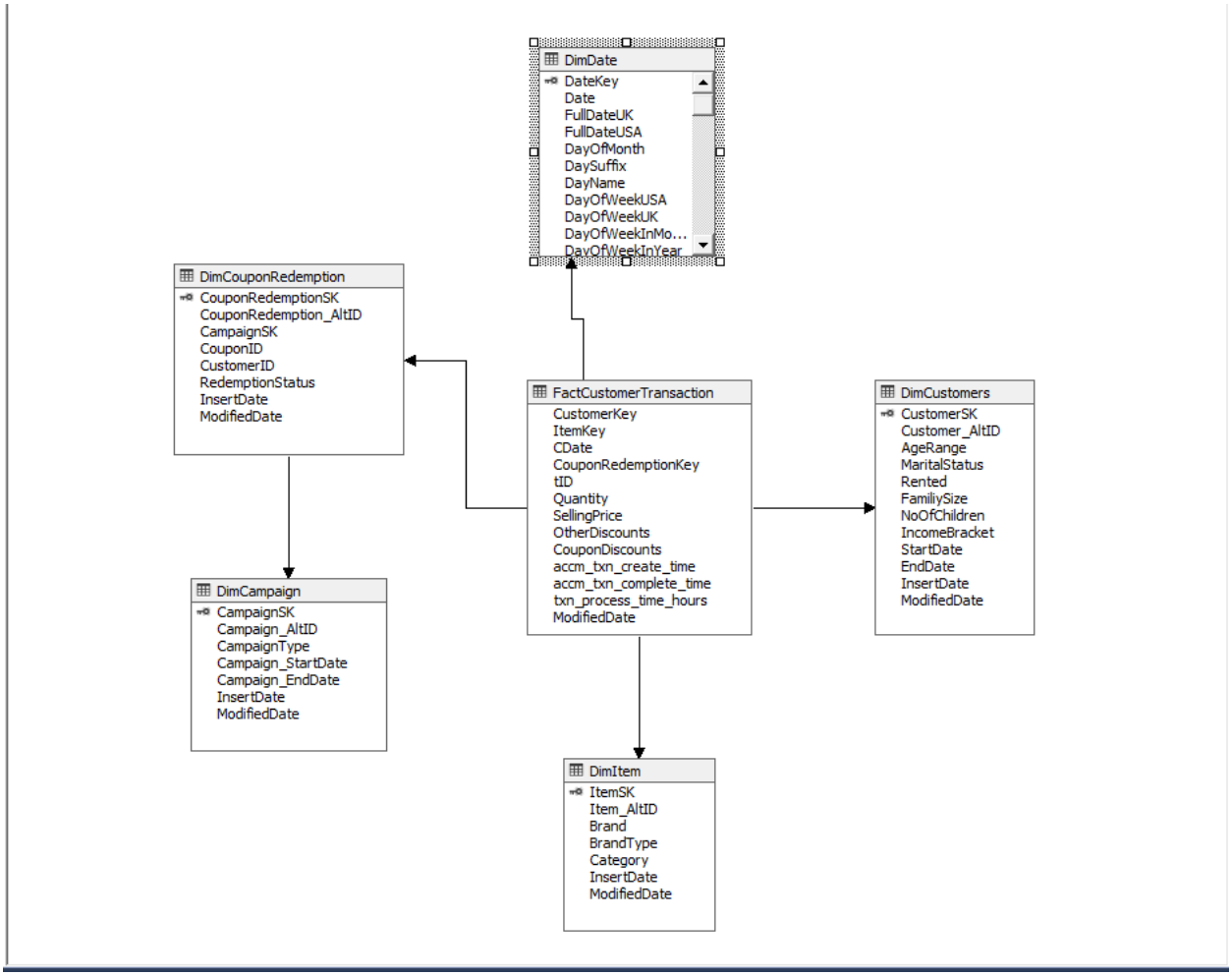
- The Snowflake schema that was created is shown below.



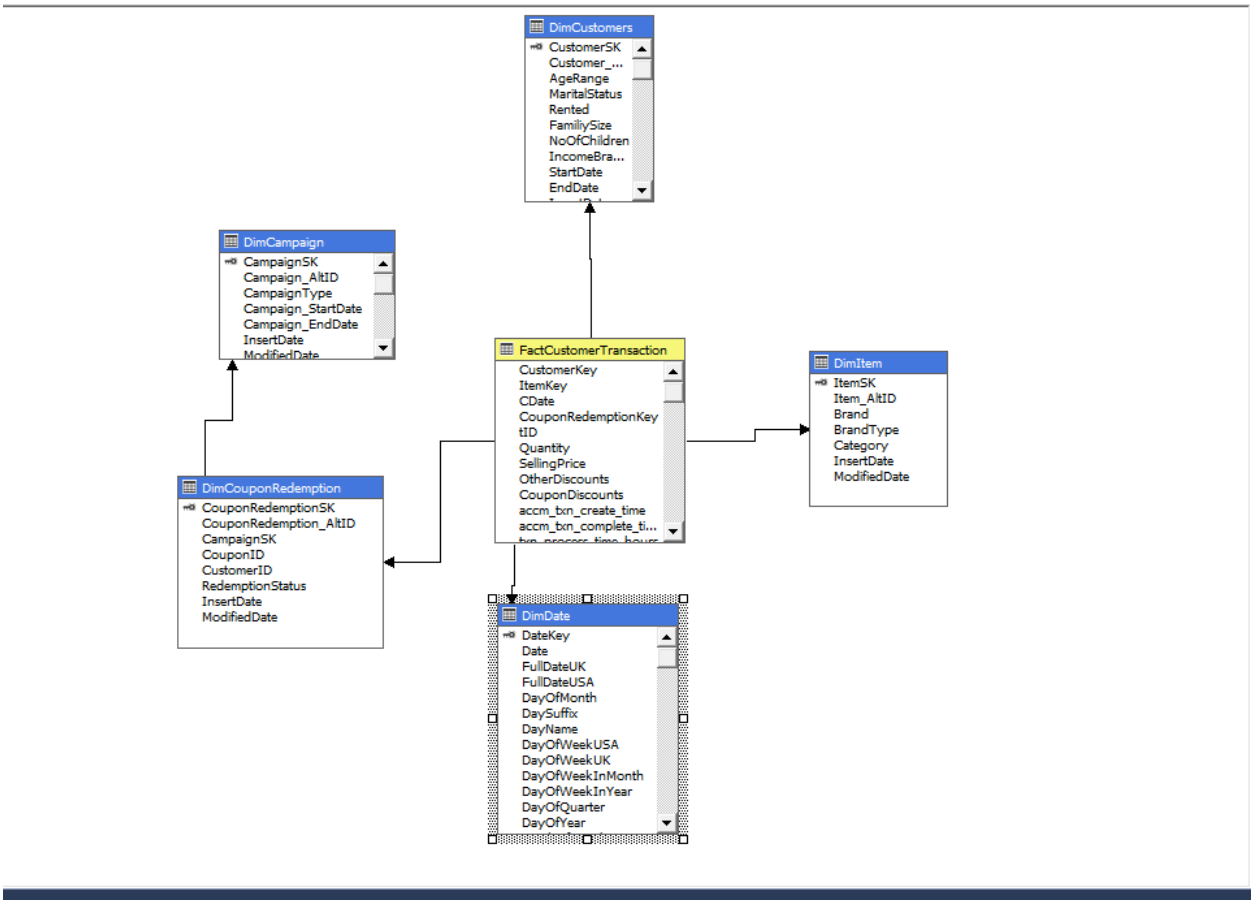
Step 02 -Cube Implementation

- Before implement the Cube I implemented the data source view. It named as DSV_Coupon RedemptionDW.dsv.
- Data warehouse was used as the data source as mentioned.
- The tables were then finished by joining the surrogate keys in the Fact table to the surrogate keys in the dimension tables, and the table structure was finalized after connecting all the essential components.

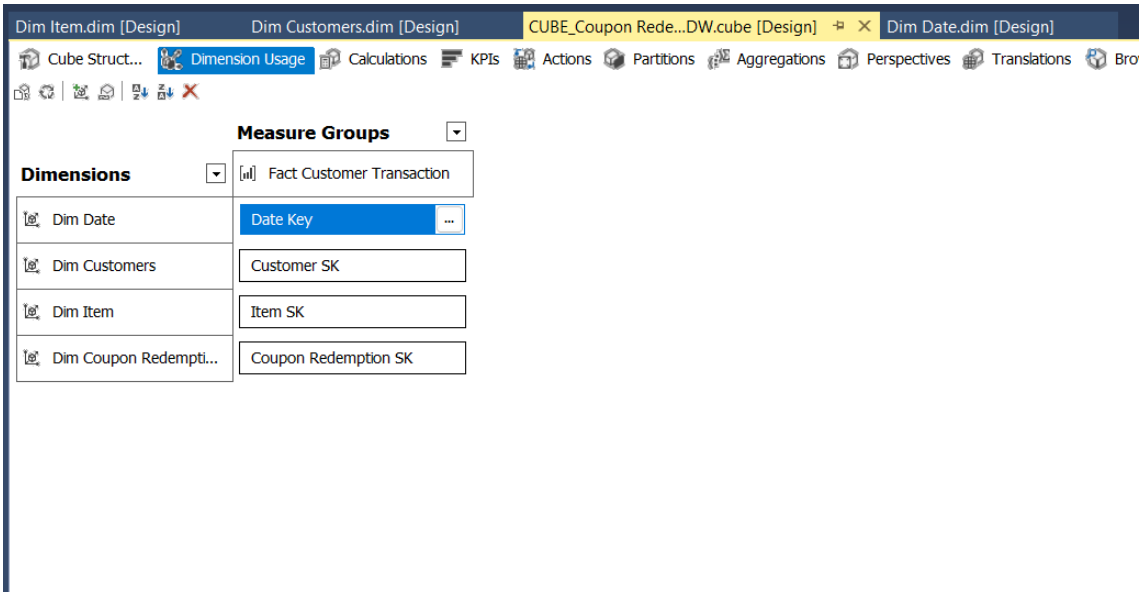
  - The table structure can be seen in the image below.



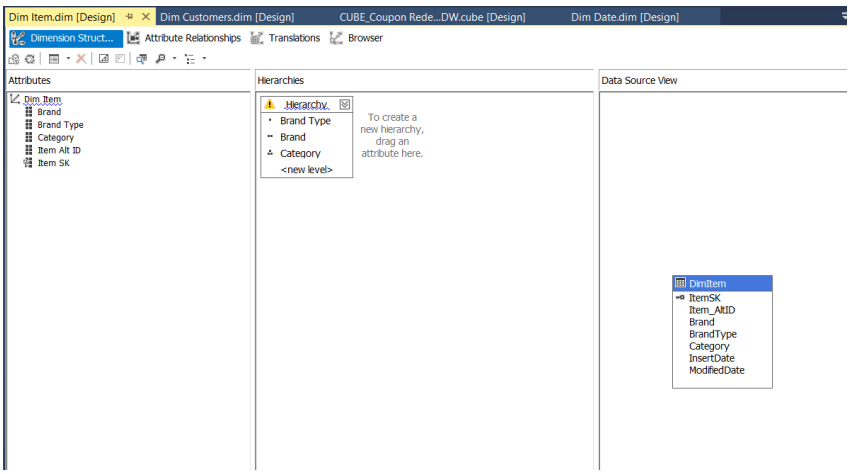
- After the Data Source view was created a cube was created. The cube was named CUBE_Coupon Redemption Dw.Cube.



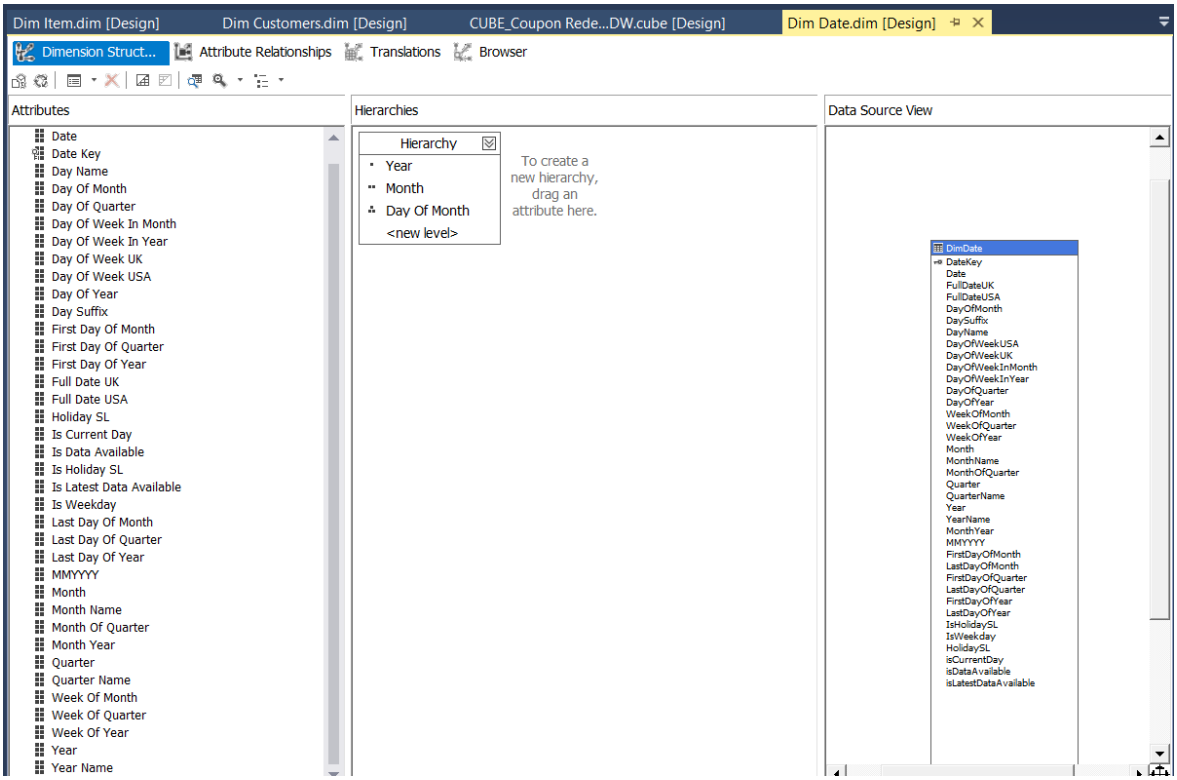
- All keys were properly mapped as follows.



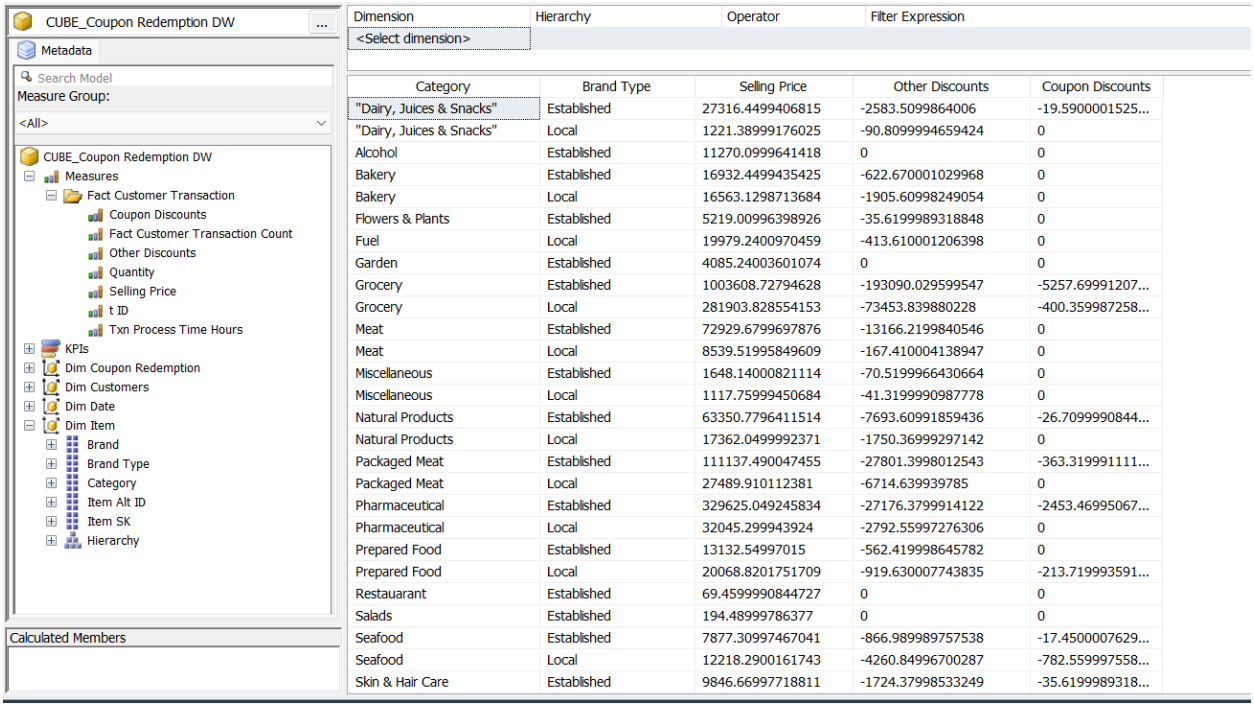
- Hierarchies were created to identify levels between relationships.
- Hierarchies were created for Items as well, considering their Brand, Brand Type, and the Item Categories.



- To map the dates and construct a flow of Year-Month-Date, date hierarchy was created.

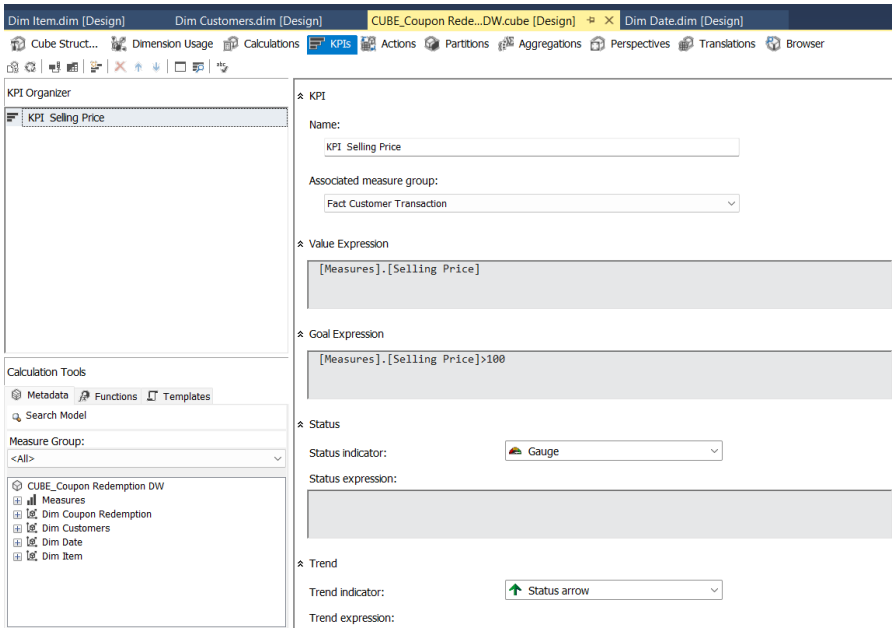


- These hierarchies were utilized to determine drill down, roll up OLAP operations.
- Sql Server Management Studio was used to connect to the Analysis Service, and the cube was then deployed.
- There were mistakes that happened throughout the deployment of the cube before it was successfully deployed, and all the errors were corrected.
- After the cube was successfully deployed, data browsing was enabled in Visual Studio Data Tools and SQL Server Management Studio, as shown below.

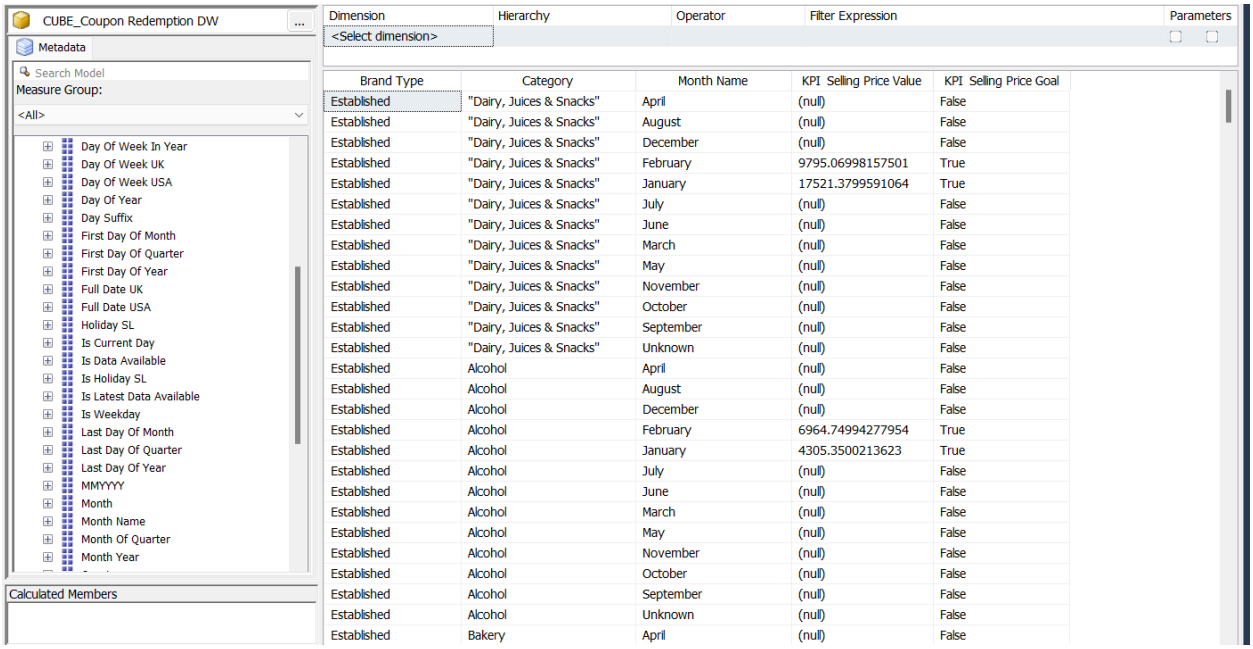


✓ Key Performer Indicator

- I have created KPI final Price. It is very important to the system to for determining how many customers purchased selling price more than 100 and which type of Items related to that price.



- The results of analyzing the KPI Selling Price against Brand Type and Category of an Item, as well as the month name, are shown in the image below.



Brand Type	Category	Month Name	KPI Selling Price Value	KPI Selling Price Goal
Established	"Dairy, Juices & Snacks"	April	(null)	False
Established	"Dairy, Juices & Snacks"	August	(null)	False
Established	"Dairy, Juices & Snacks"	December	(null)	False
Established	"Dairy, Juices & Snacks"	February	9795.06998157501	True
Established	"Dairy, Juices & Snacks"	January	17521.3799591064	True
Established	"Dairy, Juices & Snacks"	July	(null)	False
Established	"Dairy, Juices & Snacks"	June	(null)	False
Established	"Dairy, Juices & Snacks"	March	(null)	False
Established	"Dairy, Juices & Snacks"	May	(null)	False
Established	"Dairy, Juices & Snacks"	November	(null)	False
Established	"Dairy, Juices & Snacks"	October	(null)	False
Established	"Dairy, Juices & Snacks"	September	(null)	False
Established	"Dairy, Juices & Snacks"	Unknown	(null)	False
Established	Alcohol	April	(null)	False
Established	Alcohol	August	(null)	False
Established	Alcohol	December	(null)	False
Established	Alcohol	February	6964.74994277954	True
Established	Alcohol	January	4305.3500213623	True
Established	Alcohol	July	(null)	False
Established	Alcohol	June	(null)	False
Established	Alcohol	March	(null)	False
Established	Alcohol	May	(null)	False
Established	Alcohol	November	(null)	False
Established	Alcohol	October	(null)	False
Established	Alcohol	September	(null)	False
Established	Alcohol	Unknown	(null)	False
Established	Bakery	April	(null)	False

Step 03 -OLAP operations

- Online Analytical Processing can be done by connecting to Excel. It provides us a platform to give graphical as well as tabular representations of our data that we have in our cube. Reports were created using Excel by both methods, by connecting to Excel without MDX queries, where we were able to obtain all the table and using MDX queries, where selected tables were obtained.

➢ Drill Down and Roll up

	Column Labels					
	February		January		Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuantity
Row Labels	Sum of MeasuresSelling Price	Sum of MeasuresQuantity	Sum of MeasuresSelling Price	Sum of MeasuresQuantity		
⊞Established	632778.4991	7066	1046033.578	11871	1678812.077	18937
⊞Local	177988.1395	125124	260857.3593	165002	438845.4987	290126
Grand Total	810766.6385	132190	1306890.937	176873	2117657.575	309063

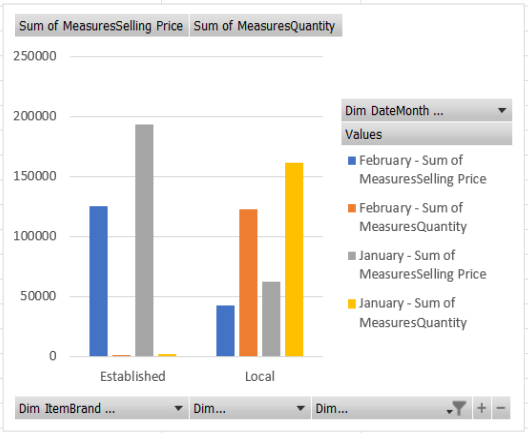
	Column Labels					
	February		January		Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuar
Row Labels	Sum of MeasuresSelling Price	Sum of MeasuresQuantity	Sum of MeasuresSelling Price	Sum of MeasuresQuantity		
⊟Established						
⊟1						
Bakery	838.1399841	49	2102.989989	104	2941.129973	
Grocery	1744.970005	16	6708.969914	31	8453.939919	
Miscellaneous			1.779999971	1	1.779999971	
Natural Products	4647.289967	130	5046.21996	151	9693.509927	
Pharmaceutical			20.65999985	2	20.65999985	
Restauarant			69.45999908	1	69.45999908	
⊟10						
"Dairy, Juices & Snacks"	70.87999725	1			70.87999725	
⊟1000						
Grocery	170.2599945	2	213.359993	3	383.6199875	
Meat	284.25	1			284.25	
Packaged Meat	975.9900131	17	1731.829983	26	2707.819996	
⊟1001						
Natural Products	88.69000244	1			88.69000244	
⊟101						
Pharmaceutical	106.4999962	5	1080.329969	40	1186.829966	
⊟1013						
Grocery	1184.699982	19	1403.759981	22	2588.459963	
⊟1015						
Pharmaceutical			70.87999725	1	70.87999725	
⊟1016						

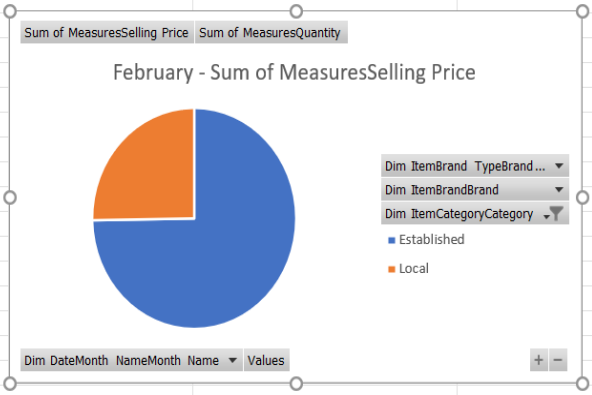
Sheet2 Sheet1

dy Accessibility: Investigate

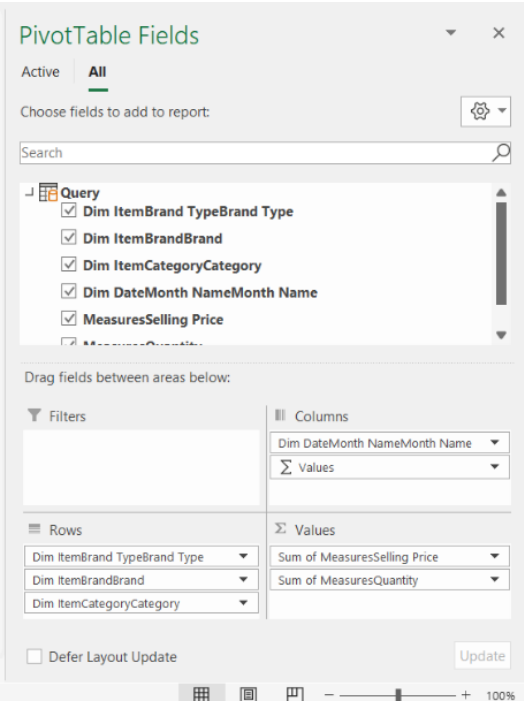
- The above screenshot shows an analysis in which we were able to compare the sum of Selling Price, and sum of quantity the items available by Brand Type, Brand and Category. We were able to analyze the variances in the values by drilling down from Brand Type, Brand and category of the items and here I used the Month name to analyze sum of selling price and quantity month wise.

Column Labels	February		January		Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuantity
Row Labels	Sum of MeasuresSelling Price	Sum of MeasuresQuantity	Sum of MeasuresSelling Price	Sum of MeasuresQuantity		
⊞Established	125074.5699	1255	193439.2696	2007	318513.8394	3262
⊞Local	42280.73006	122734	62210.55998	161650	104491.29	284384
Grand Total	167355.2999	123989	255649.8296	163657	423005.1295	287646





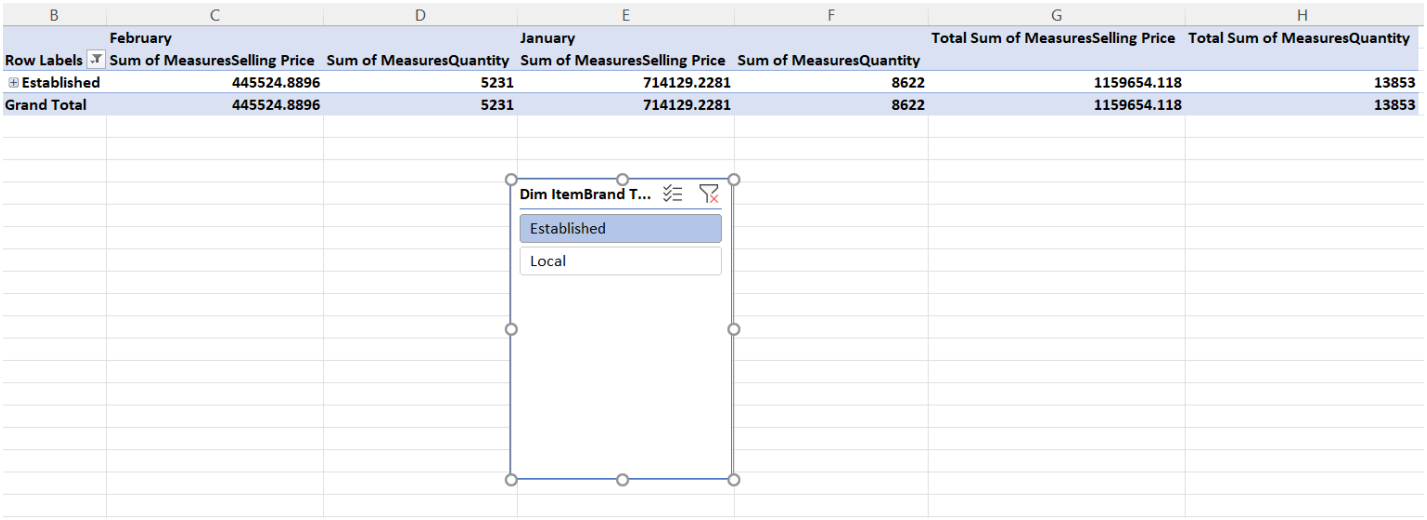
Graphical Representation



Selected proper dimension tables, also selected measures from the FactcustomerTransaction Table and Drag and drop that fields into proper coloumns, Rows and values to implement the Drill down and roll up operations.

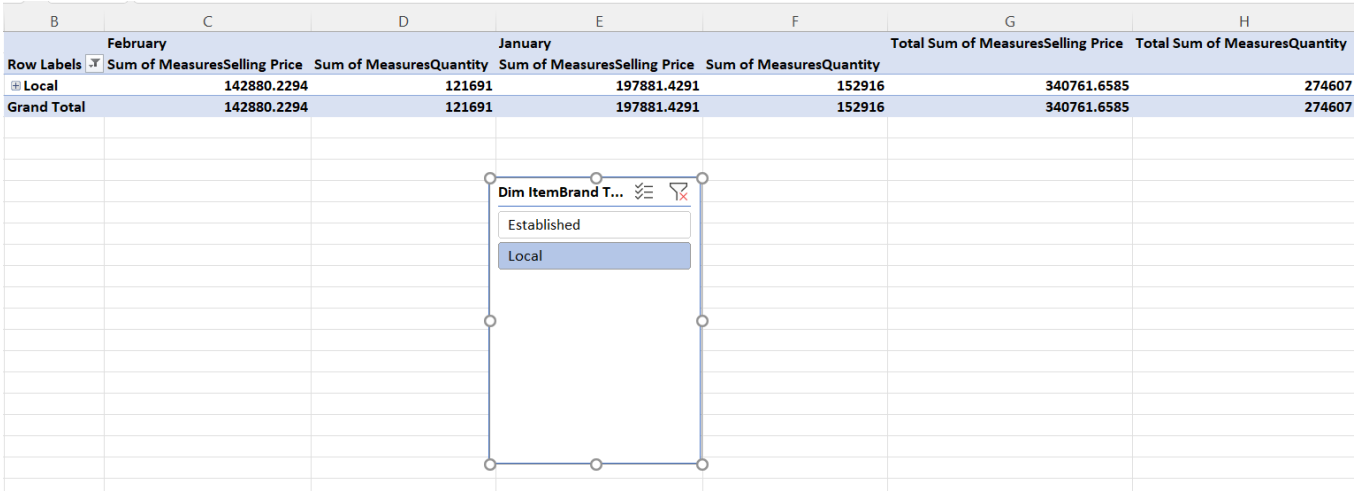
➢ Slice

- I have sliced my data set according to the Established and Local BrandTYpes.



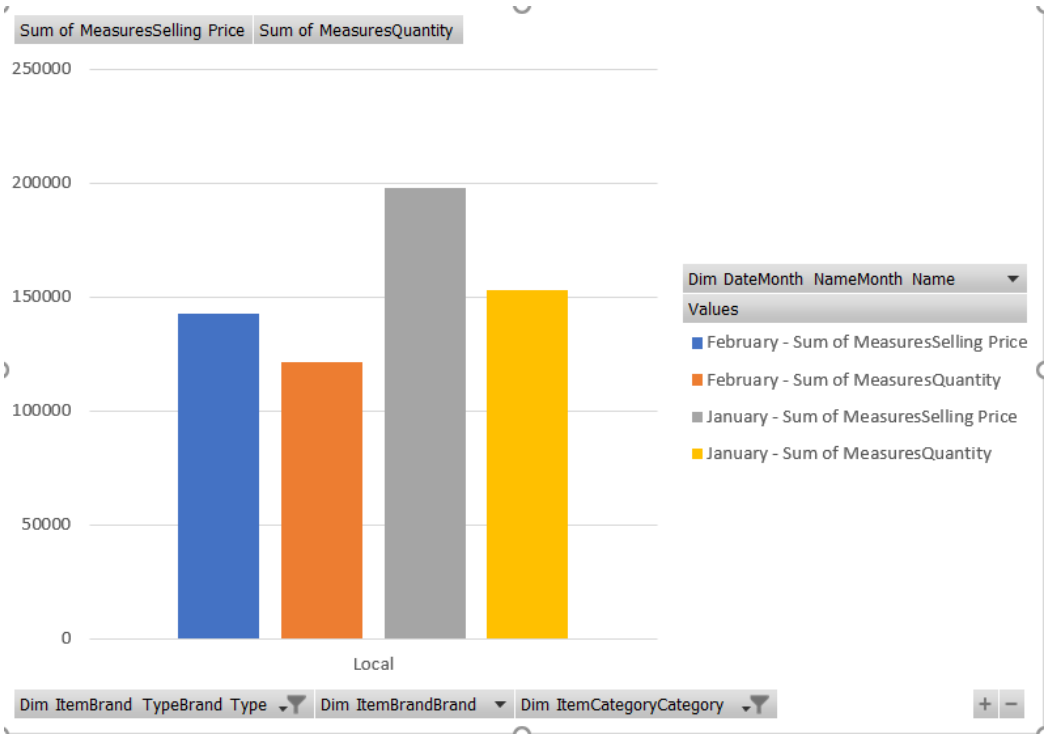
Row Labels	February Sum of MeasuresSelling Price	February Sum of MeasuresQuantity	January Sum of MeasuresSelling Price	January Sum of MeasuresQuantity	Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuantity
⊞Established	445524.8896	5231	714129.2281	8622	1159654.118	13853
Grand Total	445524.8896	5231	714129.2281	8622	1159654.118	13853

Slicing data according to the establish brand type

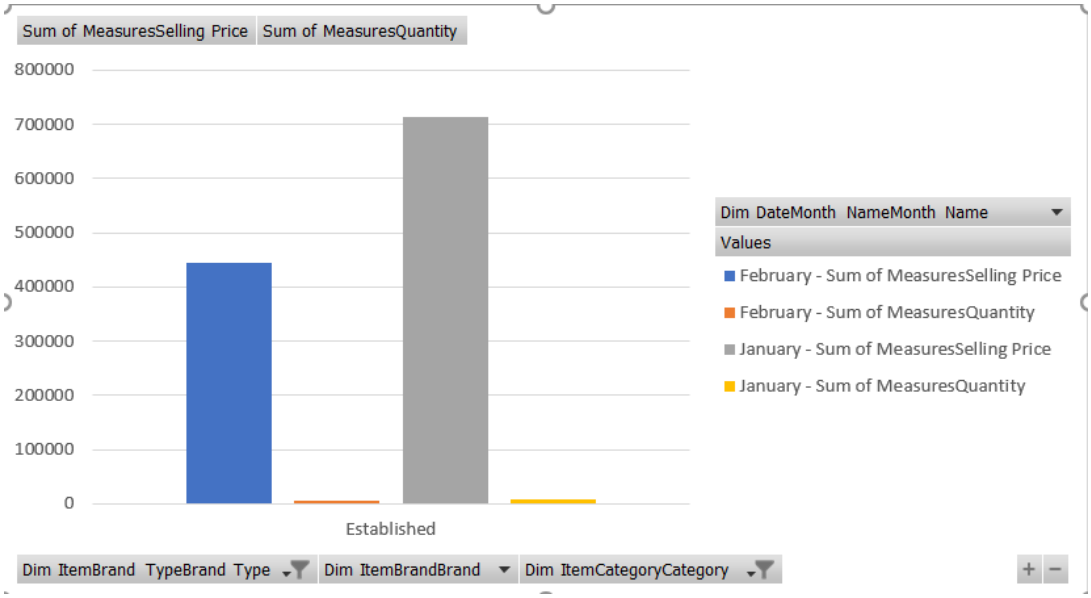


Row Labels	February Sum of MeasuresSelling Price	February Sum of MeasuresQuantity	January Sum of MeasuresSelling Price	January Sum of MeasuresQuantity	Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuantity
⊞Local	142880.2294	121691	197881.4291	152916	340761.6585	274607
Grand Total	142880.2294	121691	197881.4291	152916	340761.6585	274607

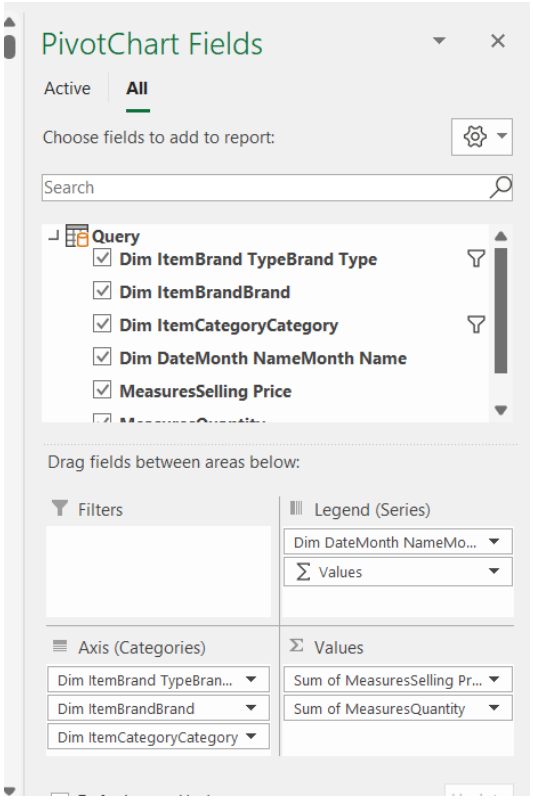
Slicing data according to the local brand type



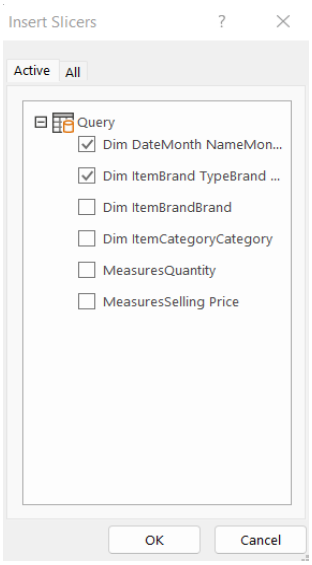
Graphical representation of slicing with local brand type



Graphical representation of slicing with establish brand type

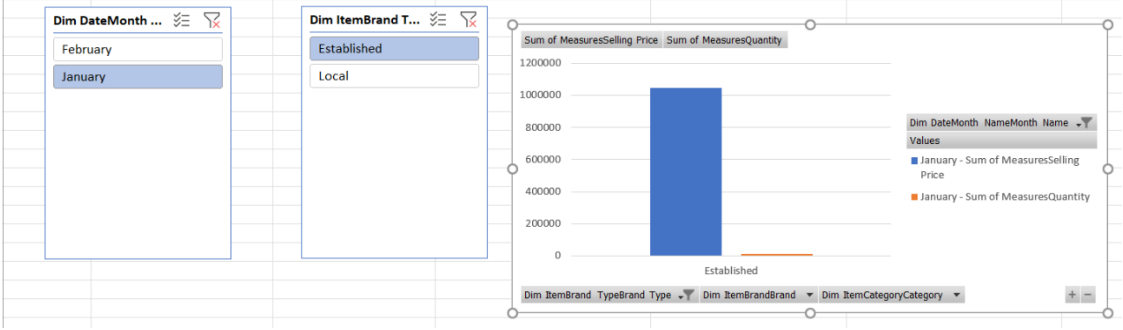


➢ Dice

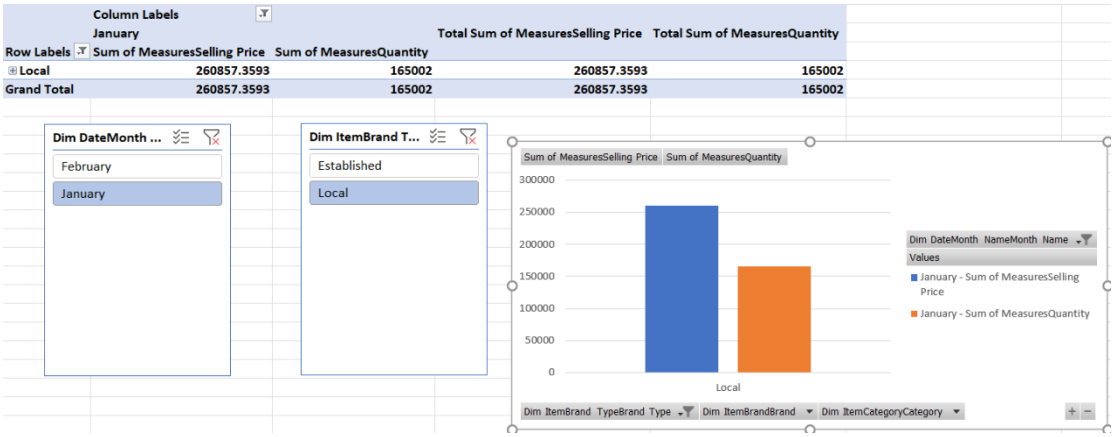


Here I used both DimItem and DimDate table,From DimItem I used BrandType and DimDate table I used Month Name to filter the data.

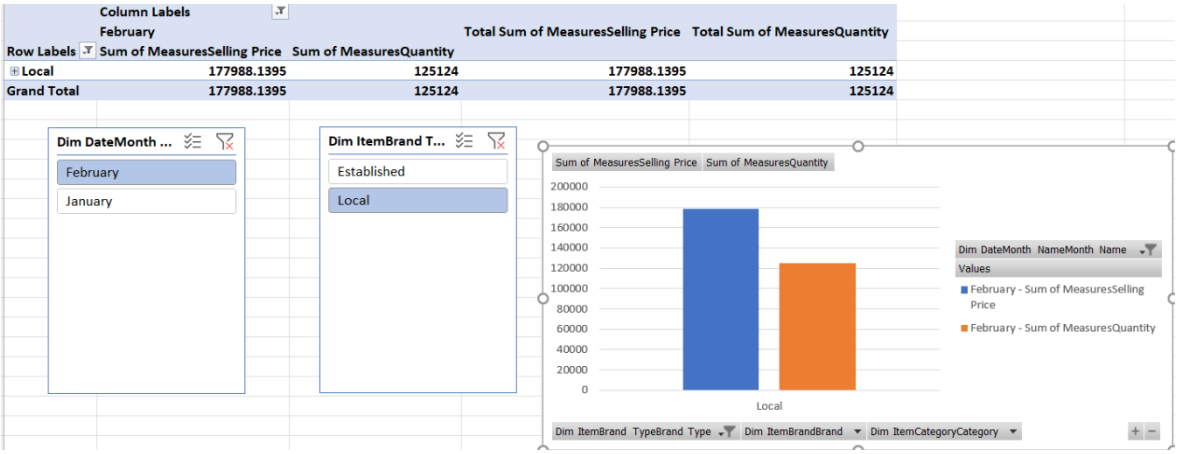
Column Labels	January		Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuantity
Row Labels	Sum of MeasuresSelling Price	Sum of MeasuresQuantity		
Established	1046033.578	11871	1046033.578	11871
Grand Total	1046033.578	11871	1046033.578	11871

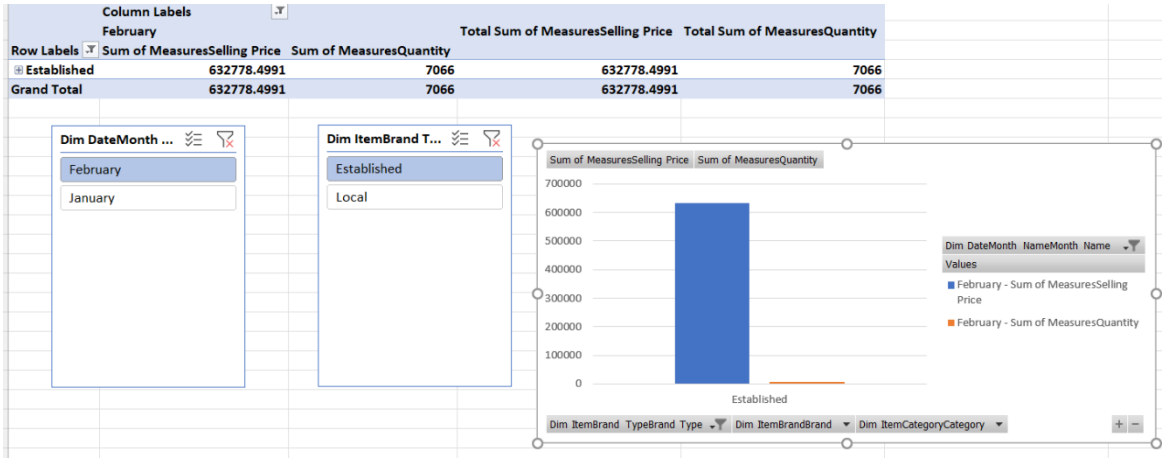


Column Labels	January		Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuantity
Row Labels	Sum of MeasuresSelling Price	Sum of MeasuresQuantity		
Local	260857.3593	165002	260857.3593	165002
Grand Total	260857.3593	165002	260857.3593	165002



Column Labels	February		Total Sum of MeasuresSelling Price	Total Sum of MeasuresQuantity
Row Labels	Sum of MeasuresSelling Price	Sum of MeasuresQuantity		
Local	177988.1395	125124	177988.1395	125124
Grand Total	177988.1395	125124	177988.1395	125124





➢ Pivot

Row Labels	Sum of MeasuresQuantity	Sum of MeasuresSelling Price	Sum of Total
1			
Established			
Bakery	153	2941.129973	449992.8859
Grocery	47	8453.939919	397335.1762
Miscellaneous	1	1.779999971	1.779999971
Natural Products	281	9693.509927	2723876.289
Pharmaceutical	2	20.65999985	41.31999969
Restauarant	1	69.45999908	69.45999908
10			
Established			
"Dairy, Juices & Snacks"	1	70.87999725	70.87999725
1000			
Established			
Grocery	5	383.6199875	1918.099937
Meat	1	284.25	284.25
Packaged Meat	43	2707.819996	116436.2598
1001			
Established			
Natural Products	1	88.69000244	88.69000244
101			
Established			
Pharmaceutical	45	1186.829966	53407.34845
1013			
Established			
Grocery	41	2588.459963	106126.8585

Sheet2 Sheet1

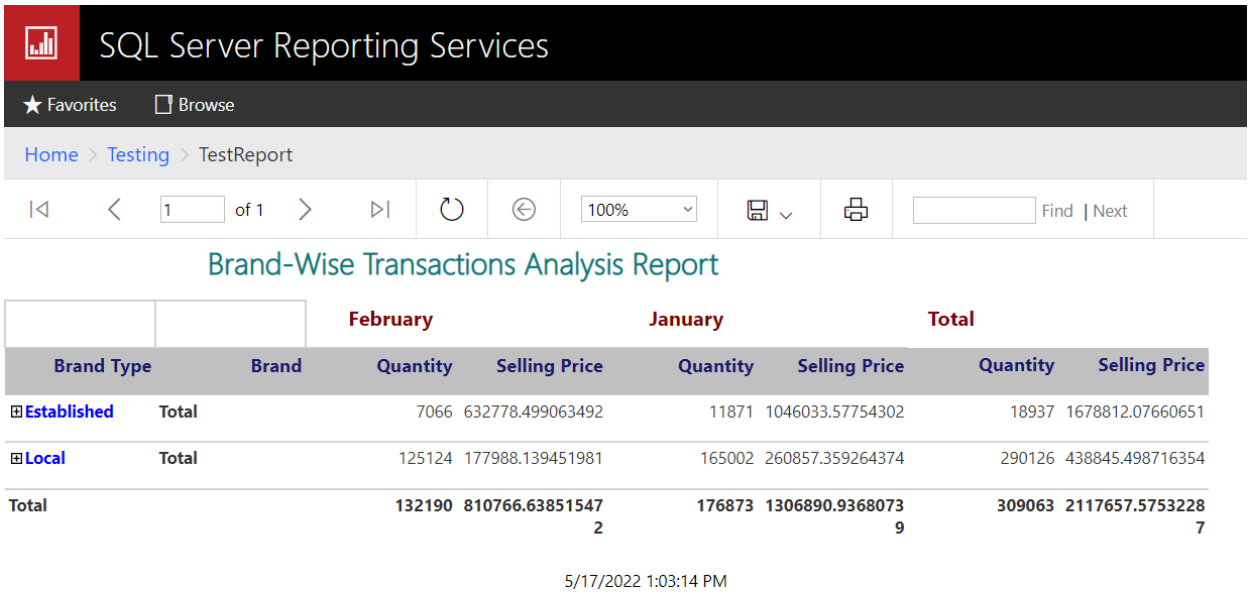
From the implement cube I implemented the above pivot table.

Step 04 - SSRS Reports

- First, I connected to the SQL reporting service configuration, the report builder was used to create reports. It was used to create number of reports.
- Then I started creating reports by specifying a data source source and then writing Query to retrieve reports.

1. Report with Matrix Report

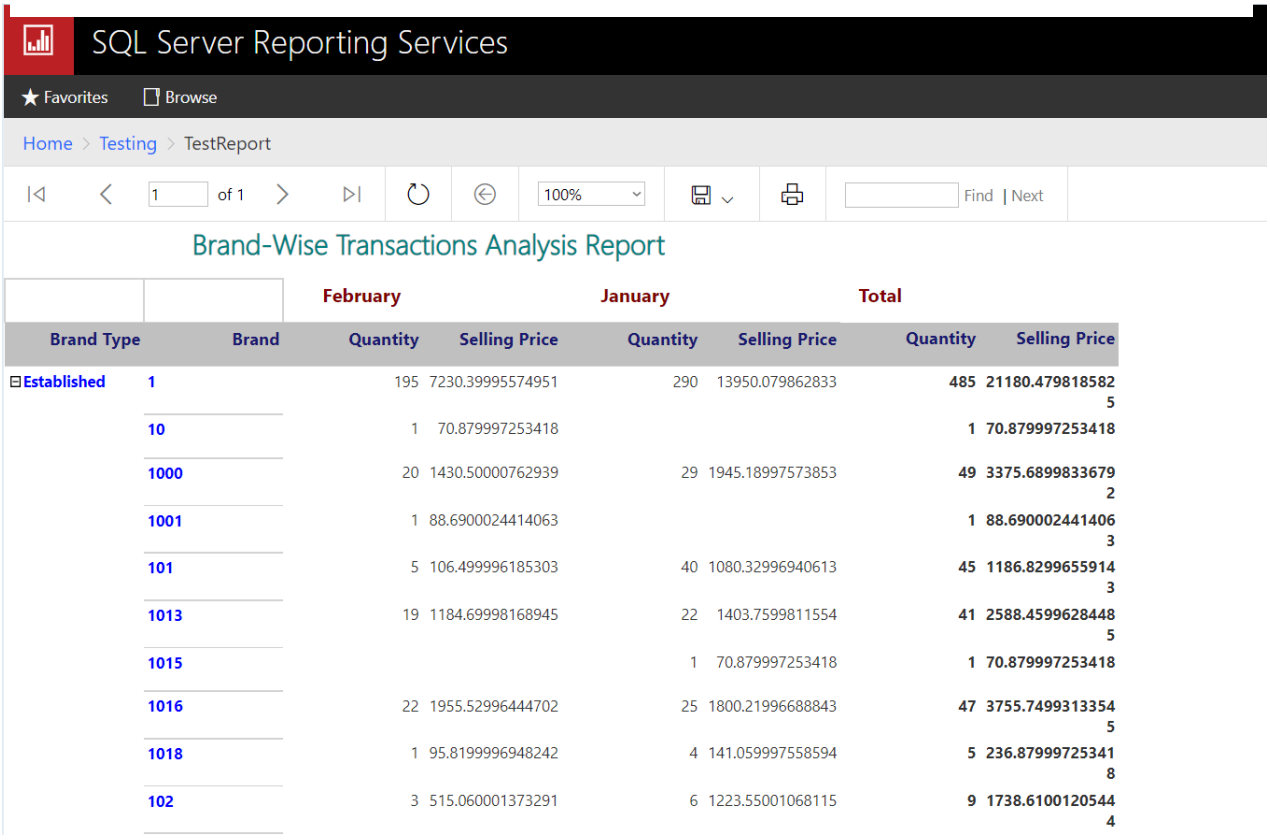
I used to Dim Item table and fact customer transaction table to analyse the brand wise transactional details. Here I hope to analyse how the customer had made the purchase and quantity of a certain brand types and brand, and here each brand of bardtype was analised separately for the months February and January.Also we looked at all the brand in the Established and Local Brand types.



Brand-Wise Transactions Analysis Report

		February		January		Total	
Brand Type	Brand	Quantity	Selling Price	Quantity	Selling Price	Quantity	Selling Price
⊞Established	Total	7066	632778.499063492	11871	1046033.57754302	18937	1678812.07660651
⊞Local	Total	125124	177988.139451981	165002	260857.359264374	290126	438845.498716354
Total		**132190**	**810766.638515472**	**176873**	**1306890.936807 39**	**309063**	**2117657.575322 87**

5/17/2022 1:03:14 PM



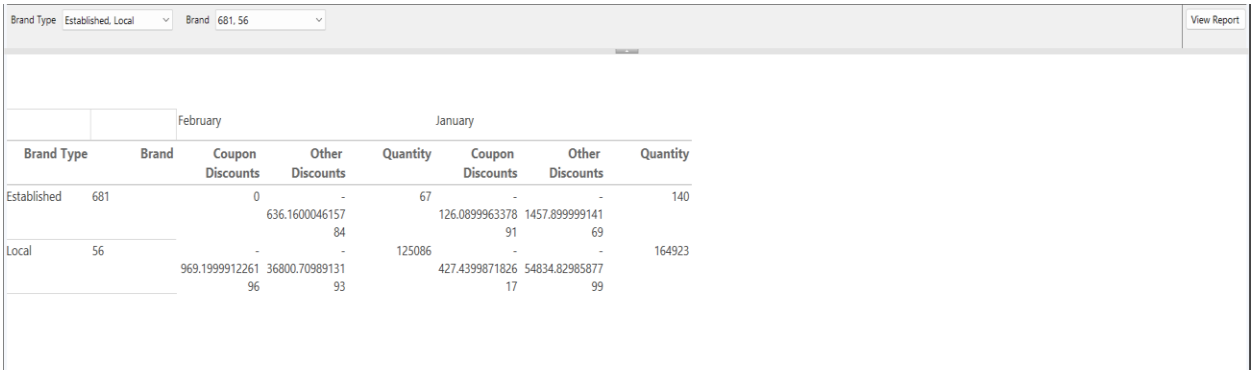
Brand-Wise Transactions Analysis Report

		February		January		Total	
Brand Type	Brand	Quantity	Selling Price	Quantity	Selling Price	Quantity	Selling Price
⊟Established	1	195	7230.39995574951	290	13950.079862833	**485**	**21180.4798185825**
	10	1	70.879997253418			**1**	**70.879997253418**
	1000	20	1430.50000762939	29	1945.18997573853	**49**	**3375.68998336792**
	1001	1	88.6900024414063			**1**	**88.690002441406 3**
	101	5	106.499996185303	40	1080.32996940613	**45**	**1186.82996559143**
	1013	19	1184.69998168945	22	1403.7599811554	**41**	**2588.45996284485**
	1015			1	70.879997253418	**1**	**70.879997253418**
	1016	22	1955.52996444702	25	1800.21996688843	**47**	**3755.74993133545**
	1018	1	95.8199996948242	4	141.059997558594	**5**	**236.879997253418**
	102	3	515.060001373291	6	1223.55001068115	**9**	**1738.61001205444**

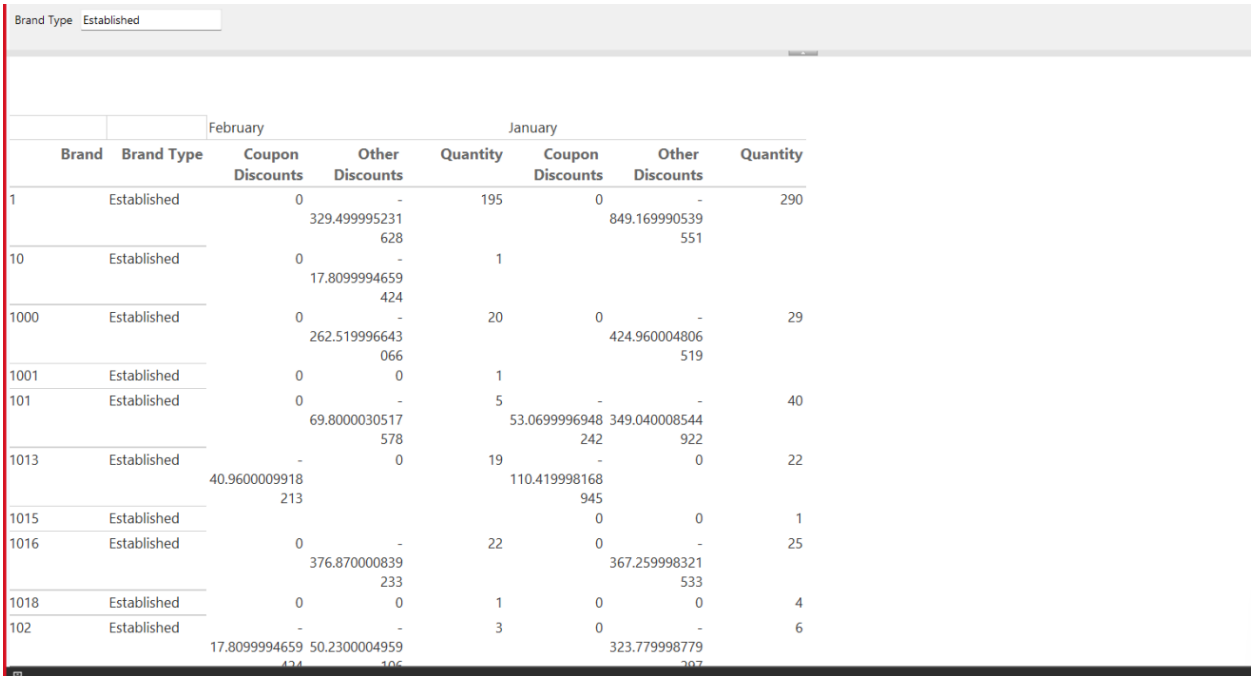
Above two images show the matrix report of analysing Brand-wise transactions.

2. Report with more than one Parameter

More Than one Parameter based on Brand and Brand Type



		February			January		
Brand Type	Brand	Coupon Discounts	Other Discounts	Quantity	Coupon Discounts	Other Discounts	Quantity
Established	681	0	-636.160004615784	67	-126.089996337891	-1457.89999914169	140
Local	56	-969.199991226196	-36800.7098913193	125086	-427.439987182617	-54834.8298587799	164923

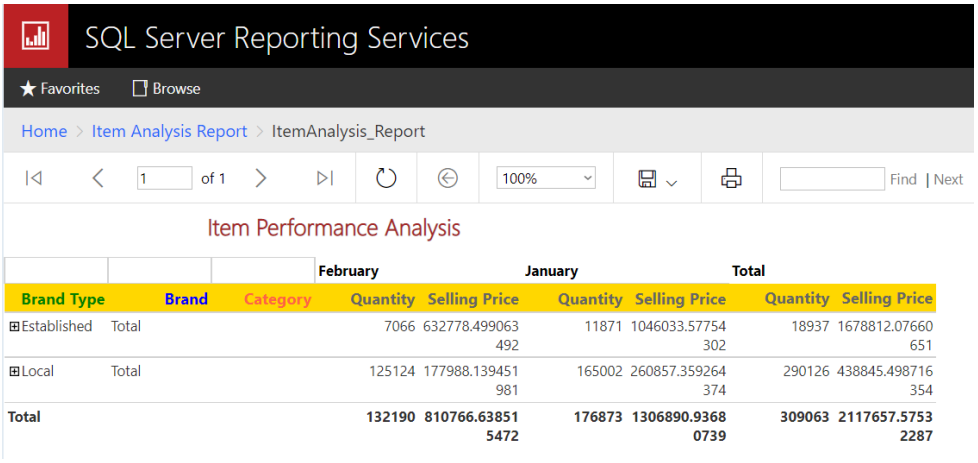


		February			January		
Brand	Brand Type	Coupon Discounts	Other Discounts	Quantity	Coupon Discounts	Other Discounts	Quantity
1	Established	0	-329.499995231628	195	0	-849.169990539551	290
10	Established	0	-17.8099994659424	1			
1000	Established	0	-262.519996643066	20	0	-424.960004806519	29
1001	Established	0	0	1			
101	Established	0	-69.8000030517578	5	-53.0699996948242	-349.040008544922	40
1013	Established	-40.9600009918213	0	19	-110.419998168945	0	22
1015	Established				0	0	1
1016	Established	0	-376.870000839233	22	0	-367.259998321533	25
1018	Established	0	0	1	0	0	4
102	Established	-17.8099994659424	-50.2300004959106	3	0	-323.779998779297	6

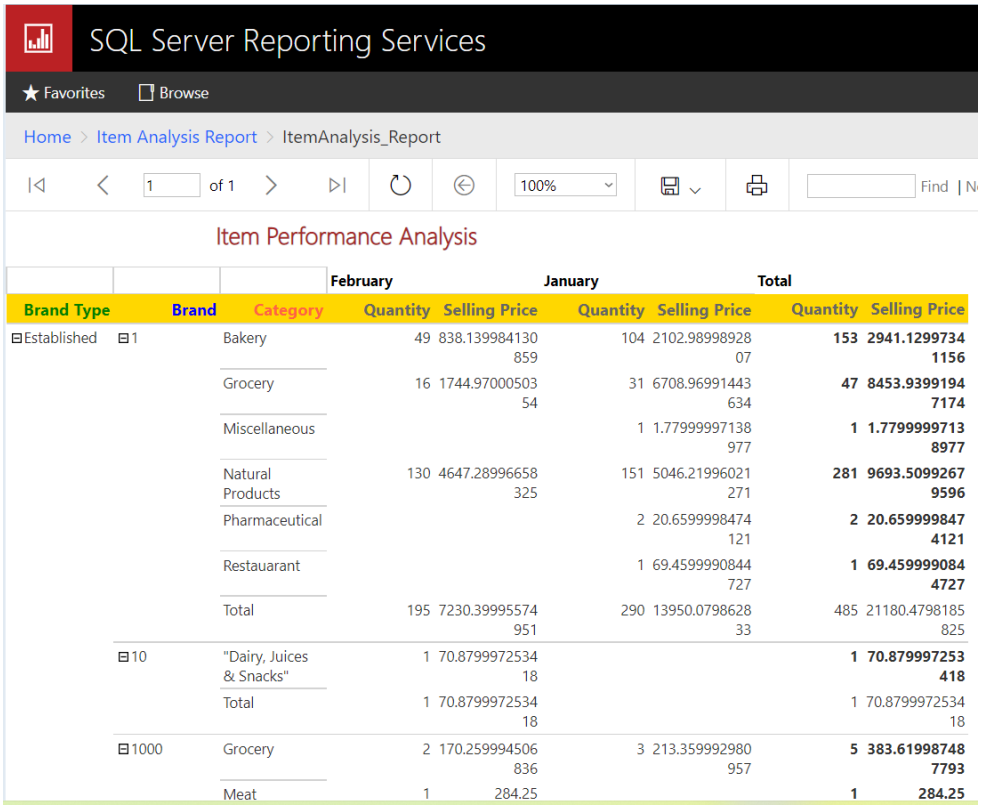
One of the most important studies required by this organization is to examine the discounts and determine whether they are used, as well as to determine which brands the consumer uses the discounts on. This report offers multi-valued parameters, such as the ability to filter by Item Brand Type to see all of the Brands that fall under it.

3. SSRS Drill Down report

- To create the drill down Report I used Brand,BrandTypes and Categories. All categories are under the Brand and all Brands are under the Brand Types. We were able to analyze the variances in the values by drilling down from BrandType, Brand and category of the items.

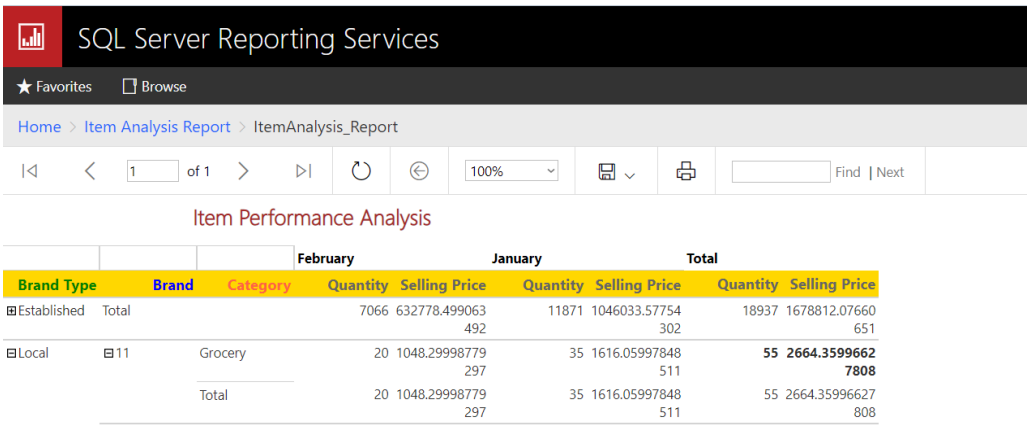


			February		January		Total	
Brand Type	Brand	Category	Quantity	Selling Price	Quantity	Selling Price	Quantity	Selling Price
⊞Established	Total		7066	632778.499063492	11871	1046033.57754302	18937	1678812.07660651
⊞Local	Total		125124	177988.139451981	165002	260857.359264374	290126	438845.498716354
Total			**132190**	**810766.638515472**	**176873**	**1306890.936807390**	**309063**	**2117657.575322287**



			February		January		Total	
Brand Type	Brand	Category	Quantity	Selling Price	Quantity	Selling Price	Quantity	Selling Price
⊟Established	⊟1	Bakery	49	838.13998413085 9	104	2102.9899892807	**153**	**2941.129973411 56**
		Grocery	16	1744.9700050354	31	6708.9699144363 4	**47**	**8453.939919471 74**
		Miscellaneous			1	1.7799999713977	**1**	**1.779999971389 77**
		Natural Products	130	4647.2899665832 5	151	5046.2199602127 1	**281**	**9693.509926795 96**
		Pharmaceutical			2	20.659999847412 1	**2**	**20.65999984741 21**
		Restauarant			1	69.459999084472 7	**1**	**69.45999908447 27**
		Total	195	7230.3999557495 1	290	13950.079862833	485	21180.479818582 5
	⊟10	"Dairy, Juices & Snacks"	1	70.879997253418			**1**	**70.87999725341 8**
		Total	1	70.879997253418			1	70.879997253418
	⊟1000	Grocery	2	170.25999450683 6	3	213.35999298095 7	**5**	**383.619987487 793**
		Meat	1	284.25			**1**	**284.25**

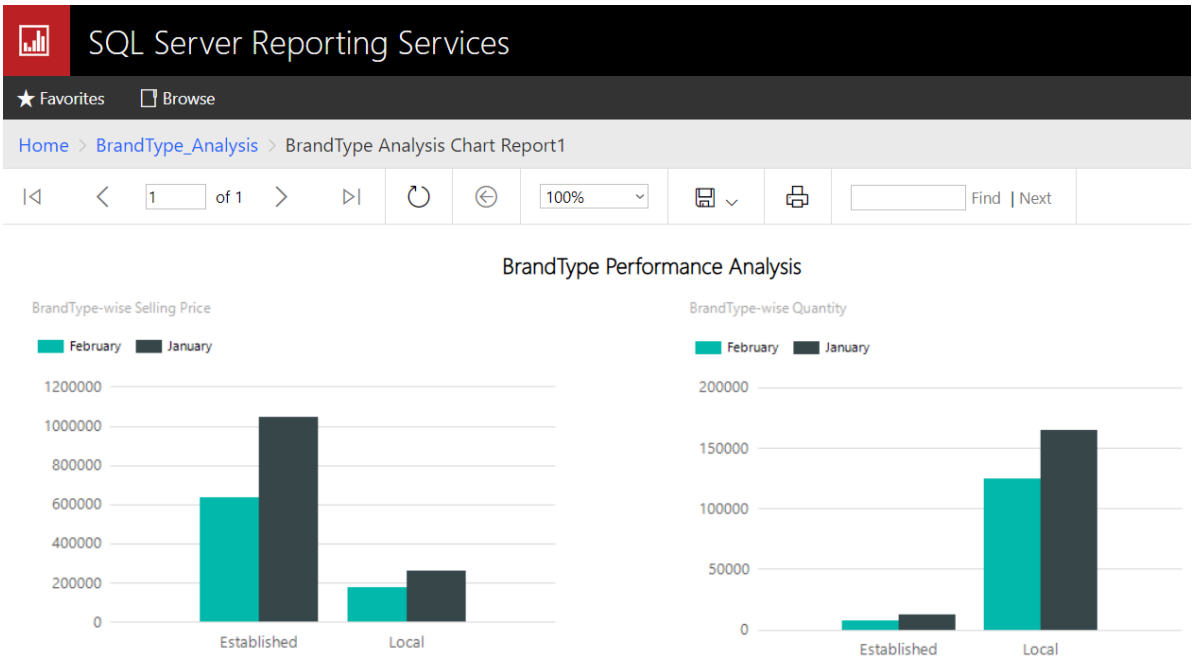
Item performance under the Established

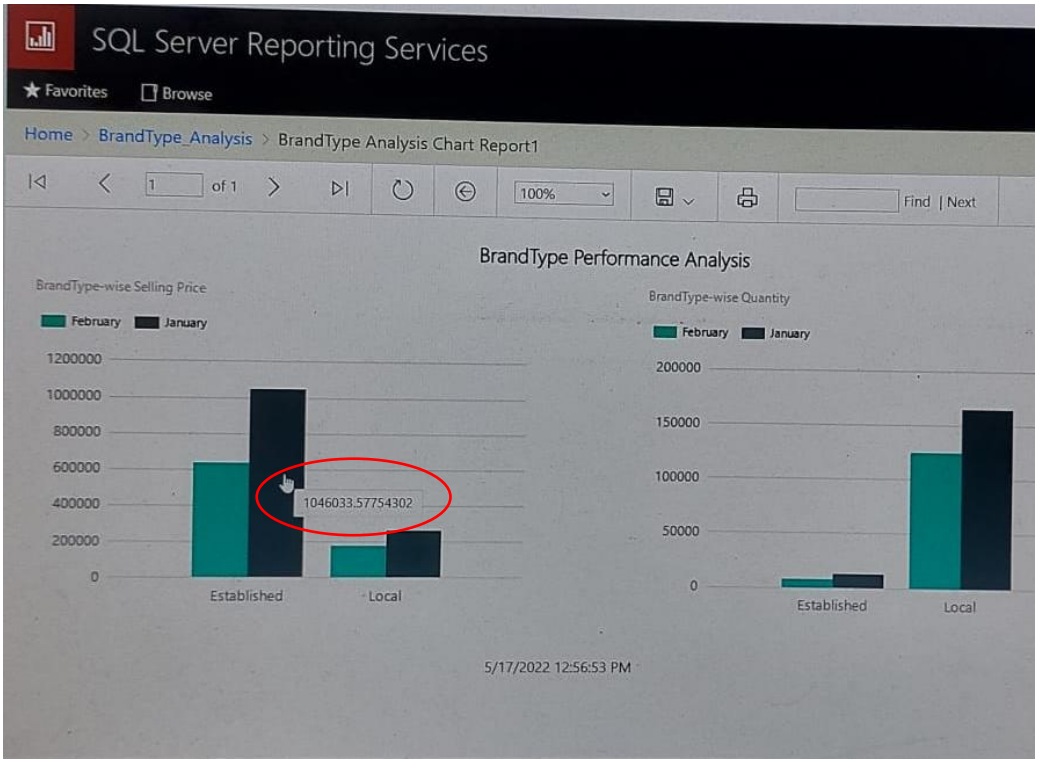


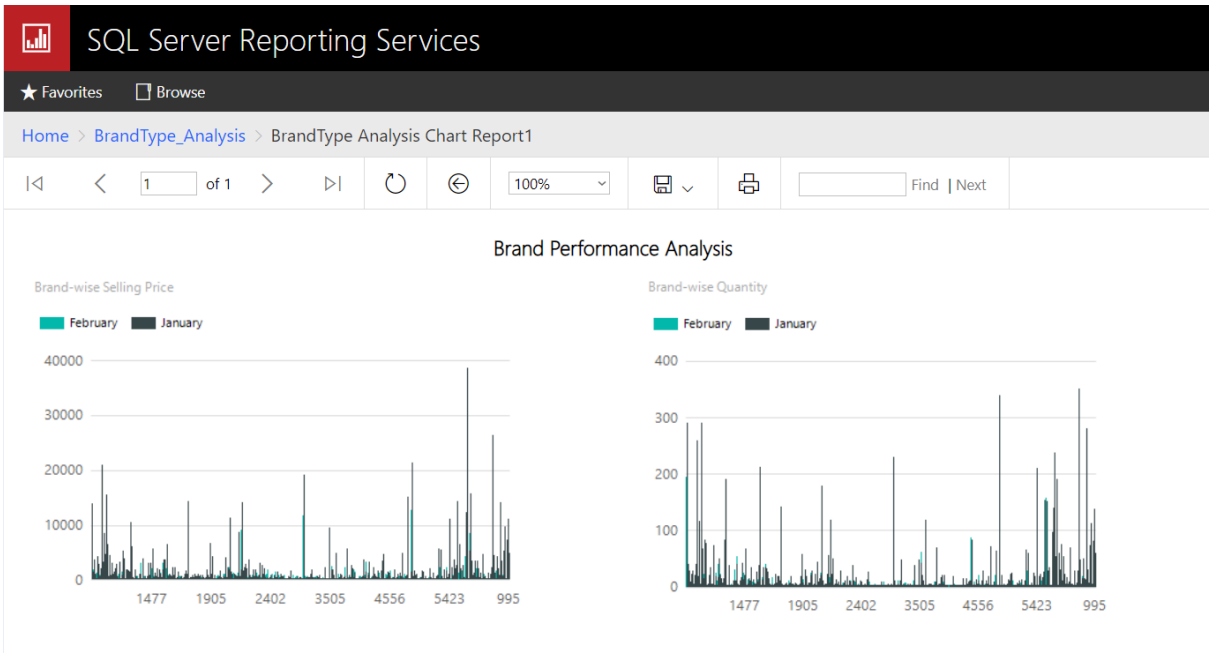
			February		January		Total	
Brand Type	Brand	Category	Quantity	Selling Price	Quantity	Selling Price	Quantity	Selling Price
⊞Established	Total		7066	632778.49906349 2	11871	1046033.5775430 2	18937	1678812.076606 51
⊟Local	⊟11	Grocery	20	1048.2999877929 7	35	1616.0599784851 1	**55**	**2664.359966278 08**
		Total	20	1048.2999877929 7	35	1616.0599784851 1	55	2664.359966278 08

Item Performance Analysing under the Local BrandType.

4. SSRS Drill Through Report







Above images shows the drill through Report.

- First, I created the BrandType Performance Analyse Report, using that we were able to drill through the Brand performance Analysis Report as well.