

wawiwa

Suggestion for presenting results
and the analysis process

SQL Unit Summary Project

This lesson topics

- 1 Suggestion for a solution
- 2 The Analysis Process



The First Step to a Profitable Business

Summary of Sales Analysis
for the Years 2011-2014

Background



"Adventure Works " was founded in May 2011.
The company has branches around the world.



The company sells bicycles and related equipment.
Its aim is to encourage the sport of cycling throughout the world.



After 3 years of operation, they decided to examine the company's profitability in order to increase efficiency and profit.

Research Questions



1. Are the Sales Seasonal?
2. Is there an upward / downward trend in the company's performance over the months and years?

* Dates for review: 06/2011 –06/2014

Are the Sales Seasonal?

There is a slight seasonality.

Highest revenue months

June-July

Highest revenue quarter

3

Most profitable month

November

Is there an upward / downward trend in the company's performance over the years?

There is an upward trend.



The company started being profitable from the last quarter of 2013.

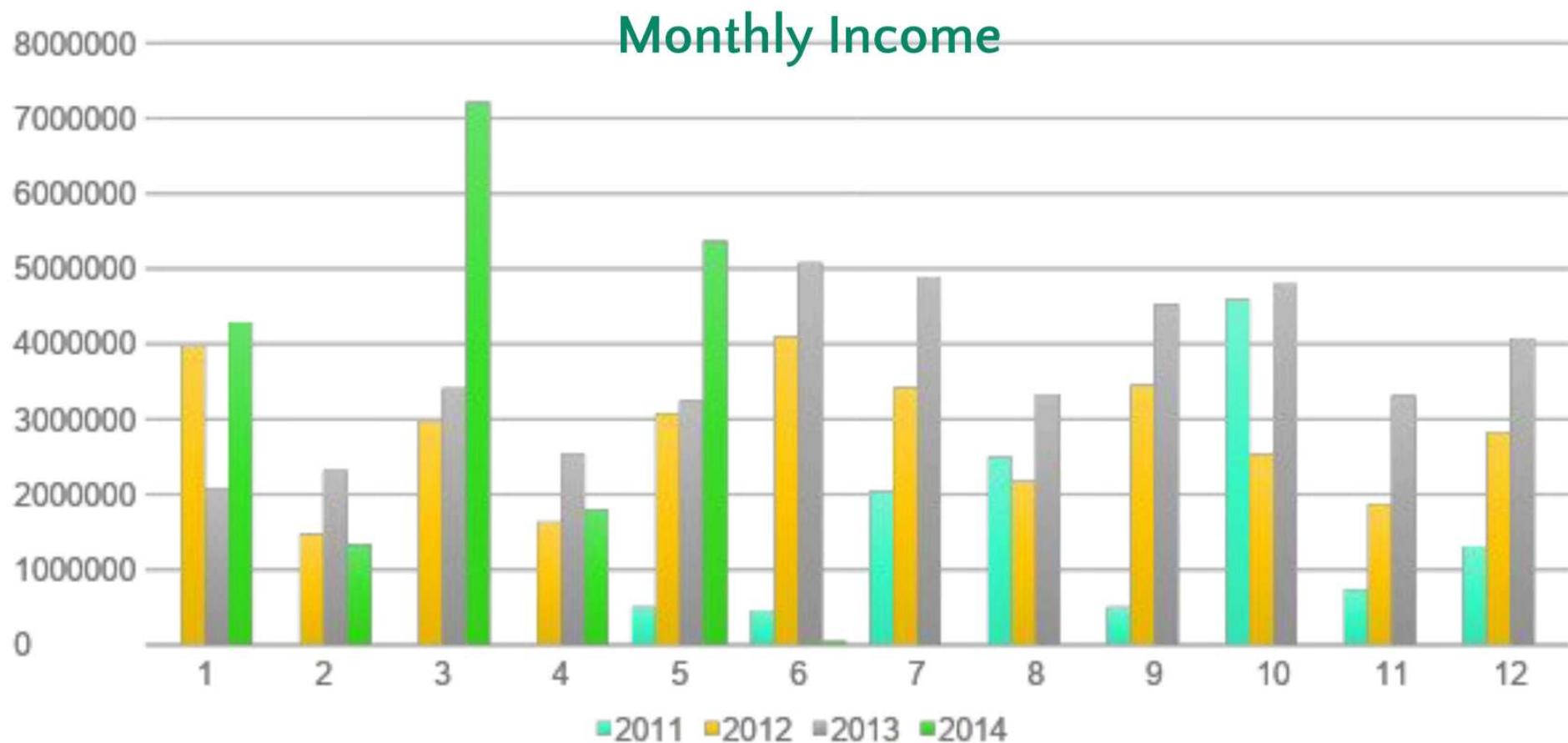


In 2014, there was a drop in revenue, as compared to previous years.



There was a rise in revenue over the years 2011-2013

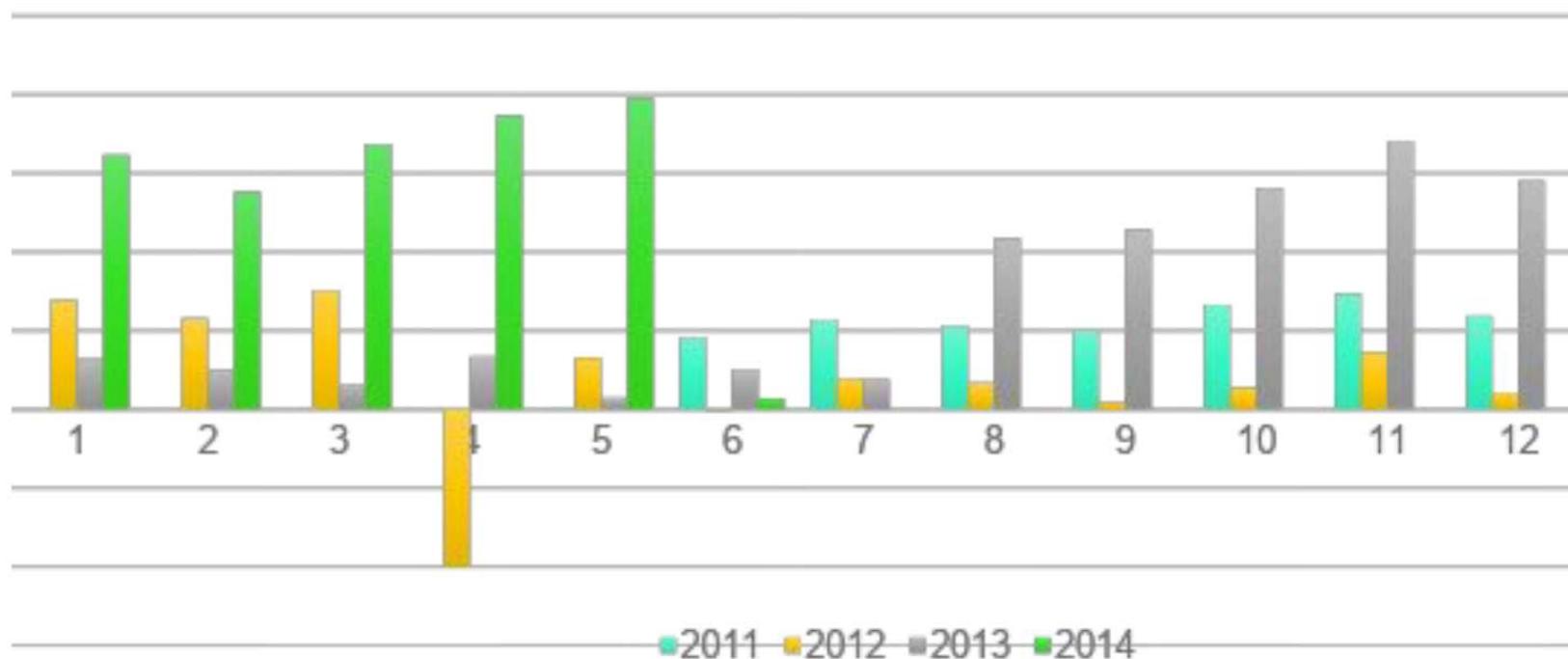
Is there an upward / downward trend in the company's performance over the years?



* Dates for review: 06/2011 – 06/2014

Is there an upward / downward trend in the company's performance over the years?

Monthly Margins



* Dates for review: 06/2011 – 06/2014

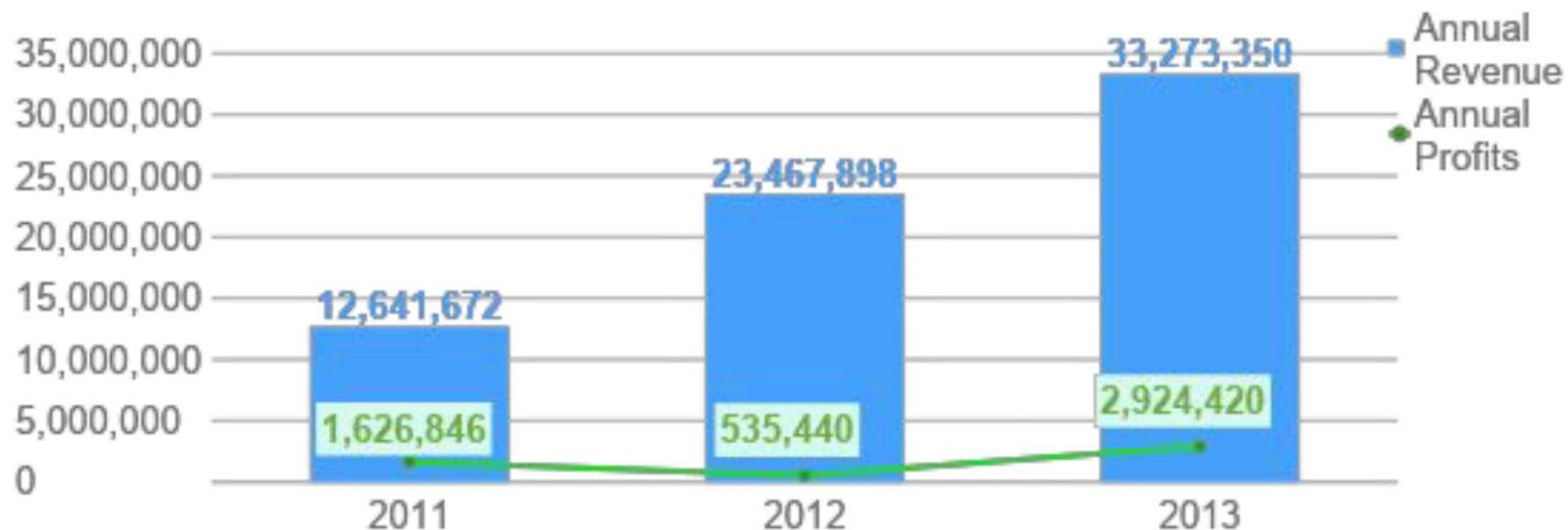
T-M

Is there an upward / downward trend in the company's performance over the years?



Is there an upward / downward trend in the company's performance over the years?

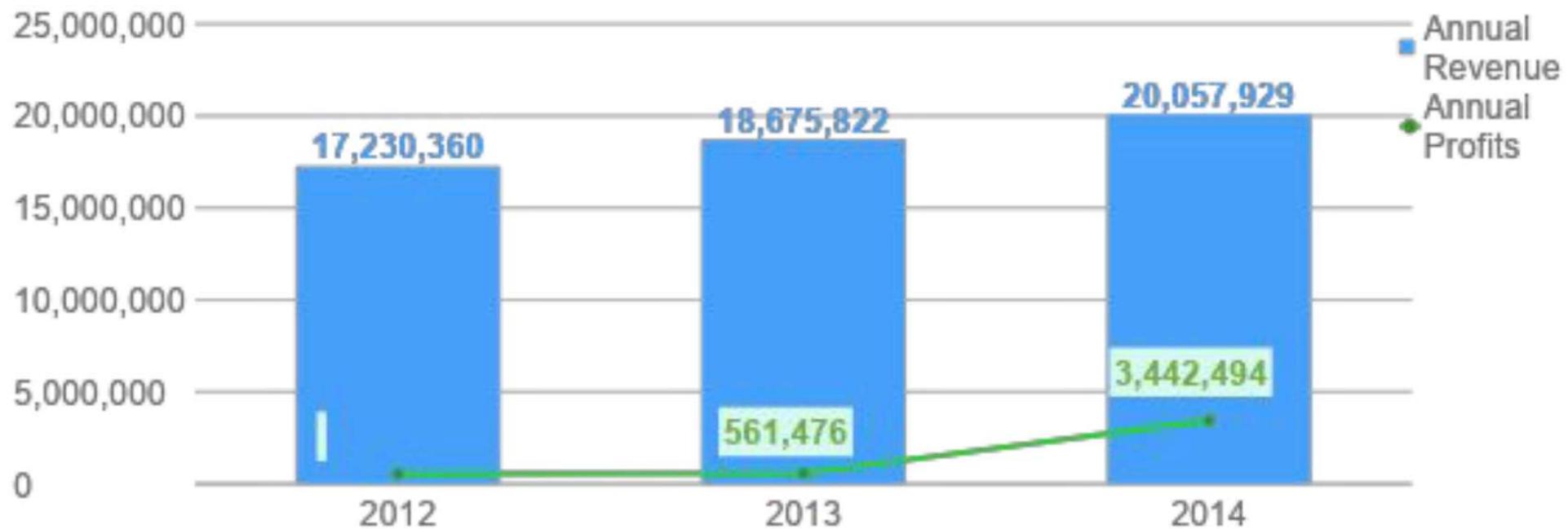
Comparison of the last 6 months of each year



A rise in revenue.
A significant drop in profits in 2012, with a rebound in 2013.

Is there an upward / downward trend in the company's performance over the years?

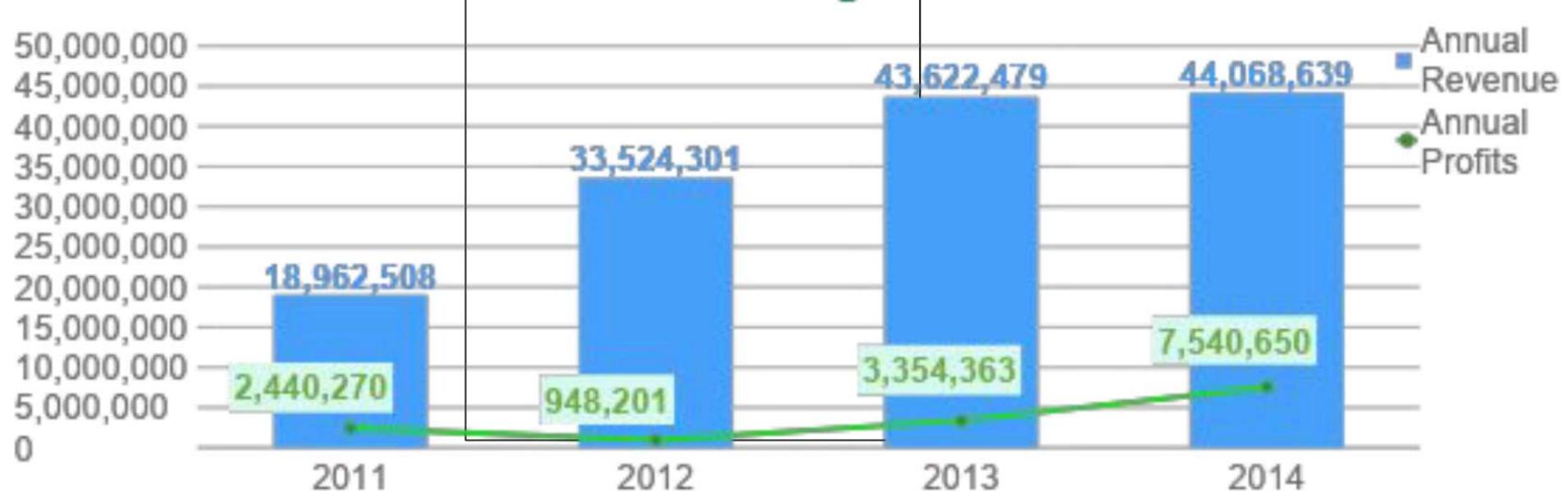
Comparison of the first 6 months of each year



A rise in both revenue and profit.

Is there an upward / downward trend in the company's performance over the years?

Annual comparison standardized according to monthly averages



An upward trend in both revenue and profit throughout the years.

Conclusions



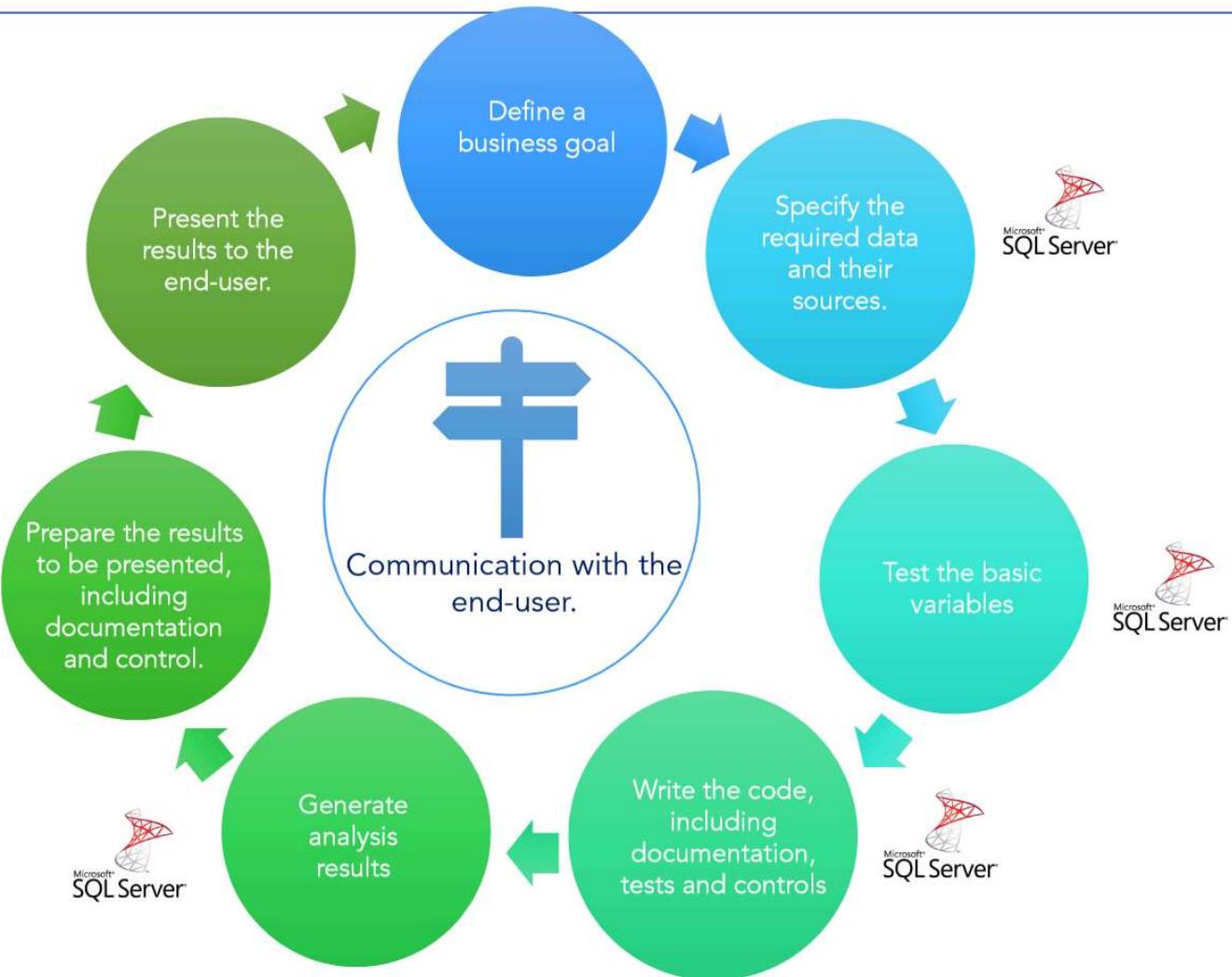
Additional Points to Explore

- Rise / fall in certain periods – look for the reason: holidays / political events / force majeure ...
- Analysis of the quantity of products sold
- Analysis of profitable products vs. products sold at a loss.
Why are products sold at a loss? Is this part of the marketing strategy?
- Analysis of sales reports: Who are the top sellers?
Consider sale incentives for the strong and investing in improving the weaker ones.
- What are the top-selling categories
- Examine the difference between 2012 and 2013 >> What changed to make profits rise?
Check discounts, prices, new items...

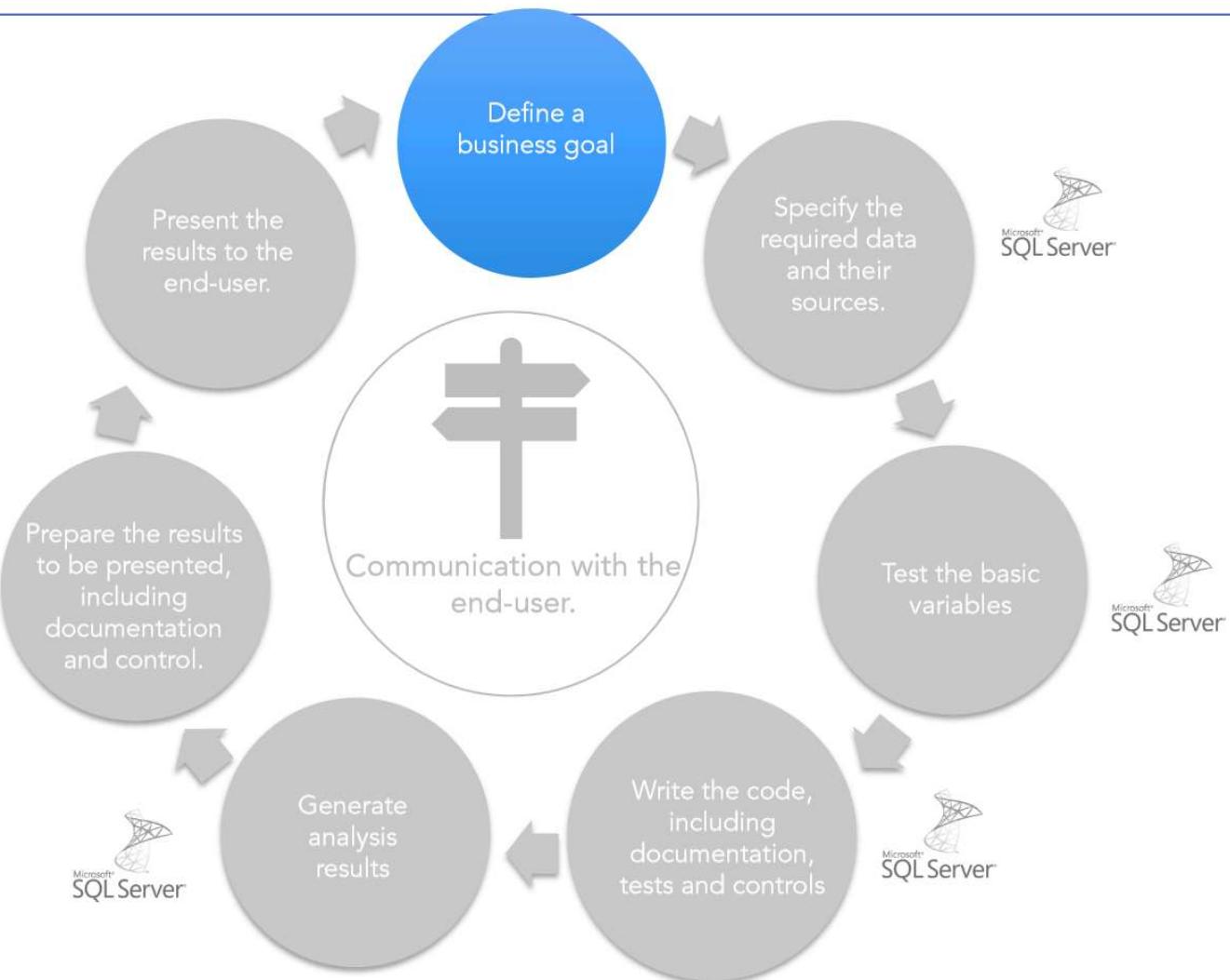


The Analysis Process

Data Analysis and the Analyst's Work Cycle



Data Analysis and the Analyst's Work Cycle



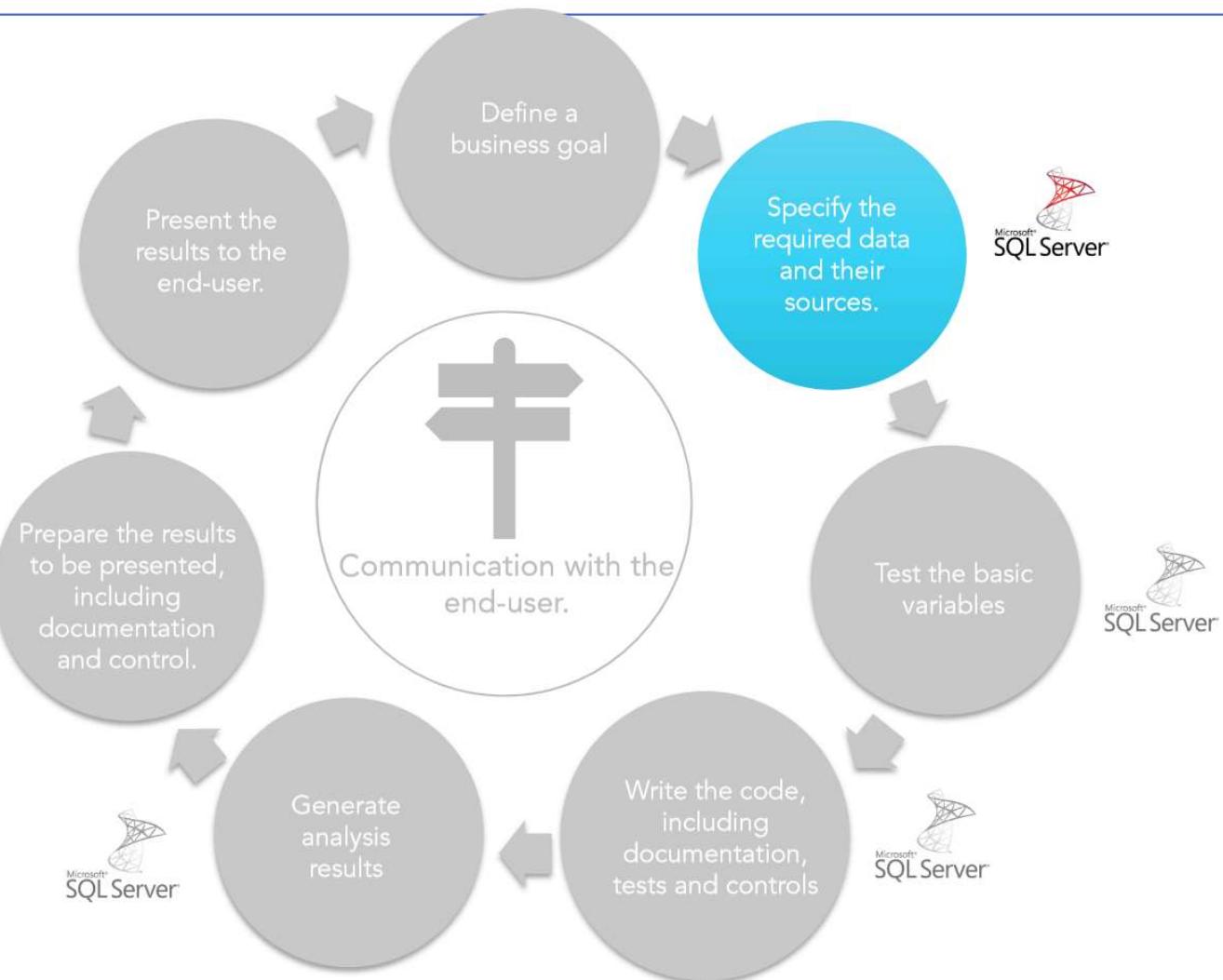
Research Questions



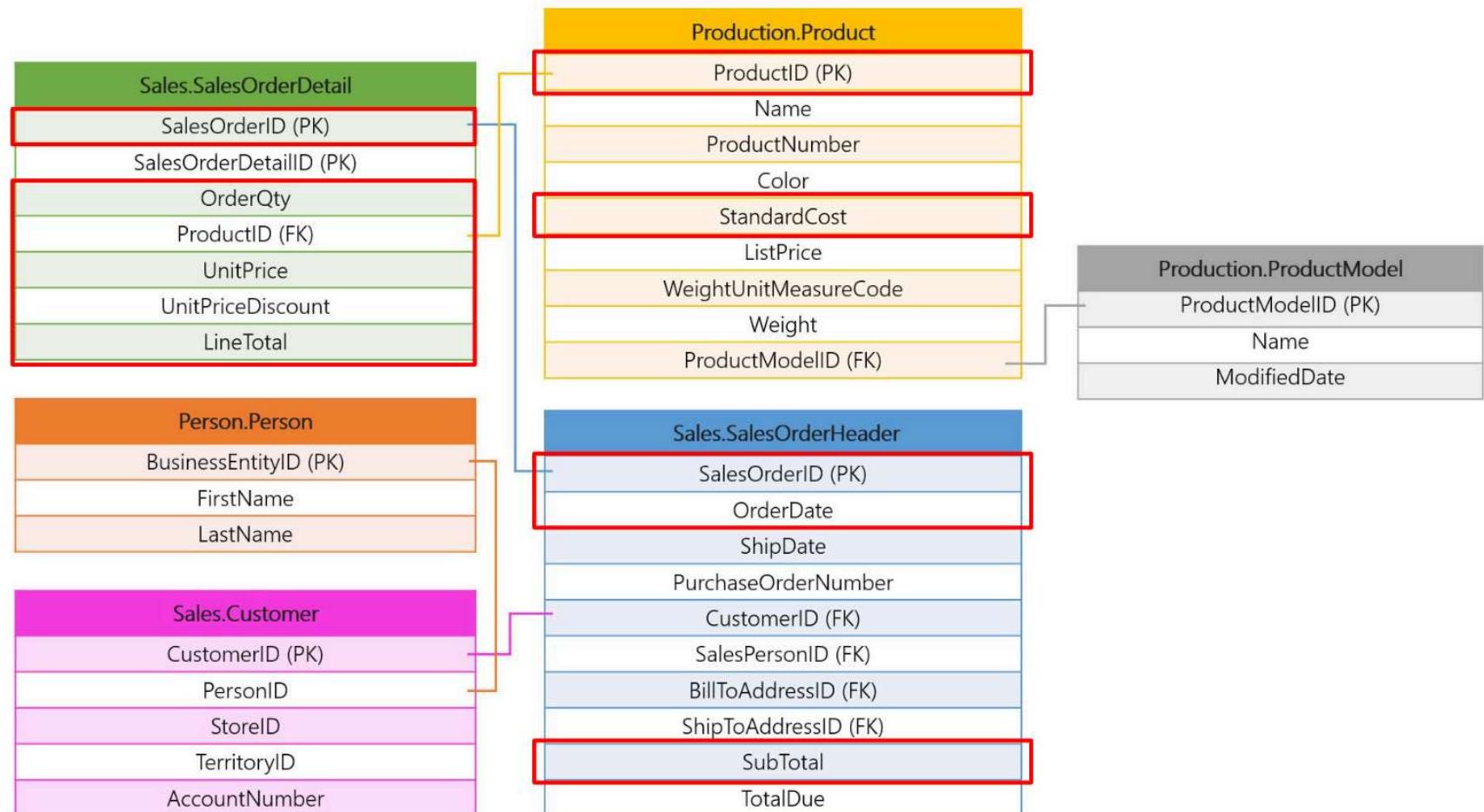
1. Are the Sales Seasonal?
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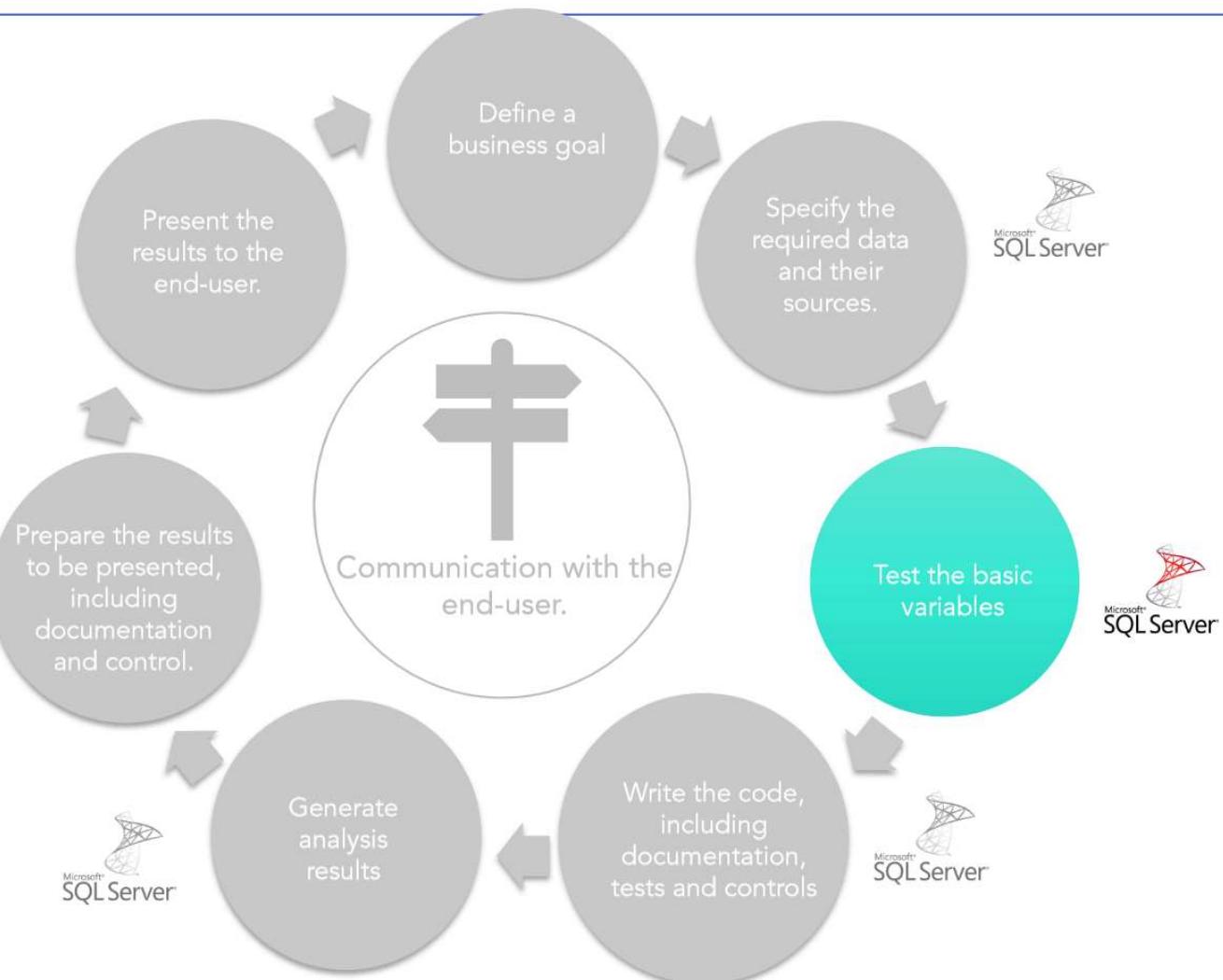
Data Analysis and the Analyst's Work Cycle



Specifications for the Required Data and Their Sources



Data Analysis and the Analyst's Work Cycle



Checking the Integrity of the Data

Calculating Total Due – Order Header

```
--check if TotalDue is calculated as sum of SubTotal, TaxAmt, Freight  
Select SalesOrderID,  
       OrderDate,  
       SubTotal,  
       TaxAmt,  
       Freight,  
       TotalDue - (SubTotal+TaxAmt+Freight) as diff  
  
from sales.salesOrderHeader  
where TotalDue - (SubTotal+TaxAmt+Freight) <> 0
```



	SalesOrderID	OrderDate	SubTotal	TaxAmt	Freight	diff

Checking the Integrity of the Data

Calculating Total Due – Sales Order Details

--Check if the lineTotal is correct

```
Select SalesOrderID,
    UnitPrice,
    UnitPriceDiscount,
    OrderQty,
    LineTotal,
    (UnitPrice-UnitPriceDiscount)*OrderQty as CalcLineTotal,
    (UnitPrice-UnitPriceDiscount)*OrderQty - LineTotal as diff
from sales.SalesOrderDetail
where (UnitPrice-UnitPriceDiscount)*OrderQty - LineTotal <> 0
```

	SalesOrderID	UnitPrice	UnitPriceDiscount	OrderQty	LineTotal	CalcLineTotal	diff
1	43875	1971.9942	0.02	12	23190.651792	23663.6904	473.038608
2	43875	1957.4942	0.02	13	24938.476108	25447.1646	508.688492
3	43879	5.0136	0.02	13	63.873264	64.9168	1.043536
4	43881	5.225	0.05	21	104.238750	108.675	4.436250
5	43884	1971.9942	0.02	14	27055.760424	27607.6388	551.878376
6	43898	405.477	0.02	13	5165.776980	5270.941	105.164020
7	43898	27.879	0.02	11	300.535620	306.449	5.913380
8	43906	4.75	0.10	26	111.150000	120.90	9.750000
9	44098	5.225	0.05	22	109.202500	113.85	4.647500

Significant differences.
What are they from??



Checking the Integrity of the Data

Calculating Total Due – Sales Order Details

--Check if the lineTotal is correct - discount presentage

```
Select SalesOrderID,
      UnitPrice,
      UnitPriceDiscount,
      OrderQty,
      LineTotal,
      UnitPrice*(1-UnitPriceDiscount)*OrderQty as CalcLineTotal,
      UnitPrice*(1-UnitPriceDiscount)*OrderQty - LineTotal as diff
from sales.SalesOrderDetail
where UnitPrice*(1-UnitPriceDiscount)*OrderQty - LineTotal <> 0
```

	SalesOrderID	UnitPrice	UnitPriceDiscount	OrderQty	LineTotal	CalcLineTotal	diff
1	43875	1971.9942	0.02	12	23190.651792	23190.6516	-0.000192
2	43875	1957.4942	0.02	13	24938.476108	24938.4759	-0.000208
3	43879	5.0136	0.02	13	63.873264	63.8729	-0.000364
4	43881	5.225	0.05	21	104.238750	104.2398	0.001050
5	43884	1971.9942	0.02	14	27055.760424	27055.7602	-0.000224
6	43898	405.477	0.02	13	5165.776980	5165.7775	0.000520
7	43898	27.879	0.02	11	300.535620	300.5354	-0.000220



After recalculation as a discount percentage, the differences are negligible (less than 0.007) due to rounding.

Checking the Integrity of the Data

Calculating Total Due – Sales Order Header

```
--Check if the linesTotal is the same as the subTotal
select h.SalesOrderID, h.SubTotal, d.LinesSum,
       h.SubTotal - d.LinesSum as Diff
  from   Sales.SalesOrderHeader h
         left join  ( select SalesOrderID,
                               sum (UnitPrice*(1-UnitPriceDiscount)* OrderQty) as LinesSum
                          from sales.SalesOrderDetail
                         group by SalesOrderID
                     )d
        on d.SalesOrderID = h.SalesOrderID
   where h.SubTotal - d.LinesSum <> 0
```

	SalesOrderID	SubTotal	LinesSum	Diff
1	43875	121761.9396	121761.9392	0.0004
2	43879	21718.7639	21718.7635	0.0004
3	43881	38816.8056	38816.8066	-0.001
4	43884	115696.3313	115696.3311	0.0002
5	43898	50948.9161	50948.9164	-0.0003
6	44098	16369.1545	16369.1556	-0.0011
7	44100	81164.2329	81164.2327	0.0002

After having applied the conclusions, the differences are negligible (less than 0.007).



Checking the Integrity of the Data – Product Table

```
--check data in product table
select *
from Production.Product
where StandardCost = 0
```

There are 200 rows without costs or list prices.

Product ID codes with cost 0: Up to number 679.
From this number onwards, there are values.

- This can be attributed to the addition of data columns from a specific date onwards.

There are products without a color.

	ProductID	Name	ProductNumber	MakeFlag	FinishedGoodsFlag	Color	SafetyStockLevel	ReorderPoint	StandardCost
1	1	Adjustable Race	AR-5381	0	0	NULL	1000	750	0.00
2	2	Bearing Ball	BA-8327	0	0	NULL	1000	750	0.00
3	3	BB Ball Bearing	BE-2349	1	0	NULL	300	600	0.00
4	4	Headset Ball Bearings	BE-2908	0	0	NULL	300	600	0.00
5	316	Blade	BL-2036	1	0	NULL	300	600	0.00
6	317	LL Crankarm	CA-5965	0	0	Black	500	375	0.00
7	318	ML Crankarm	CA-6738	0	0	Black	500	375	0.00
8	319	HL Crankarm	CA-7457	0	0	Black	500	375	0.00

Checking the Integrity of the Data – Were Products Sold Without Cost?

```
--Check how many items sold per year without cost
select year (h.OrderDate) as SaleYear,
       count (d.SalesOrderID) as NoCostLines,
       sum (d.LineTotal) as TotalSalePrice,
       sum (d.OrderQty) as TotalQtySold
  from Sales.SalesOrderDetail d
  left join Sales.SalesOrderHeader h
    on d.SalesOrderID = h.SalesOrderID
  left join Production.Product p
    on d.ProductID = p.ProductID
 where p.StandardCost = 0
 group by year (h.OrderDate)
```

Results	Messages		
SaleYear	NoCostLines	TotalSalePrice	TotalQtySold

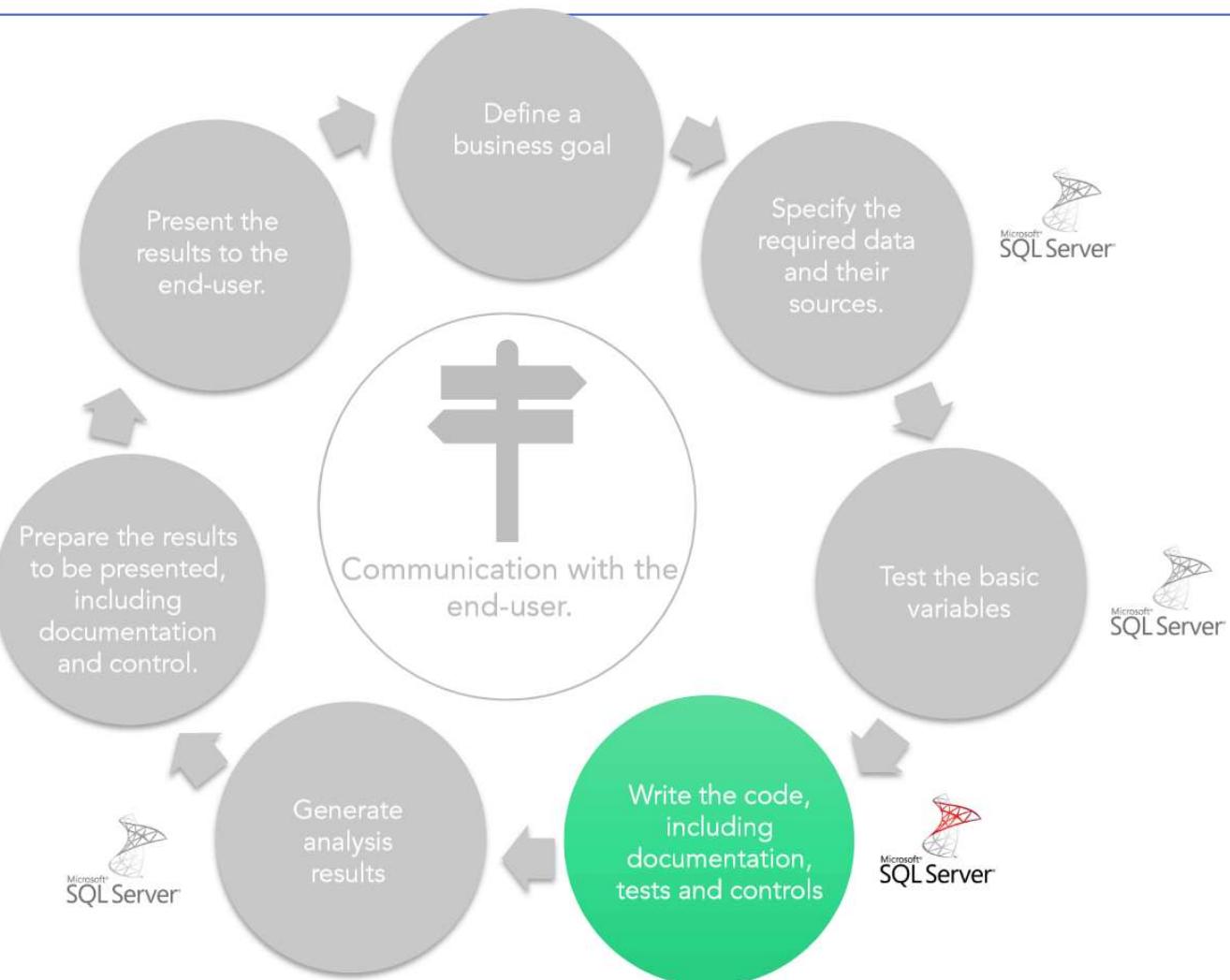
It is important to check if there are orders without cost data, as this affects the profitability calculations.

If there are, check how many, how significant they are and how much effect they have.

This information will help decide what action to take: Ignore/ Omit/ Update cost data



Data Analysis and the Analyst's Work Cycle



Creating a Detailed Panel

```
--Create panel with all the data
create view DetailedProjectPanel as
Select d.SalesOrderID,
       h.OrderDate,
       d.ProductID,
       p.StandardCost,
       d.OrderQty,
       d.UnitPrice,
       d.UnitPriceDiscount as UnitDiscountPrecent,
       d.UnitPrice * (d.UnitPriceDiscount) as UnitDiscountAmount,
       d.UnitPrice * (d.UnitPriceDiscount) * d.OrderQty as LineDiscount,
       d.LineTotal / d.OrderQty as UnitPriceAfterDiscount,
       d.LineTotal / d.OrderQty - p.StandardCost as UnitProfit,
       d.LineTotal - p.StandardCost * d.OrderQty as LineProfit,
       d.LineTotal

from Sales.SalesOrderDetail d
      left join Sales.SalesOrderHeader h  on d.SalesOrderID = h.SalesOrderID
      left join Production.Product p   on d.ProductID = p.ProductID
```

Examining Panel Data

Integrity Check

When calculating the margin, a significant negative margin was found.

- The margin calculation was examined and found to be correct.
- Note that the cost is higher than the sale price.



Assumptions: Check with the business entity

- Negative profit may be due to an increase in the product cost, but the true, historical costs are not included.
- It may be due to liquidating inventory even at a loss, a special discount for a customer, a market entry strategy, etc...

SalesOrderID	OrderDate	ProductID	StandardCost	OrderQty	UnitPrice	UnitDiscountPercent	UnitDiscountAmount	LineDiscount	UnitPriceAf...	UnitProfit	LineProfit	LineTotal
51823	2013-06-30 00:00:00.000	957	1481.9379	21	953.628	0.20	190.7256	4005.2376	16020.9504	-719.0355	-15099.745500	16020.950400
46380	2012-04-30 00:00:00.000	776	1898.0944	11	843.7475	0.35	295.3116	3248.4276	6032.7949	-1349.6585	-14846.243775	6032.794625
46380	2012-04-30 00:00:00.000	777	1898.0944	10	843.7475	0.35	295.3116	2953.116	5484.359	-1349.6585	-13496.585250	5484.358750
46380	2012-04-30 00:00:00.000	771	1912.1544	9	849.9975	0.35	297.4991	2677.4919	4972.4856	-1359.656	-12236.904225	4972.485375
46334	2012-04-30 00:00:00.000	771	1912.1544	9	849.9975	0.35	297.4991	2677.4919	4972.4856	-1359.656	-12236.904225	4972.485375
46348	2012-04-30 00:00:00.000	775	1898.0944	9	843.7475	0.35	295.3116	2657.8044	4935.9231	-1349.6585	-12146.926725	4935.922875
51131	2013-05-30 00:00:00.000	954	1481.9379	16	953.628	0.20	190.7256	3051.6096	12206.4384	-719.0355	-11504.568000	12206.438400
51858	2013-06-30 00:00:00.000	957	1481.9379	16	953.628	0.20	190.7256	3051.6096	12206.4384	-719.0355	-11504.568000	12206.438400
46334	2012-04-30 00:00:00.000	772	1912.1544	8	849.9975	0.35	297.4991	2379.9928	4419.9872	-1359.656	-10877.248200	4419.987000
46334	2012-04-30 00:00:00.000	777	1898.0944	8	843.7475	0.35	295.3116	2362.4928	4387.4872	-1349.6585	-10797.268200	4387.487000
46334	2012-04-30 00:00:00.000	775	1898.0944	8	843.7475	0.35	295.3116	2362.4928	4387.4872	-1349.6585	-10797.268200	4387.487000
46380	2012-04-30 00:00:00.000	775	1898.0944	8	843.7475	0.35	295.3116	2362.4928	4387.4872	-1349.6585	-10797.268200	4387.487000
46364	2012-04-30 00:00:00.000	778	1898.0944	8	843.7475	0.35	295.3116	2362.4928	4387.4872	-1349.6585	-10797.268200	4387.487000
46372	2012-04-30 00:00:00.000	777	1898.0944	8	843.7475	0.35	295.3116	2362.4928	4387.4872	-1349.6585	-10797.268200	4387.487000

Data Integrity and Quality

2 Possible Scenarios

Everything is Correct

The low prices are due to a pre-determined strategy, and the expected losses have been taken into account.

Recalculate costs

The costs are incorrect, and historical costs were not saved.
For the purpose of the analysis, calculate the costs using the sale price and a profit ratio.

Creating a Concentrated Panel

```
--create concentrate view
create view MonthConcentrateProjectPanel as
select year (OrderDate) as YearSale,
       datepart (quarter, OrderDate) as QuarterSale,
       month (OrderDate) as MonthSale,
       count (SalesOrderID) as MonthCountSales,
       sum (OrderQty) as MonthSumSaleItemQty,
       sum (LineTotal) as MonthSumSalesPrice,
       sum (LineProfit) as MonthSumProfit,
       sum (LineProfit) / sum(OrderQty) as MonthAvgProfit

from DetailedProjectPanel pnl

group by year (OrderDate), datepart (quarter, OrderDate), month (OrderDate)
```

Examining the Concentrated Panel Data



Integrity Check

Significant negative margins were found.

The negative interval was already checked with the customer when the detailed panel was created. This panel was based on that one, so the data is presumed to be correct.

YearSale	QuarterSale	MonthSale	MonthCountSales	MonthSumSaleItemQty	MonthSumSalesPrice	MonthSumProfit	MonthAvgProfit
2011	2	5	357	825	503805.916900	3705.656300	4.491704
2011	2	6	141	141	458910.824800	183781.263400	1303.413215
2011	3	7	941	2209	2044600.003338	228949.122538	103.643785
2011	3	8	1242	2904	2495816.733446	213054.264946	73.365793
2011	3	9	157	157	502073.845800	200136.355600	1274.753857
2011	4	10	2083	5382	4588761.816130	265813.038530	49.389267
2011	4	11	230	230	737839.821400	294138.893000	1278.864752
2011	4	12	565	1040	1309863.251140	237267.248540	228.141585
2012	1	1	1712	3967	3970627.278958	278901.317158	70.305348
2012	1	2	676	1442	1475426.909980	231824.676980	160.766072
2012	1	3	1331	3184	2975748.238428	302323.797528	94.950941
2012	2	4	1020	2405	1634600.798332	-400288.416668	-166.440090
2012	2	5	1944	7723	3074602.813538	130684.001338	16.921403
2012	2	6	3215	11295	4099354.356751	-4579.620849	-0.405455
2012	3	7	2459	9142	3417953.869571	79325.506671	8.677040
				5507	2175007.217705	27501.470705	10.144150

Examining the Concentrated Panel Data



Checking abnormal values

In June 2014, the amount of sales was extremely low compared to the rest of the data.

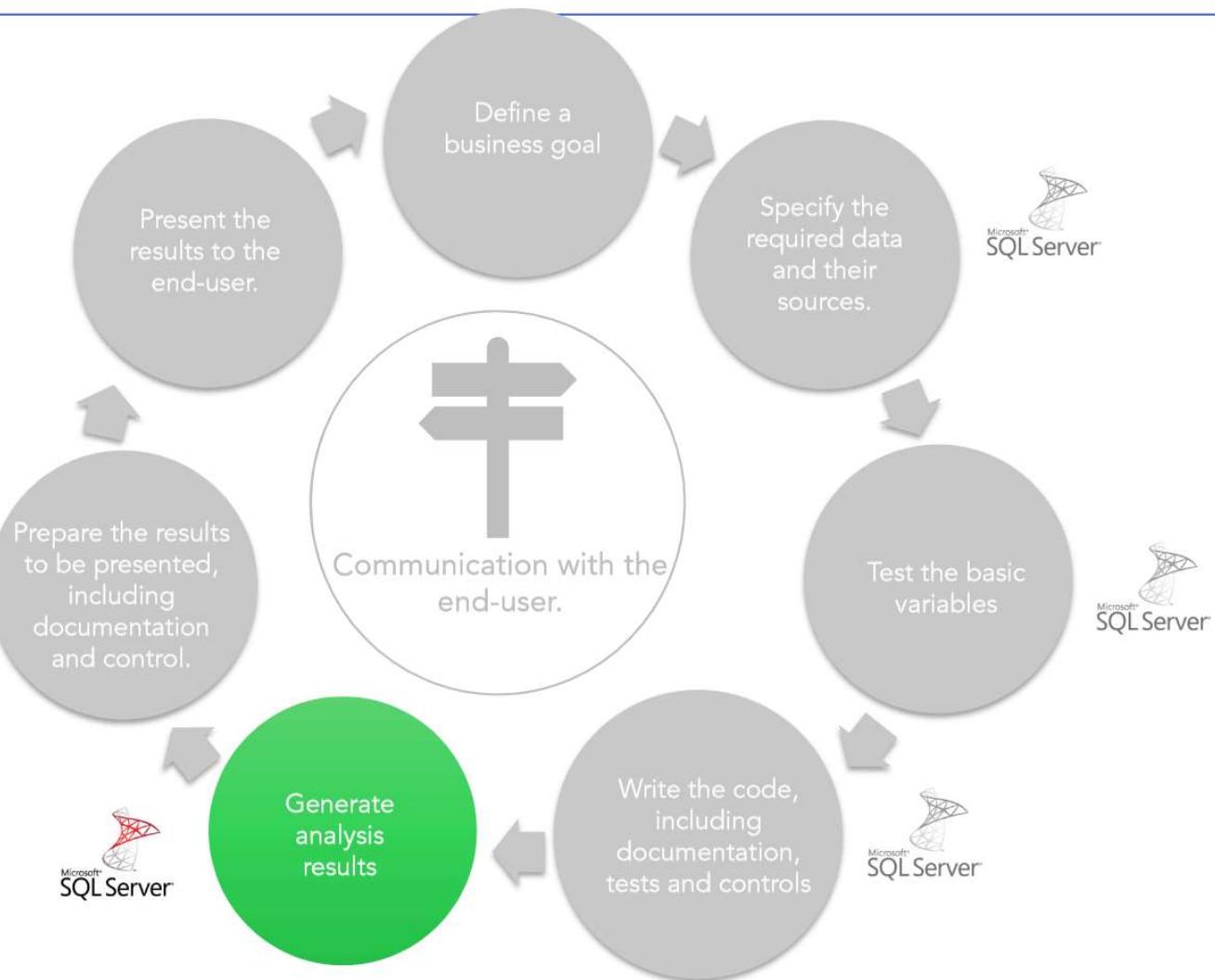
There were a lot of sales, but most of the items sold were accessories (tights, tank top, wheels ...), so the prices ranged only between 2.29 - 159

Assumptions: Check with the business entity

- Any unusual event (political / climate/ medical (corona) / relocation , etc.) may have made them want to liquidate small, cheap goods
- If this is an exceptional event, consideration must be given to whether to enter the data for analysis or not.

	OrderDate	ProductID	Name	StandardCost	ListPrice	UnitPriceAfterDiscount
1	2014-06-01 00:00:00.000	873	Patch Kit/8 Patches	0.8565	2.29	2.290000
2	2014-06-01 00:00:00.000	873	Patch Kit/8 Patches	0.8565	2.29	2.290000
3	2014-06-01 00:00:00.000	873	Patch Kit/8 Patches	0.8565	2.29	2.290000
4	2014-06-01 00:00:00.000	873	Patch Kit/8 Patches	0.8565	2.29	2.290000
2127	2014-06-13 00:00:00.000	879	All-Purpose Bike Stand	59.466	159.00	159.000000
2128	2014-06-11 00:00:00.000	879	All-Purpose Bike Stand	59.466	159.00	159.000000
2129	2014-06-11 00:00:00.000	879	All-Purpose Bike Stand	59.466	159.00	159.000000
2130	2014-06-05 00:00:00.000	879	All-Purpose Bike Stand	59.466	159.00	159.000000

Data Analysis and the Analyst's Work Cycle



Monthly Profit Ranking Query

```
--Month ranking Profit
Select YearSale,
       MonthSale,
       MonthSumProfit,
       rank () over (partition by YearSale order by MonthSumProfit desc) as MonthRank

from MonthConcentrateProjectPanel
order by MonthRank, MonthSumProfit desc
```

Monthly Margin Ranking

YearSale	MonthSale	MonthSumProfit	MonthRank
2014	5	792473.558238	1
2013	11	682138.532687	1
2012	3	302323.797528	1
2011	11	294138.893000	1
2014	4	746490.173900	2
2013	12	580801.828701	2
2012	1	278901.317158	2
2011	10	265813.038530	2
2014	3	675665.151674	3
2013	10	562510.616902	3
2011	12	237267.248540	3
2012	2	231824.676980	3
2014	1	647468.820553	4
2013	9	456772.369003	4
2011	7	228949.122538	4
2012	11	144957.761506	4
2014	2	553029.957400	5
2013	8	434840.100655	5
2011	8	213054.264946	5
2012	5	130684.001338	5
2011	9	200136.355600	6

November has been a relatively profitable month over the years.

Monthly Sales Ranking

YearSale	MonthSale	MonthSumSalesPrice	MonthRank
2014	3	7217531.091974	1
2013	6	5081069.131596	1
2011	10	4588761.816130	1
2012	6	4099354.356751	1
2014	5	5366674.969338	2
2013	7	4896353.737794	2
2012	1	3970627.278958	2
2011	8	2495816.733446	2
2013	10	4795813.289802	3
2014	1	4289817.950953	3
2012	9	3454151.940485	3
2011	7	2044600.003338	3
2013	9	4532908.705303	4
2012	7	3417953.869571	4
2014	4	1797173.923000	4
2011	12	1309863.251140	4
2013	12	4075486.625601	5
2012	5	3074602.813538	5
2014	2	1337725.035600	5
2011	11	737839.821400	5

There are no clear findings in the monthly ranking.

June and July were months with relatively high revenues throughout the years.

Quarterly Margin Ranking

```
--Quarter ranking sale price
Select YearSale,
       QuarterSale,
       sum (MonthSumSalesPrice) as QuartSumPrice,
       rank () over (partition by YearSale order by sum (MonthSumSalesPrice)desc) as
       QuartRank

from MonthConcentrateProjectPanel

group by YearSale, QuarterSale
order by QuartRank, QuartSumPrice desc
```

Quarterly Margin Ranking

YearSale	QuarterSale	QuartSumProfit	QuartRank
2014	1	1876163.929627	1
2013	4	1825450.978290	1
2012	1	813049.791666	1
2011	4	797219.180070	1
2014	2	1566329.733638	2
2013	3	967435.728252	2
2011	3	642139.743084	2
2012	4	243306.005366	2
2013	1	296076.831519	3
2011	2	187486.919700	3
2012	3	166029.430281	3
2013	2	265399.391074	4
2012	2	-274184.036179	4

The last quarter was the most profitable quarter over the years.
The first quarter was also relatively profitable

Quarterly Sales Ranking

YearSale	QuarterSale	QuartSumPrice	QuartRank
2014	1	12845074.078527	1
2013	3	12763226.510652	1
2012	3	9047743.027781	1
2011	4	6636464.888670	1
2013	4	12183430.160990	2
2012	2	8808557.968621	2
2014	2	7212854.732338	2
2011	3	5042490.582584	2
2013	2	10858958.798474	3
2012	1	8421802.427366	3
2011	2	962716.741700	3
2013	1	7816863.581519	4
2012	4	7246197.900666	4

There are no significant data.

The third quarter has relatively high revenues.

Annual Sales Query

In 2011 and 2014 there are only partial data, so they must be analyzed monthly by comparing with corresponding months in subsequent/previous years.

2013 was more successful than 2012. This is evident in the increases:
50% in the quantity of items sold, 76% in the amount of sales and 20% in profits

YearSale	YearCountSales	SumYearSaleItemQty	SumYearSalesPrice	SumYearProfit
2011	5716	12888	12641672.212954	1626845.842854
2012	21689	68579	33524301.324434	948201.191134
2013	56573	131788	43622479.051635	3354362.929135
2014	37339	61659	20057928.810865	3442493.663265

wawiwa

That's it for today,
see you next time!