Finex

Data Modeling with Microsoft Excel

by Ng Hoi Yee

Model and analyze data using power pivot, DAX, and cube functions

Exploring data

Inside the Main Transaction folder, 6 files include sales records from 2015 to 2020 for sales organization, Finex Ventures.
Other files contain information on the following:
Customer Data, Location Data, Return Data, Store Data
Get Data >from file> from Excel workbook > Transform data

- Finex Customer Data
- Finex Location Data
- Finex Product Data
- Finex Return Data
- Finex Store Data

Main Transaction

- Finex Main Transaction Data 2015
- Finex Main Transaction Data 2016
- Finex Main Transaction Data 2017
- Finex Main Transaction Data 2018
- Finex Main Transaction Data 2019
- Finex Main Transaction Data 2020

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Exploring data

Finex Main Transaction Data 2015

	A	B	C	D	E	F	G	H	I
1	**Order ID**	**Order Date**	**Delivery Date**	**Delivery Mode**	**Customer ID**	**Product ID**	**Store ID**	**Quantity**	**Discount**
2	OrdID-2015-00000001	01-Jan-15	42007	2-3 Day	CustID- 210	ProdID-28001131	TW028	6	0.02
3	OrdID-2015-00000002	01-Jan-15	42011	2-3 Day	CustID- 146	ProdID-28000201	TN001	16	0.335
4	OrdID-2015-00000003	01-Jan-15	42011	Pick up	CustID- 372	ProdID-28000421	CC008	7	0.22
5	OrdID-2015-00000004	01-Jan-15	42010	Pick up	CustID- 453	ProdID-28000421	WU006	18	0.045

Finex Customer Data

Customer ID	First Name	Last Name	Segment	Customer Address	Marital Status	Gender	Bank Details	Account No.	Homeowner	Birthdate	yearly_income	occupation
CustID- 401	Selorm	Addo	Consumer	P.O. Box AN 3718	S	M	Stanchart, High Street	221047202	Y	22883	$30K - $50K	Skilled Manual
CustID- 525	Peter	Ankoma	Consumer	P.O. Box TK 7039	M	M	Ecobank, South Industrial Area	263347571	Y	31997	$70K - $90K	Professional
CustID- 214	Priscilla	Mintah	Consumer	P.O. Box KN 8066	M	F	Zenith Bank, Graphic Road	229182813	N	22823	$50K - $70K	Professional
CustID- 030	Cecilia	Esi	Home Office	P.O. Box AW 5738	M	F	GT Bank, Abeka-Lapaz	228040025	Y	27455	$10K - $30K	Skilled Manual

Finex Location Data

Location ID	City	Region	Country
TW028	Tamale	Northern	Ghana
TN001	Axim	Western	Ghana
CC008	Ahwiaa	Ashanti	Ghana

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Exploring data

Finex Product Data

Product ID	Category	Sub-Category	Product Name	Unit Cost	Unit price	returnable
ProdID-28000011	Electronics	Accessories_Supplies	Power Supply Module for HKC 401-2K201-D4211 HKL-480201/5	56.37	212	
ProdID-28000021	Phone_Tablets	Mobile Phones	Apple iPhone 8 Plus Gold 64GB 256GB 4G LTE Unlocked Smartp	963.59	2105	1
ProdID-28000031	Home_Office	Furniture	Printed Chair Cover Soft Milk Silk	105.14	343	
ProdID-28000041	Phone_Tablets	Mobile Phones	Apple iphone 8 plus locked ee red - 256 gb	1143.22	1746	
ProdID-28000051	Electronics	Accessories_Supplies	Power Supply Board Driver Board for Samsung T220 T220G T22	140	372	

Finex Return Data

Return date	Product ID	Store ID	Quantity
01-Jan-15	ProdID-28000781	AG016	1
01-Jan-15	ProdID-28000841	TN001	2
01-Jan-15	ProdID-28001471	AG018	3
02-Jan-15	ProdID-28000331	GA013	3

Finex Store Data

Store Name	Location ID	Store phone	First opened date	Last remodel date	Total sqft	Grocery sqft
Store 1	TW028	0202625555	19616	24076	23593	17475
Store 2	TN001	0246055558	35552	39452	28206	22271
Store 3	CC008	0265095551	29945	33105	39696	24390
Store 4	WU006	0573045551	31092	33245	23759	16844

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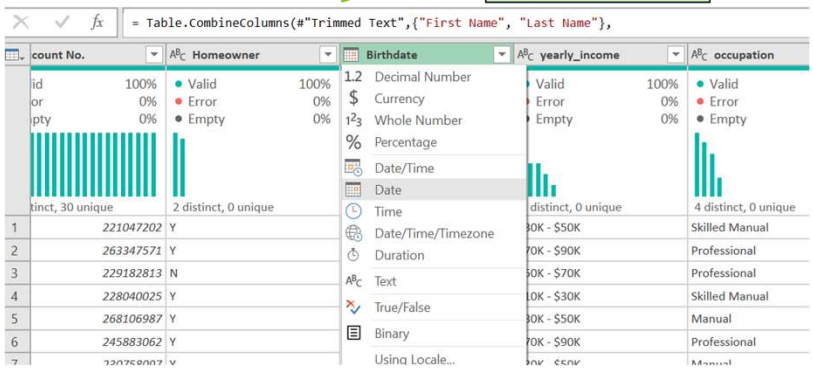
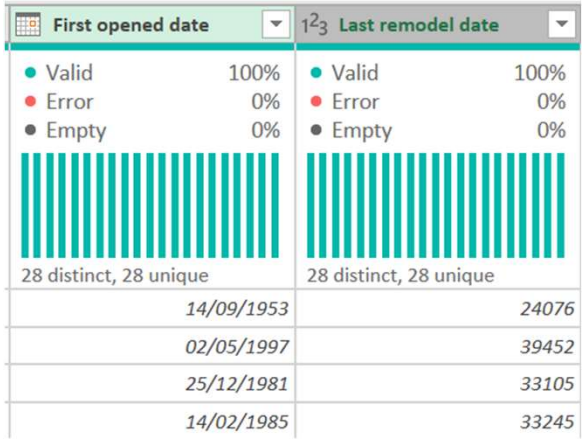
Power Query

Birthdate

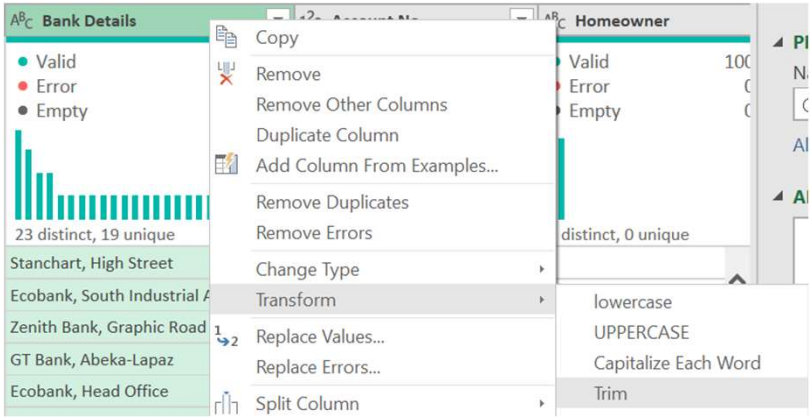


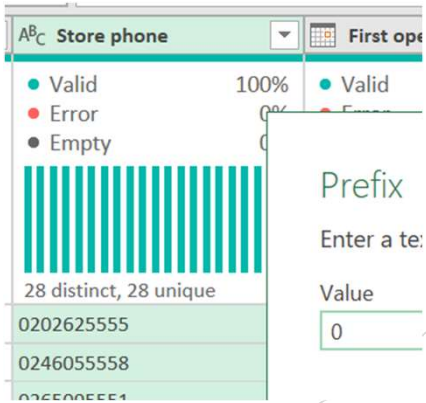
First opened date

Last remodel date



Bank Details





Store phone - add prefix, 0

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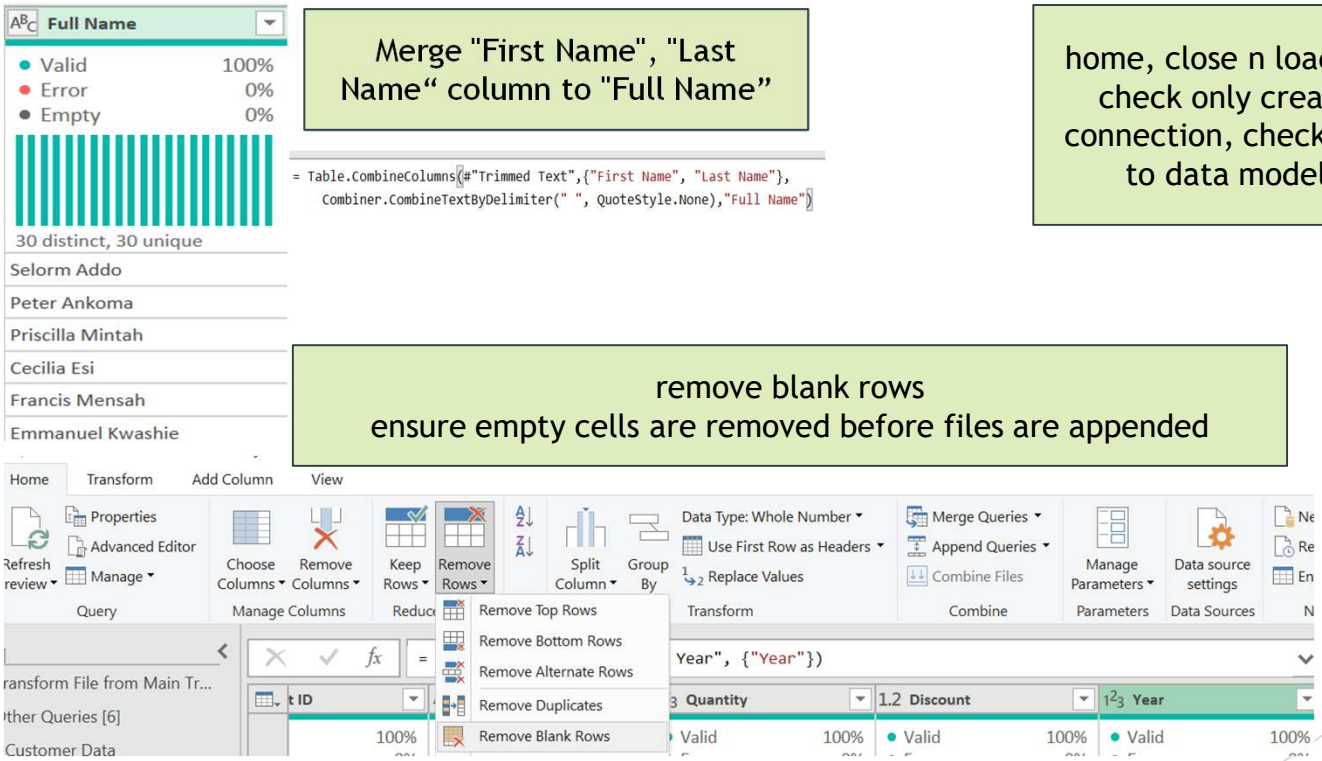
Power Query



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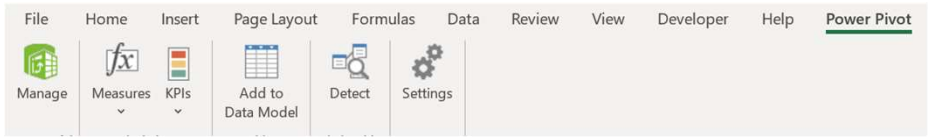
Power Pivot

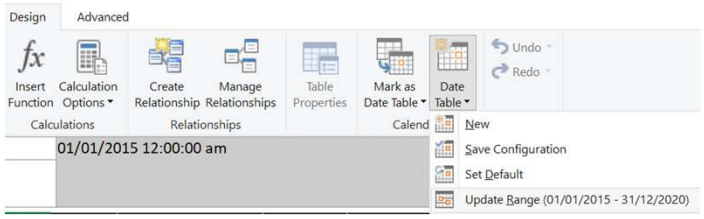
Manage



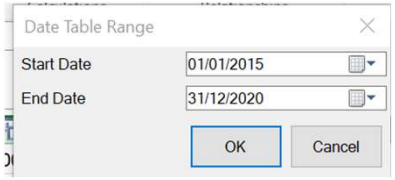
age of customer:=DATEDIFF([Birthdate],TODAY(),YEAR)

```
=DATEDIFF([Birthdate],TODAY(),YEAR)
```

Marital Status	Gender	Bank Details	Account No.	Homeowner	Birthdate	yearly_income	occupation	age of customer
S	M	Stanchart, Hig...	221047202	Y	25/08/1962 12:...	$30K - $50K	Skilled Manual	62
M	M	Ecobank, Sout...	263347571	Y	08/08/1987 12:...	$70K - $90K	Professional	37
M	F	Zenith Bank, ...	229182813	N	26/06/1962 12:...	$50K - $70K	Professional	62



use the earliest date in main transaction table n not cust's birthdates



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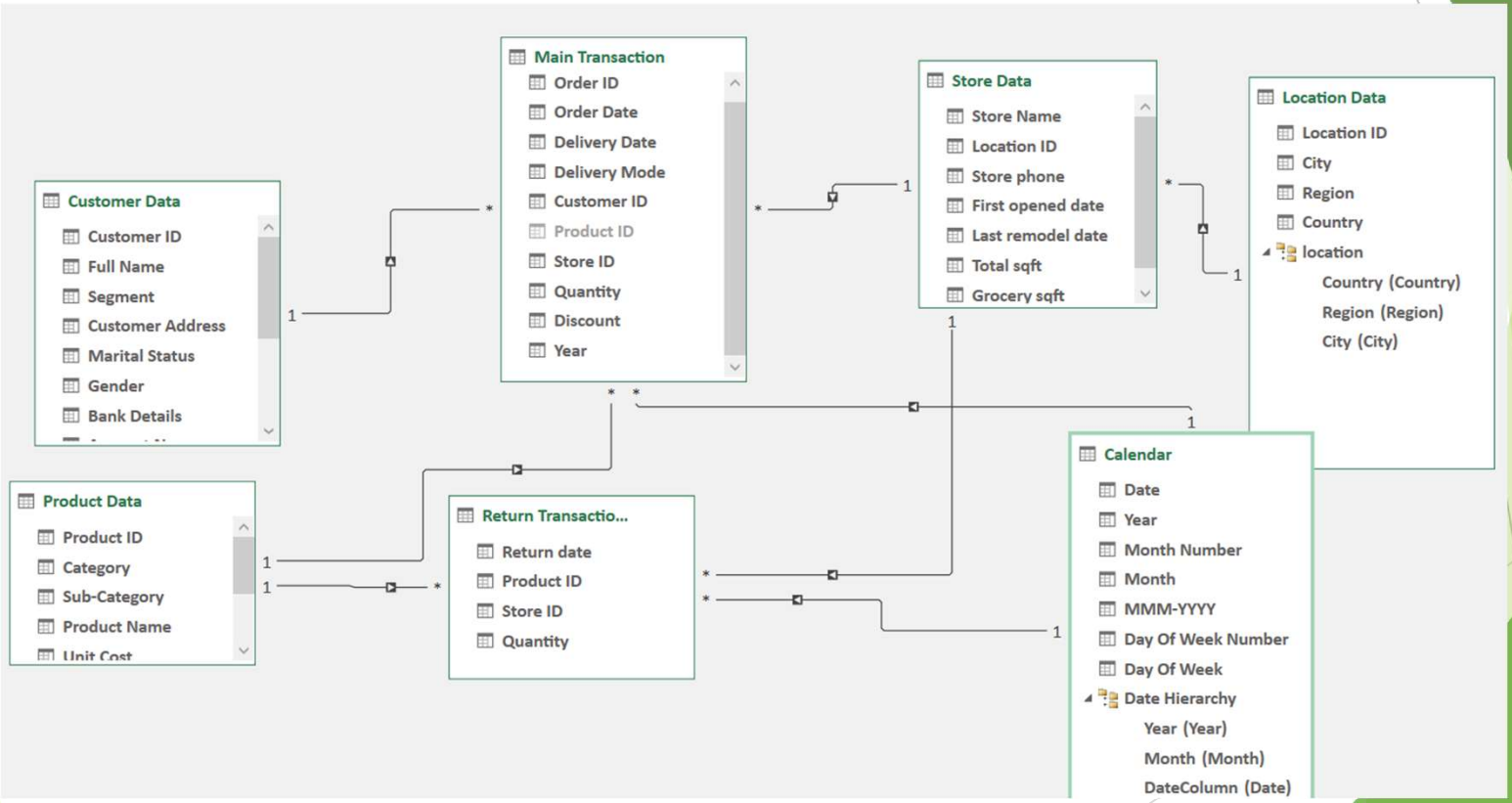
Power Pivot

Home> diagram view



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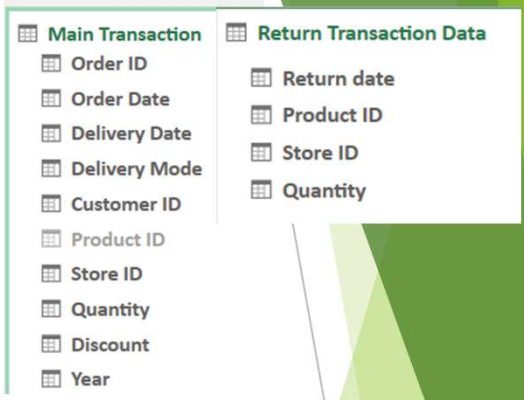
Power Pivot

Fact table (Main Transaction and Return Transaction Data)
- contain duplicate data
  eg, customer make 5 orders of different products in one day
- contain main activity, has columns we use to create key numerical measure
Eg, total sales, count of trans

Dimension table
- include all tables to describe these measures.
- to get insights. eg, beak-down of sales by product, location, customer, date
- use slicer n filters

Primary key
- has unique value, not duplicate. eg, product id
Foreign key
- reference a primary key in another table, can be duplicate.
eg, product id in main transaction



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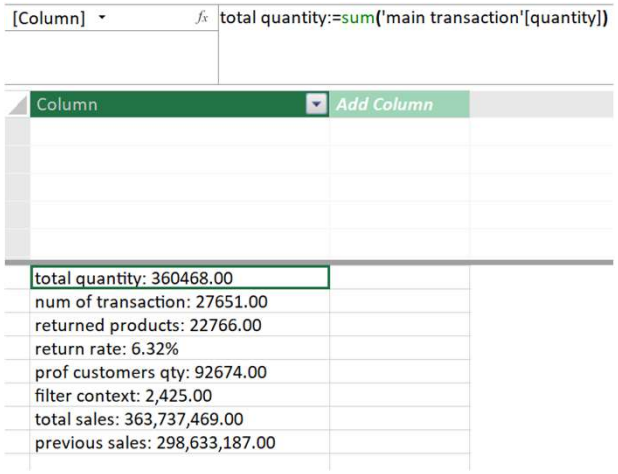
DAX - Data Analysis Expression

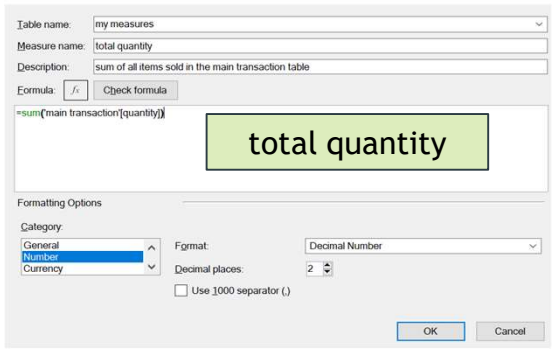
Implicit values
- just drag to values (eg. quantity in main transaction) to get total quantity

Explicit values
- using DAX
- can be reused, can apply permanent number format to apply measure in dashboard, existing measure can be used to create other complex measure



my measures table
- To store all measures in one table

=sum('main transaction'[quantity])



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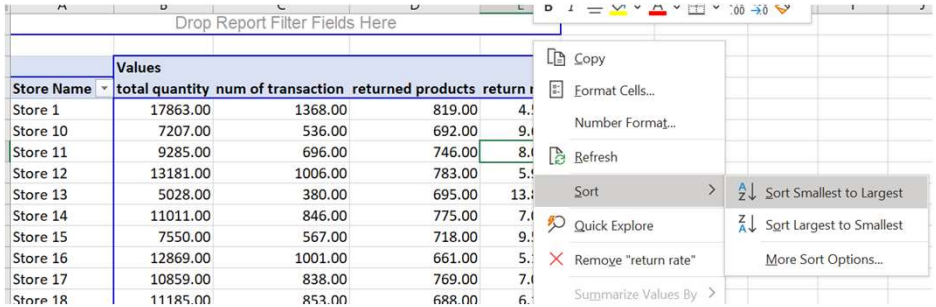
DAX - Case study 1

Manage measures

Manage Measures

New | Edit | Delete

Measure	Formula
filter context	CALCULATE([total quantity], 'Product Data'[Category]="Home_Office",'Store Data'[Store Name]="store 15")
num of transaction	countrows('main transaction')
previous sales	calculate([total sales],sameperiodlastyear('Calendar'[date]))
prof customers qty	calculate([total quantity],'Customer Data'[occupation]="Professional")
return rate	divide([returned products],[total quantity],0)
returned products	sum('return transaction data'[quantity])
total quantity	sum('main transaction'[quantity])
total sales	sumx('Main Transaction',[Quantity]*related('Product Data'[Unit price]))



case study 1: summarize num of trans, return rate, unique product for each store

Based on data, we can see store 28 has a high return rate, therefore it requires further investigation

Store Name	total quantity	num of transaction	returned products	return rate
Store 28	2435.00	190.00	708.00	29.08%
Store 6	4981.00	379.00	731.00	14.68%
Store 13	5028.00	380.00	695.00	13.82%
Store 19	5537.00	420.00	718.00	12.97%
Store 23	6799.00	526.00	746.00	10.97%
Store 27	7216.00	559.00	772.00	10.70%
Store 10	7207.00	536.00	692.00	9.60%

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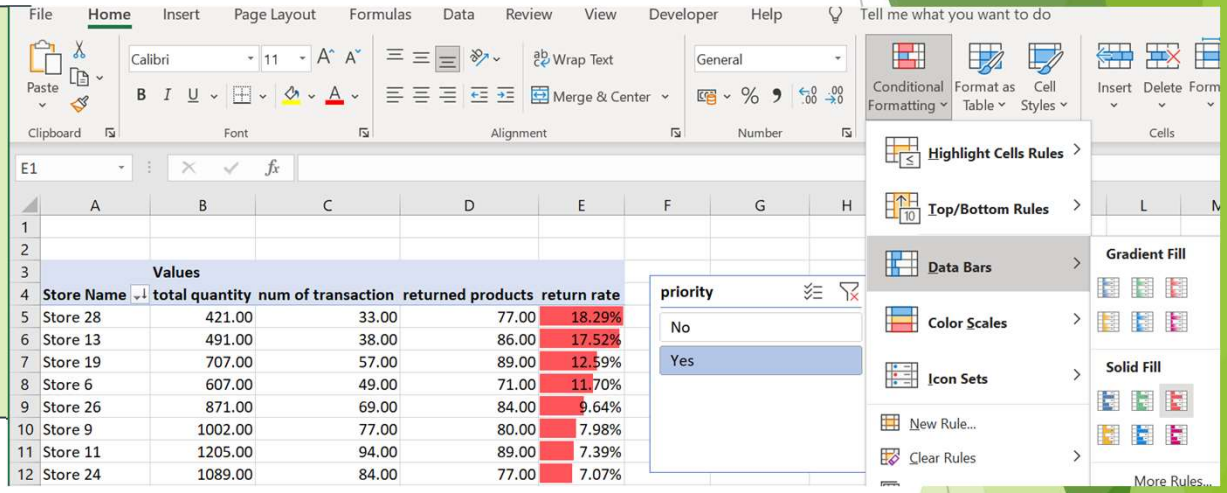
DAX - Case study 2

case study 2: show total quantity of priority product that were returned

priority product:
- electronic product
- price of product more than 500
- product is returnable



	Store Name	Values total quantity	num of transaction	returned products	return rate
5	Store 28	421.00	33.00	77.00	18.29%
6	Store 13	491.00	38.00	86.00	17.52%
7	Store 19	707.00	57.00	89.00	12.59%
8	Store 6	607.00	49.00	71.00	11.70%
9	Store 26	871.00	69.00	84.00	9.64%
10	Store 9	1002.00	77.00	80.00	7.98%
11	Store 11	1205.00	94.00	89.00	7.39%
12	Store 24	1089.00	84.00	77.00	7.07%

Power pivot
Data view: Product Data table

priority:=if ([Category]="Electronics" && [Unit price] >500 && [returnable]=1,"Yes","No")

priority- add as slicer

Based on data, we can see store 28 has a high return rate, therefore it requires further investigation

by Ng Hoi Yee

DAX - Case study 3

case study 3: show total quantity of product purchased by professional customers

Store Name	total quantity	num of transaction	returned products	return rate	prof customers qty
Store 28	421.00	33.00	77.00	18.29%	421.00
Store 13	491.00	38.00	86.00	17.52%	
Store 19	707.00	57.00	89.00	12.59%	
Store 6	607.00	49.00	71.00	11.70%	607.00
Store 26	871.00	69.00	84.00	9.64%	871.00
Store 9	1002.00	77.00	80.00	7.98%	1002.00
Store 11	1205.00	94.00	89.00	7.39%	1205.00
Store 24	1089.00	84.00	77.00	7.07%	
Store 10	954.00	72.00	67.00	7.02%	
Store 27	1069.00	85.00	73.00	6.83%	
Store 22	1639.00	126.00	107.00	6.53%	1639.00
Store 21	1041.00	81.00	66.00	6.34%	
Store 8	1108.00	88.00	68.00	6.14%	
Store 23	1115.00	87.00	68.00	6.10%	
Store 12	1269.00	101.00	74.00	5.83%	

new measure
prof customers qty
=calculate([total quantity],'Customer Data'[occupation]="Professional")

Based on data, we can see not all stores sold to our professional customers

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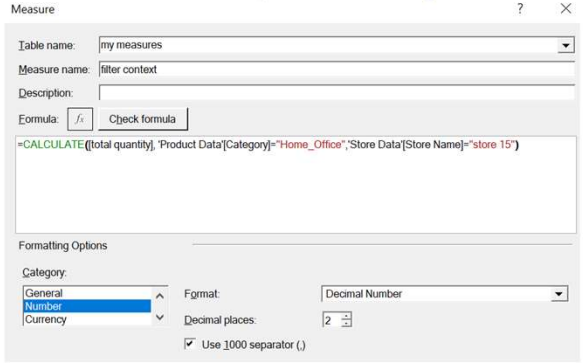
DAX - filter context

filter context – a set of filters that are applied when calculate a value or create a table.

filter context	
Month	Total
January	213.00
February	240.00
March	254.00
April	143.00
May	221.00
June	130.00
July	157.00
August	194.00
September	225.00
October	229.00
November	242.00
December	177.00
Grand Total	2,425.00

total quantity	Category			
Store Name	Electronics	Home_Office	Phone_Tablets	Grand Total
Store 1	7120.00	5755.00	7227.00	20102.00
Store 10	3284.00	2260.00	2617.00	8161.00
Store 11	4159.00	2841.00	3490.00	10490.00
Store 12	5299.00	4235.00	4916.00	14450.00
Store 13	1750.00	1735.00	2034.00	5519.00
Store 14	4855.00	3676.00	4081.00	12612.00
Store 15	3472.00	2425.00	2862.00	8759.00
Store 16	5486.00	4216.00	4800.00	14502.00
Store 17	4787.00	3480.00	4222.00	12489.00
Store 18	4531.00	3486.00	4788.00	12805.00
Store 19	2397.00	1718.00	2129.00	6244.00




```
=calculate([total quantity], 'Product
Data'[Category]="Home Office",
'Store Data'[Store Name]="store 15")
```

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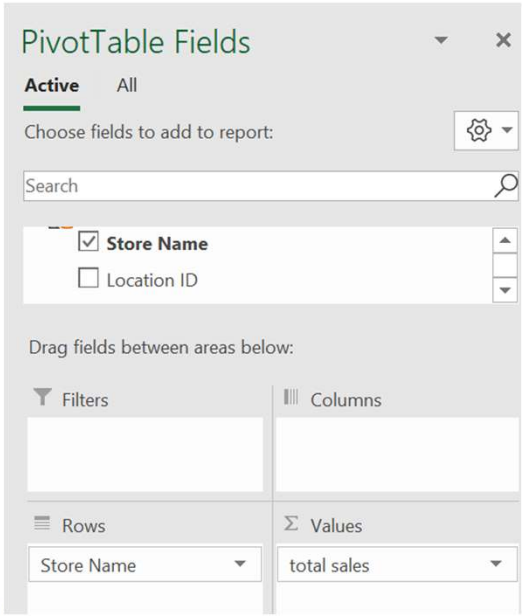
DAX - Case study 4

case study 4: show total sales for each store using sumx

```
total sales =sumx('Main Transaction',[Quantity]*related('Product Data'[Unit price]))
```



total sales	
Store Name	Total
Store 4	35,793,965.00
Store 7	35,698,494.00
Store 1	20,088,180.00
Store 20	18,579,596.00
Store 2	16,544,171.00
Store 22	14,627,944.00
Store 3	14,484,551.00
Store 16	14,450,866.00
Store 12	13,956,285.00
Store 25	13,419,926.00
Store 18	13,293,397.00
Store 5	13,280,120.00
Store 17	13,279,875.00
Store 14	12,590,520.00
Store 8	10,701,988.00
Store 21	10,308,855.00
Store 11	10,218,346.00

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DAX - Case study 5

case study 5: compare previous year sale to current year's sales

previous sales
=calculate([total sales],sameperiodlastyear('Calendar'[date]))

	Values	
Year	total sales	previous sales
2015	73,942,916.00	
2016	72,634,024.00	73,942,916.00
2017	71,849,530.00	72,634,024.00
2018	41,147,632.00	71,849,530.00
2019	39,059,085.00	41,147,632.00
2020	65,104,282.00	39,059,085.00
Grand Tot	363,737,469.00	298,633,187.00

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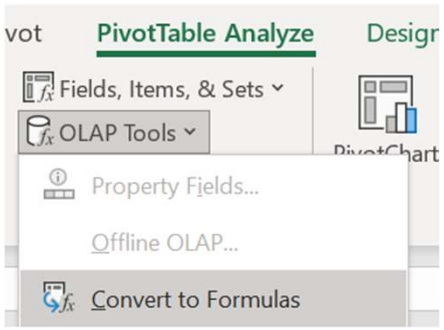
Cube functions

Cube functions: a set of advanced Excel functions that perform flexible calculations and data analysis from data model and express them directly in cells in worksheet without using PivotTables.

It works with a data model that is based on a cube, a multi-dimensional representation of your data



CUBEVALUE

used to return an aggregated value from data model based on set of expression
=CUBEVALUE (connection, [member_exp1],...)

B3 =CUBEVALUE("ThisWorkbookDataModel",$A3,B$2)

	A	B	C	D	E	F	G
1		Values					
2	Year	total sales	previous sales				
3	2015	73,942,916.00					
4	2016	72,634,024.00	73,942,916.00				
5	2017	71,849,530.00	72,634,024.00				
6	2018	41,147,632.00	71,849,530.00				
7	2019	39,059,085.00	41,147,632.00				
8	2020	65,104,282.00	39,059,085.00				
9	Grand Total	363,737,469.00	298,633,187.00				

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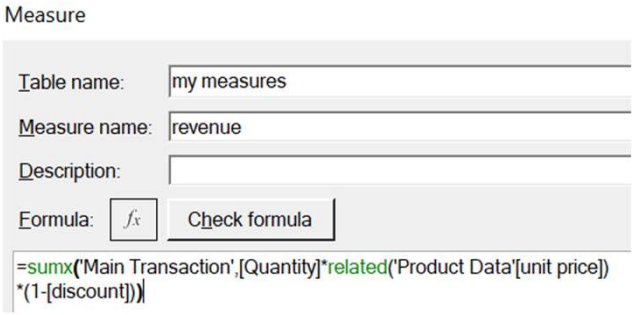
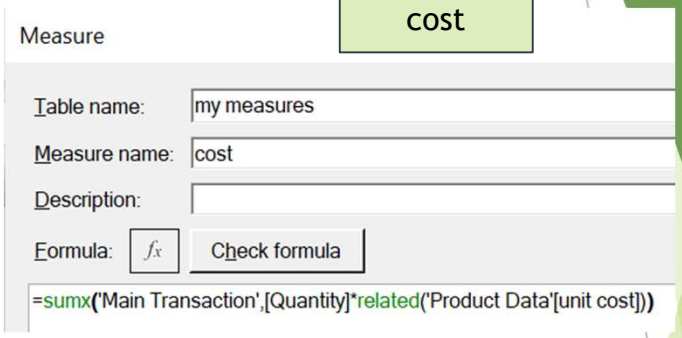
Cube functions

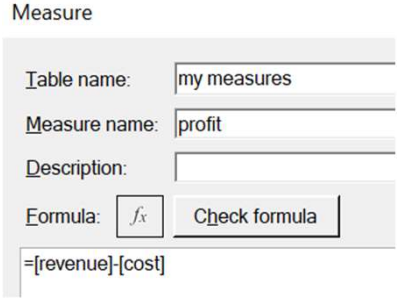
revenue



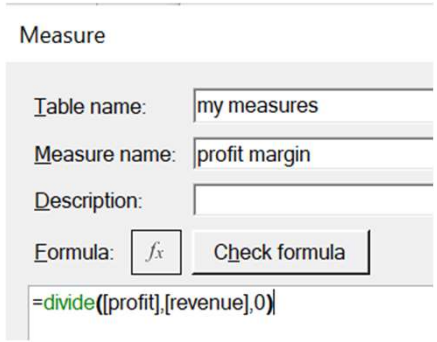
cost



profit



profit margin



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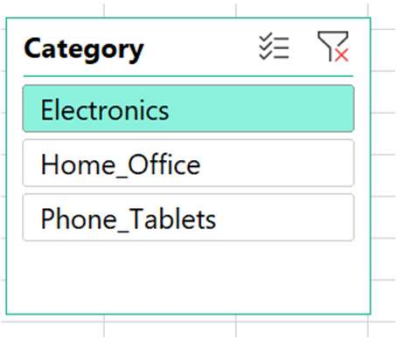
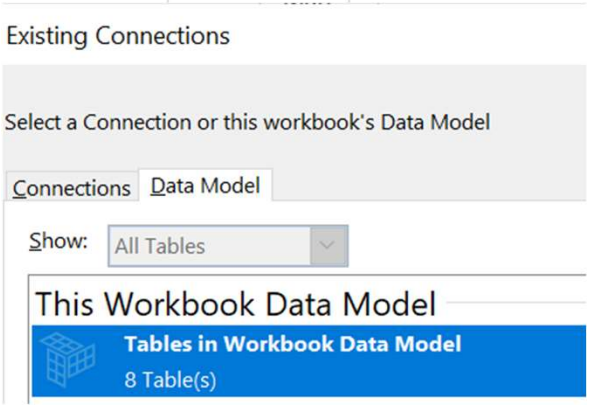
Cube functions

=CUBEVALUE("ThisWorkbookDataModel","[measures].[revenue]",Slicer_Category)

C	D	E	F
		Year	Values
		revenue	163,919,190.47
		cost	84,573,064.08
		profit	79,346,126.38
		profit margin	48.41%

Insert >slicer> data model





=CUBEVALUE("ThisWorkbookDataModel","[measures].[revenue]",slicer_category)

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Cube functions

CUBEMEMBER

used to return an item from a column in the tables in data model

=CUBEMEMBER(connection, member_expression)

=CUBEMEMBER("ThisWorkbookDataModel","[product data].[Category].[electronics]")

C	D	E	F
),141,918.00		cubemember	cubevalue
2,620,749.00		Electronics	163,919,190.47

fx =CUBEVALUE("ThisWorkbookDataModel","[measures].[revenue]",E11)

E	F	G
cubemember	cubevalue	
Electronics	163,919,190.47	

by Ng Hoi Yee

Cube functions

CUBESET

represents the entire list of items in a column, it is a collection of members.

=CUBESET(connection, set_expression, caption, sort_order, sort_by)

connections -"ThisWorkbookDataModel"
set_expression -[table].[col].children
caption - give the set a name
sort_order - sort item in set in particular order. has 6 order options
sort_by- rank or sort item based on existing measure (eg.rev)

```
=CUBESET("ThisWorkbookDataModel","[location data].[region].children","regions", 2,
"[measures].[revenue]")
```

D	E	F	G
	cubeset	cubesetcount	
	regions	10	
	months	12	
	sub-Category	13	

by Ng Hoi Yee

Cube functions

CUBESETCOUNT

counts the number of items in a CUBESET formula. the one argument is
a reference to the set.

=CUBESETCOUNT(set)

=CUBESETCOUNT(E14)

E14 is regions under cubeset

D	E	F
	cubeset	cubesetcount
	regions	10
	months	12
	sub-Category	13

by Ng Hoi Yee

Cube functions

CUBERANKEDMEMBER

return single item from set based on ordered ranking

= CUBERANKEDMEMBER(connection, set_expression, rank, [order_expression])

=CUBERANKEDMEMBER("ThisWorkbookDataModel",E14,1)

D	E	F
	sub-Category	13
	cuberankedmember	
	first item in region	Northern
	first month	Jan
	first item in sub-Category	Television

E14 is regions under cubeset

cubeset	cubesetcount
regions	10
months	12
sub-Category	13
cuberankedmember	
first item in region	Northern
first month	Jan
first item in sub-Category	Television

by Ng Hoi Yee

Putting all with a dashboard

Creating a dashboard in Excel can be a powerful way to visualize and analyze data from various sources.

Pivot tables

	A	B	C	D	E	F	G	H	I	J
2										
3	**profit**	**Category**					**profit**			
4	**Year**	**Electronics**	**Home_Office**	**Phone_Tablets**	**Grand Total**		**Month**	**Total**		sparkline
5	2016	1,715,810.43	590,471.40	774,383.74	3,080,665.56		Jan	340,301.30		340,301.30
6	**Grand Total**	**1,715,810.43**	**590,471.40**	**774,383.74**	**3,080,665.56**		Feb	225,893.33		225,893.33
7							Mar	373,195.62		373,195.62
8							Apr	294,988.88		294,988.88
9							May	124,226.26		124,226.26
10	**returned products**			**revenue**	**Total**		Jun	276,659.44		276,659.44
11	**Year**	**Total**		**Total**	**6,887,743.94**		Jul	125,960.48		125,960.48
12	2016	406.00					Aug	307,992.78		307,992.78
13	**Grand Total**	**406.00**		**cost**	**Total**		Sep	198,108.42		198,108.42
14				**Total**	**3,807,078.38**		Oct	132,428.17		132,428.17
15							Nov	376,202.46		376,202.46
16				**profit**	**Total**		Dec	304,708.46		304,708.46
17				**Total**	**3,080,665.56**		**Grand Total**	**3,080,665.56**		
18										

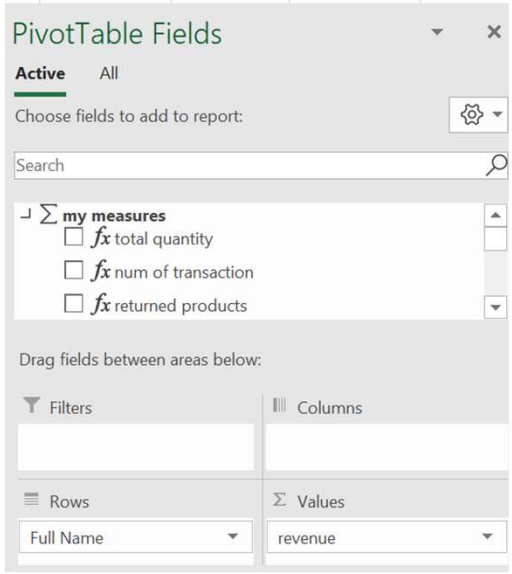
by Ng Hoi Yee

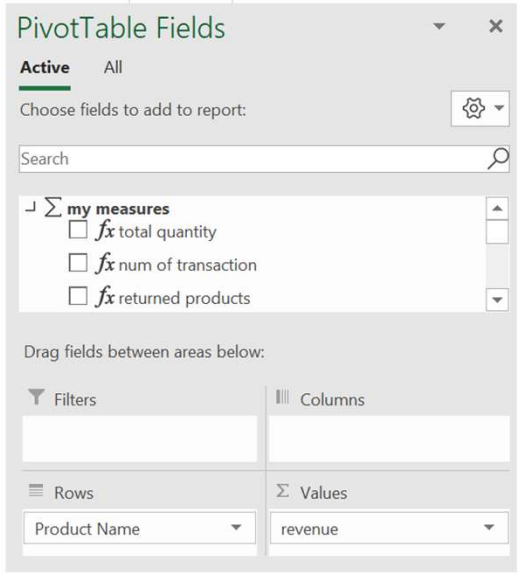
Putting all with a dashboard

revenue	
Full Name	Total
Akua Boatemaa	2,596,552.00
Grand Total	2,596,552.00

revenue	
Product Name	Total
UltraHD Smart TV	697,037.55
Grand Total	697,037.55

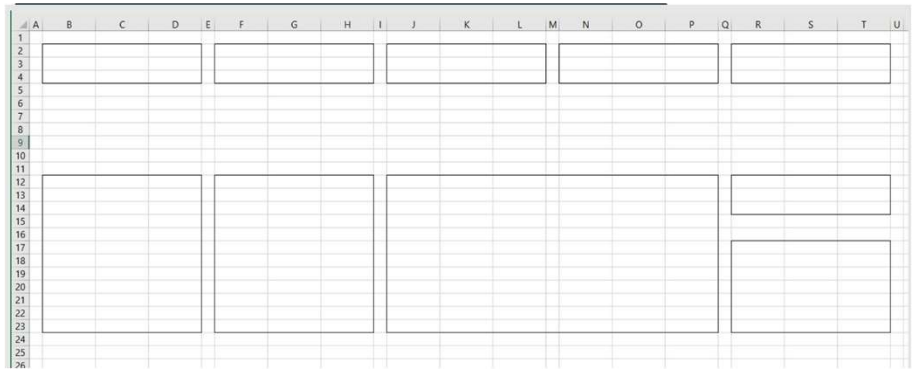
Pivot tables

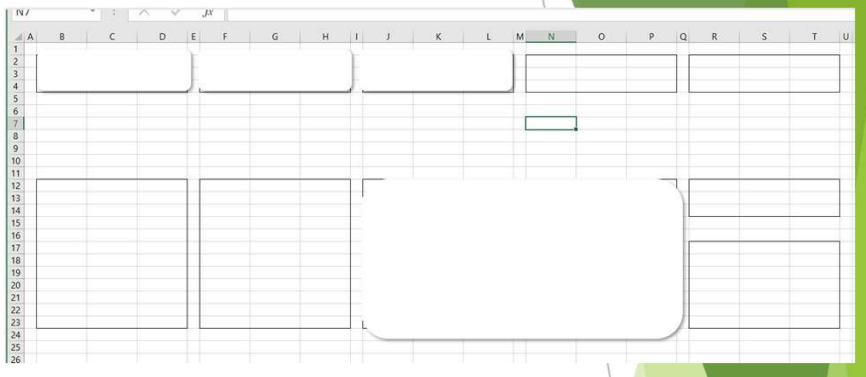


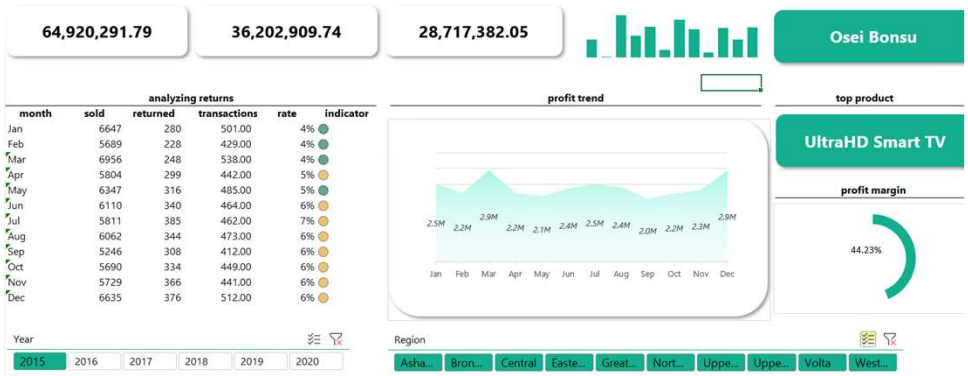


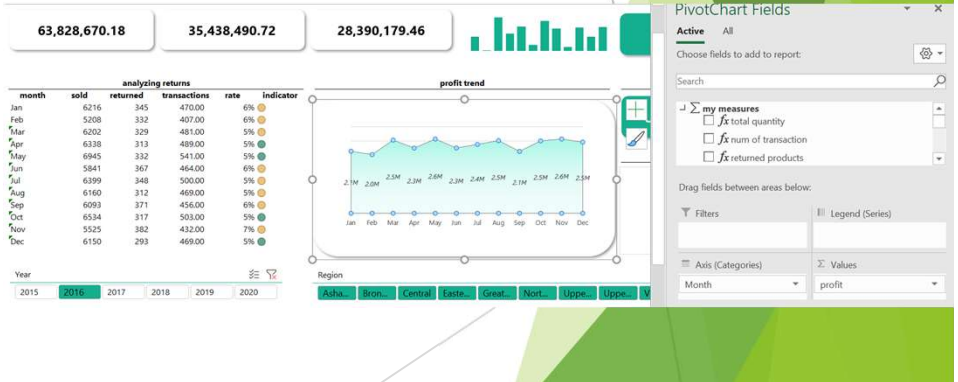
by Ng Hoi Yee

Putting all with a dashboard



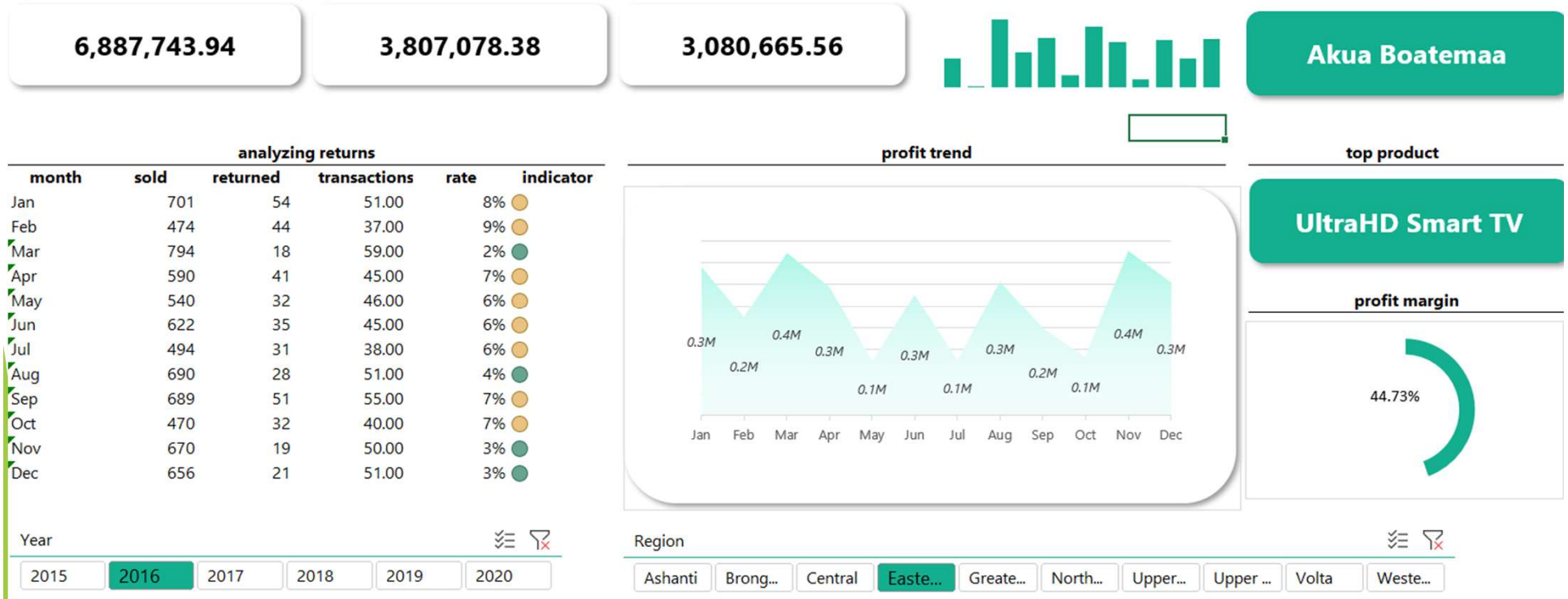






by Ng Hoi Yee

Putting all with a dashboard



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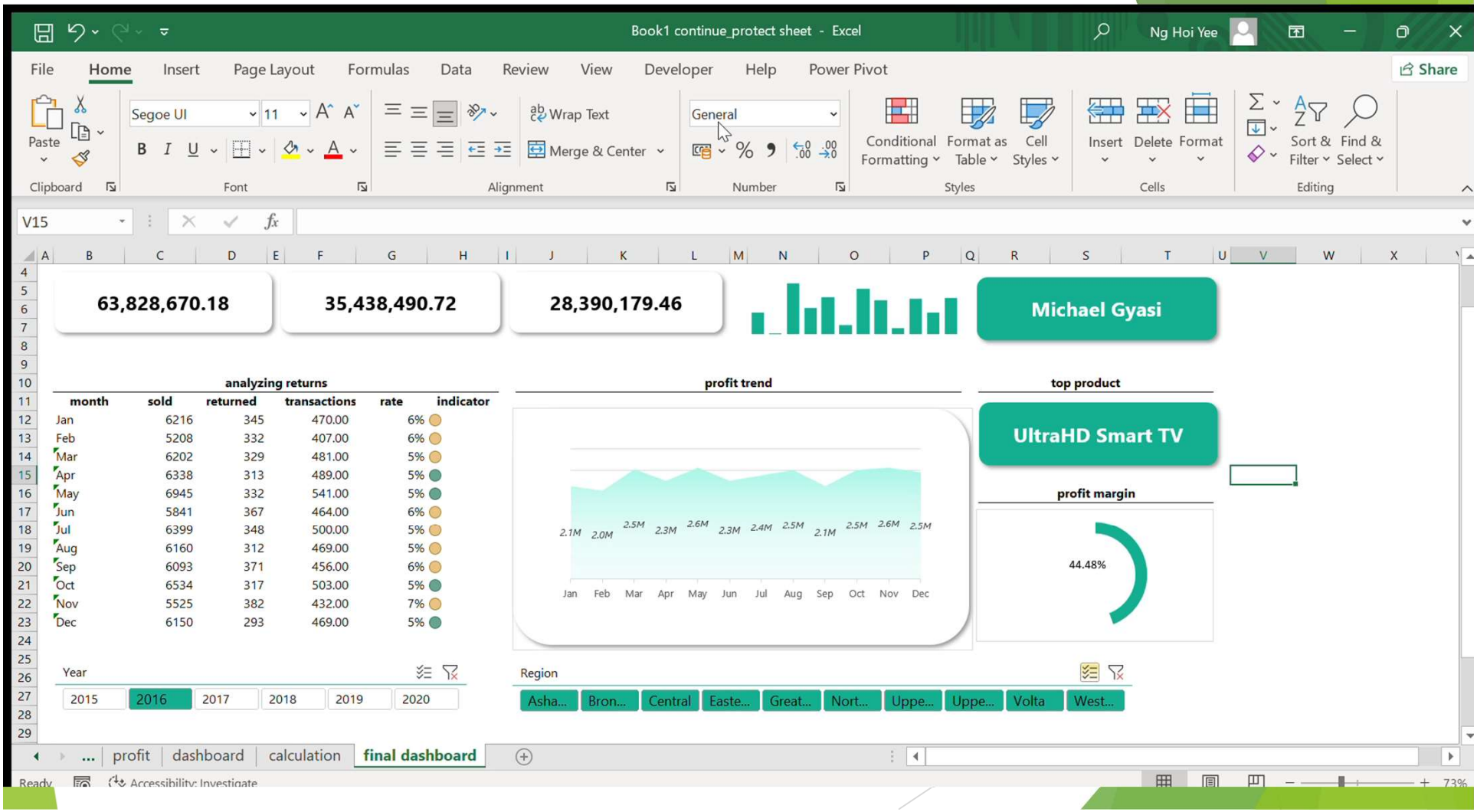
Book1 continue_protect sheet - Excel
Ng Hoi Yee
File Home Insert Page Layout Formulas Data Review View Developer Help Power Pivot
Share
Paste
Segoe UI
11
Wrap Text
Merge & Center
General
Conditional Formatting
Format as Table
Cell Styles
Insert
Delete
Format
Sort & Filter
Find & Select
Clipboard
Font
Alignment
Number
Styles
Cells
Editing
V15
63,828,670.18
35,438,490.72
28,390,179.46
Michael Gyasi
analyzing returns
month sold returned transactions rate indicator
Jan 6216 345 470.00 6%
Feb 5208 332 407.00 6%
Mar 6202 329 481.00 5%
Apr 6338 313 489.00 5%
May 6945 332 541.00 5%
Jun 5841 367 464.00 6%
Jul 6399 348 500.00 5%
Aug 6160 312 469.00 5%
Sep 6093 371 456.00 6%
Oct 6534 317 503.00 5%
Nov 5525 382 432.00 7%
Dec 6150 293 469.00 5%
profit trend
2.1M 2.0M 2.5M 2.3M 2.6M 2.3M 2.4M 2.5M 2.1M 2.5M 2.6M 2.5M
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
top product
UltraHD Smart TV
profit margin
44.48%
Year
2015 2016 2017 2018 2019 2020
Region
Asha... Bron... Central Easte... Great... Nort... Uppe... Uppe... Volta West...
profit dashboard calculation final dashboard
Ready
Accessibility: Investigate
73%

Finex

Thank you