Submitter Details

UPI: Kfri750
ID: 246378566
Name: Owusu Frimpong

Task 1 - Scope selection/definition

a) **Stakeholder:** Product team

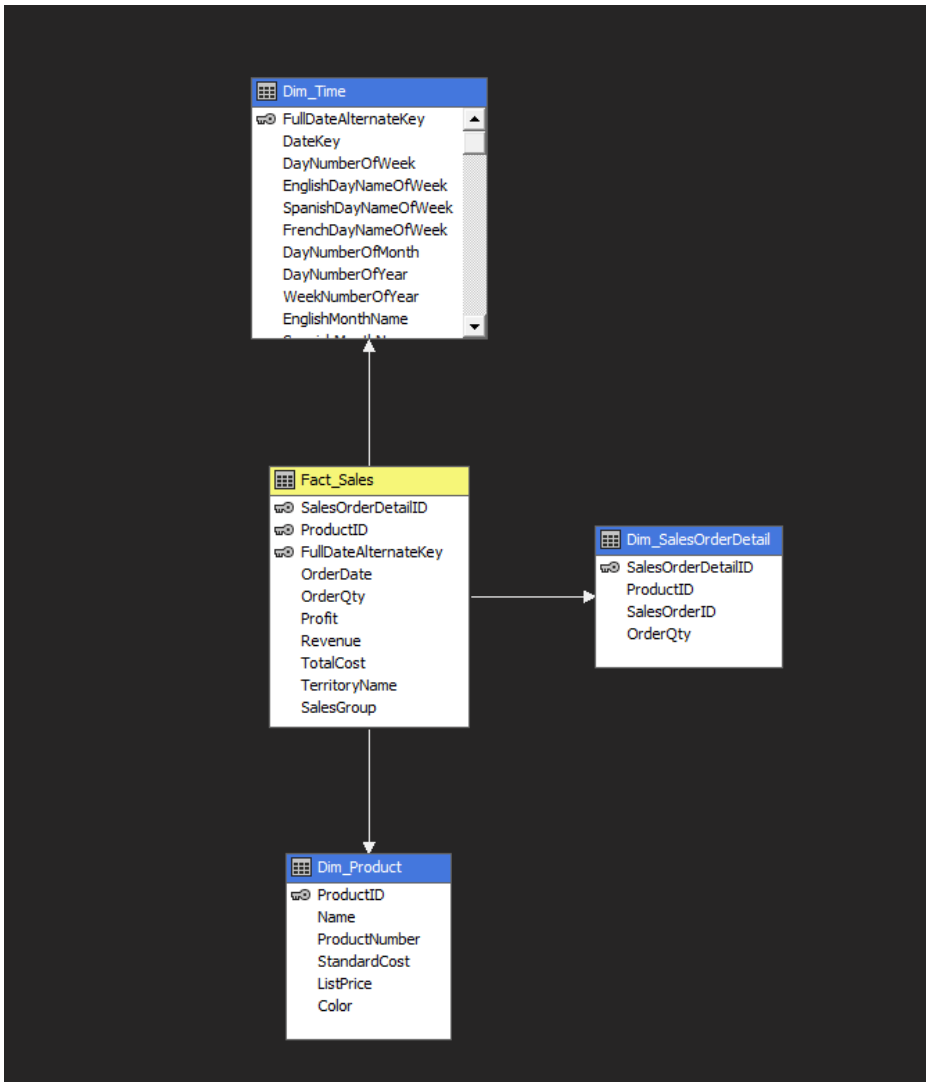
The goal in using the DW: Increase market share by extending product availability.

How the DW should aid decision making:

- Which products are the most profitable and should be made widely available?
- Which products are the least profitable?
- What are the most/least popular products? How do these correlate to revenue/cost?

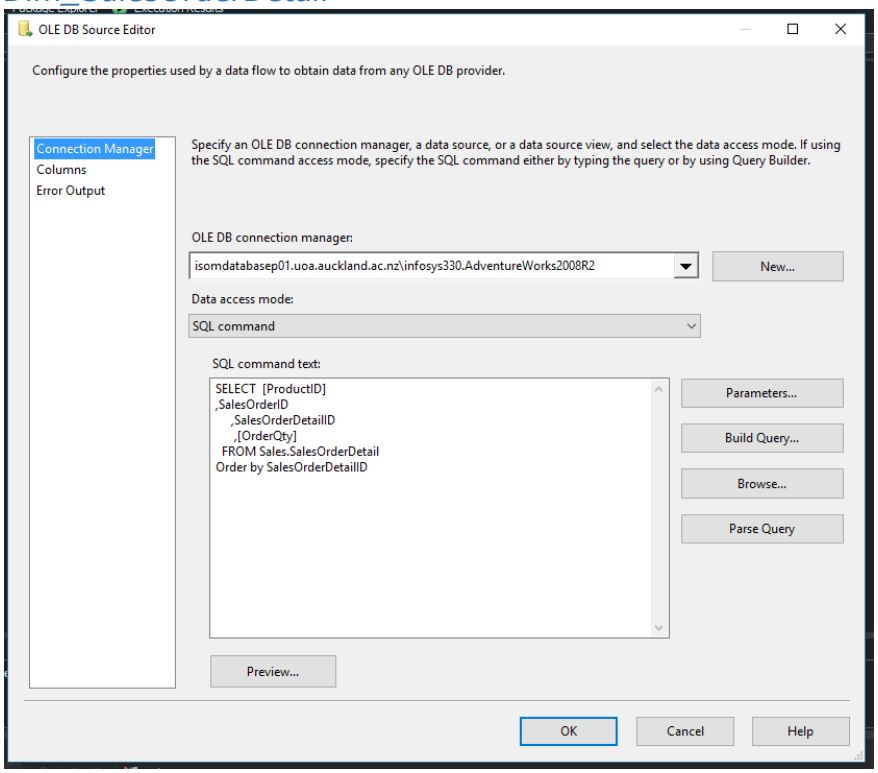
Answered in Task 5

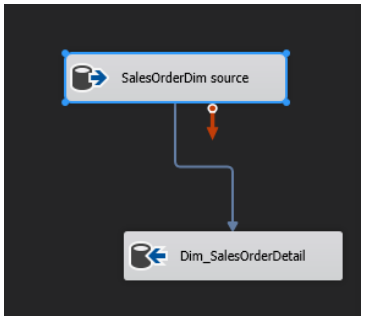
Task 2 - DW Design (schema/ERD)



Task 3 - ETL (SSIS)

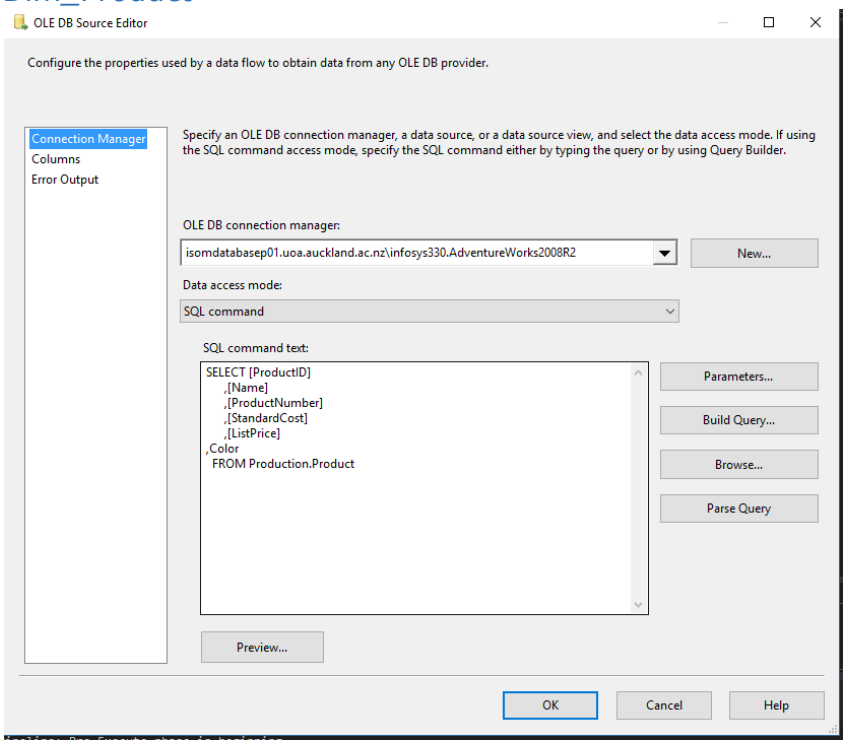
Dim_SalesOrderDetail

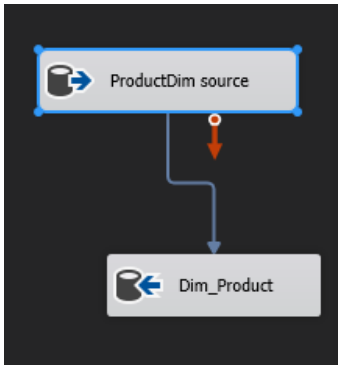




This is the SQL code I used to extract and transform the Dim_SalesOrderDetail table. No transformations were done on this dimension table; it has only been restricted to show relevant tables. This is followed by the OLE DB source and OLE DB destination used for this ETL.

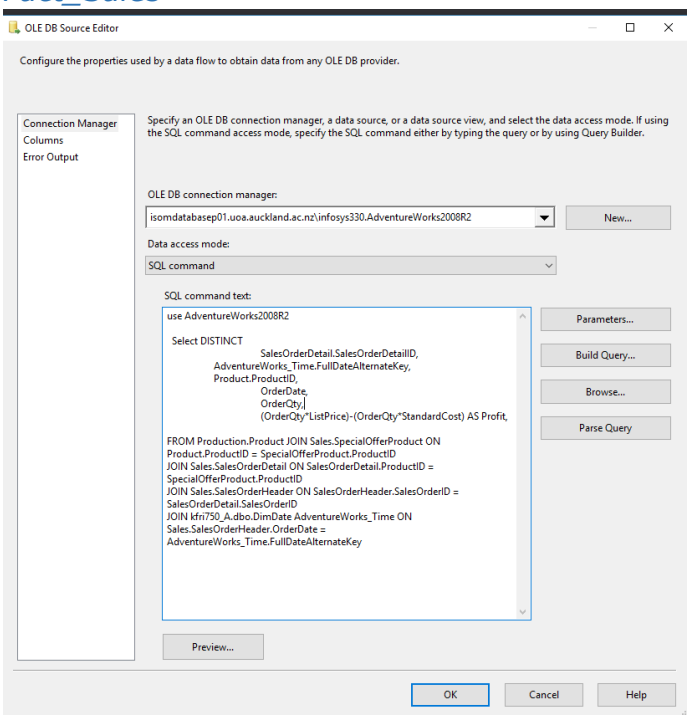
Dim_Product

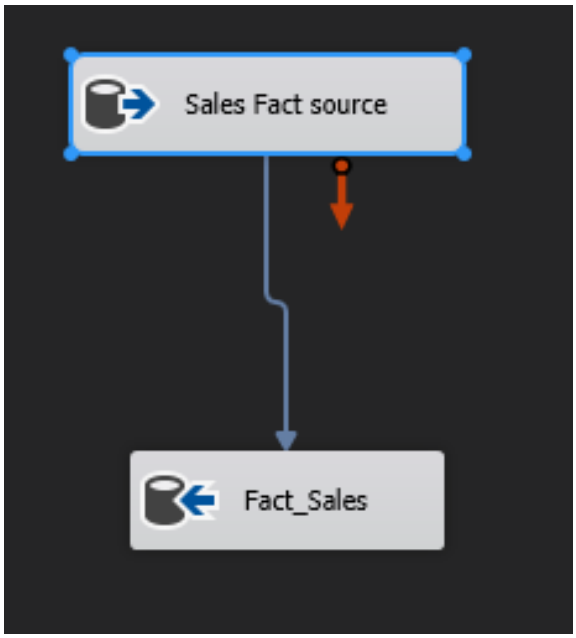




This is the SQL code I used to extract and transform the Dim_Product table. No transformations were done on this dimension table; it has only been restricted to show relevant tables. This is followed by the OLE DB source and OLE DB destination used for this ETL.

Fact_Sales





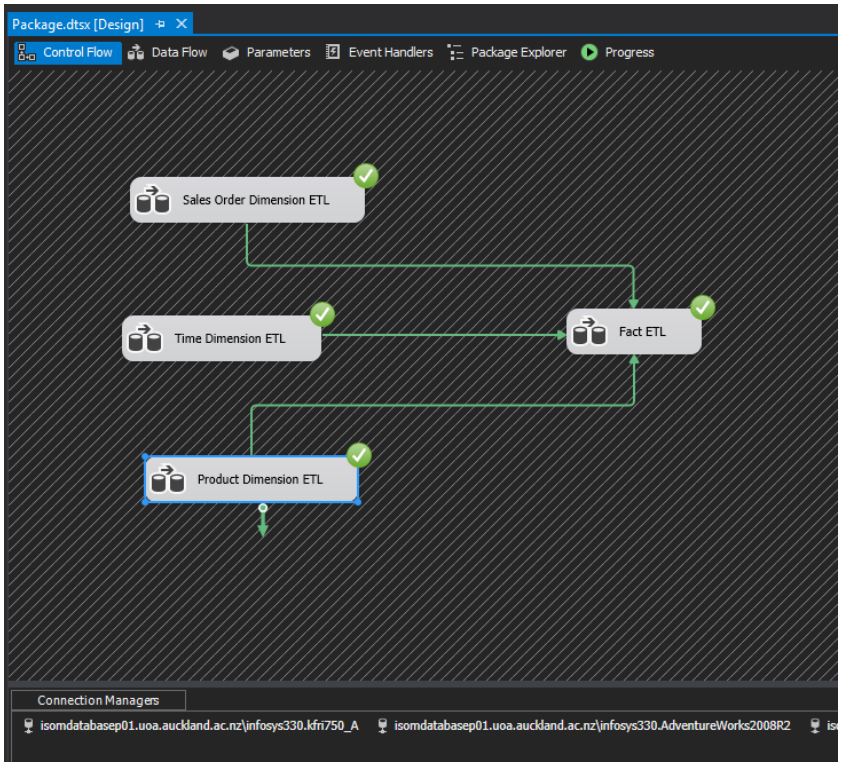
This is the SQL code I used to extract and transform the Fact_Sales table.

The transformations used here were a join between the Production.Product, Sales.SpecialOfferProduct, Sales.SalesOrderDetail, Sales.SalesOrderHeader and the DimDate tables.

This is followed by the OLE DB source and OLE DB destination used for this ETL.

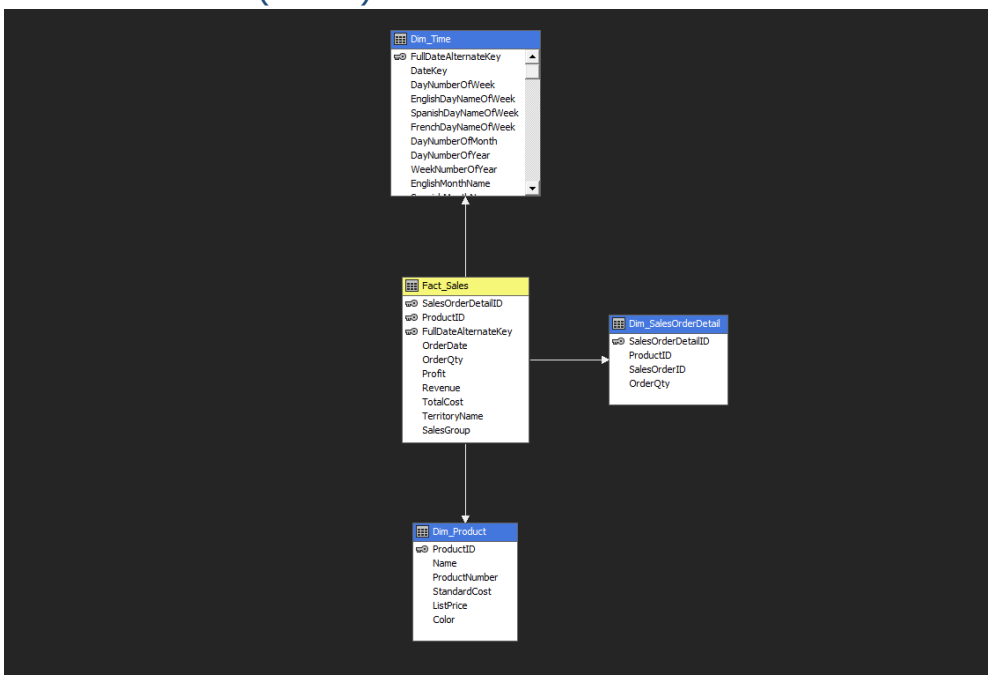
This was necessary as this is a fact table. Without these joins the comparison of data between the various dimension tables would be impossible.

SSIS Final Run

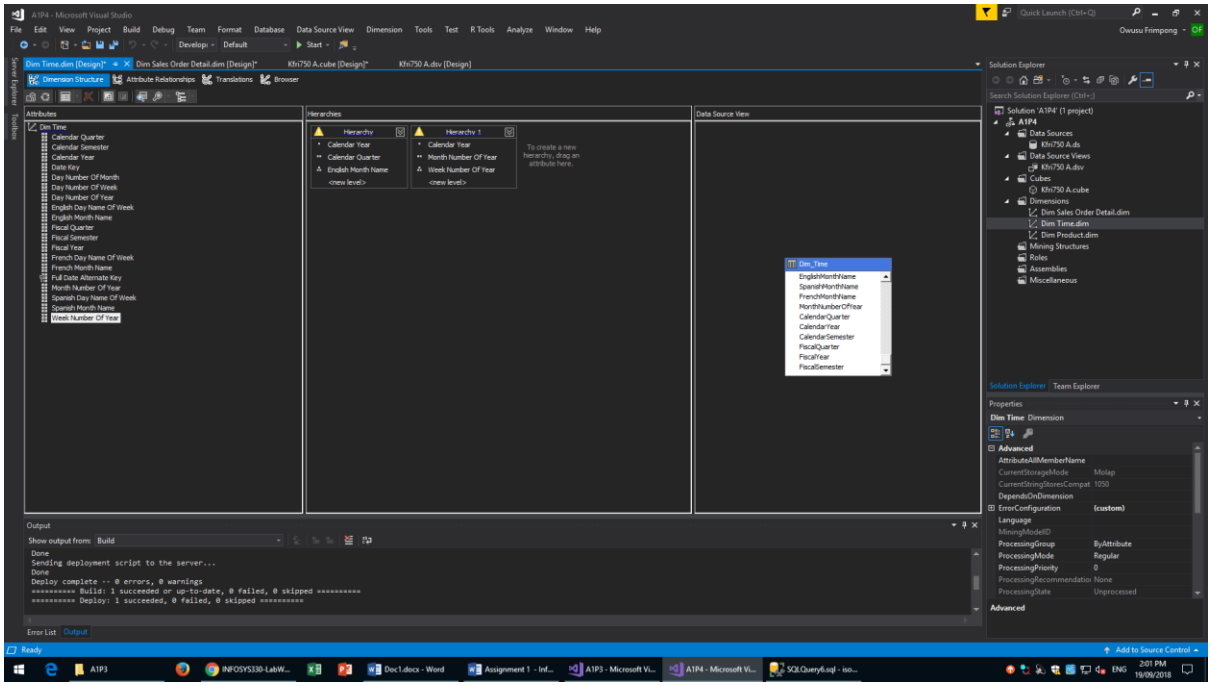


This is a screenshot of the successful run of the SSIS

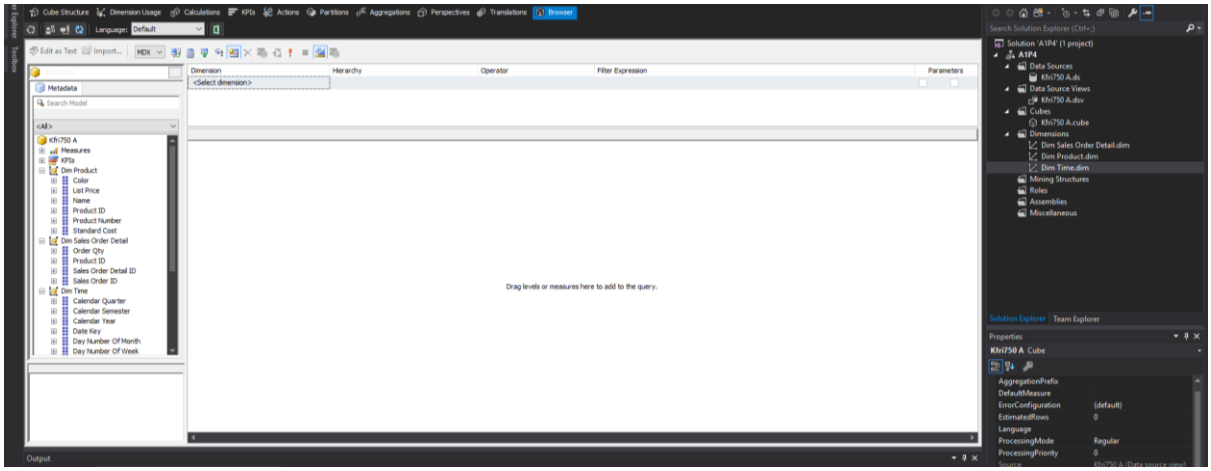
Task 4 - Cubes (SSAS)



A screenshot of the Data Source View/Cube Structure



Here are the Hierarchies that I used. These allow me to arrange the data in chronological order and make analyses based on the time of year.

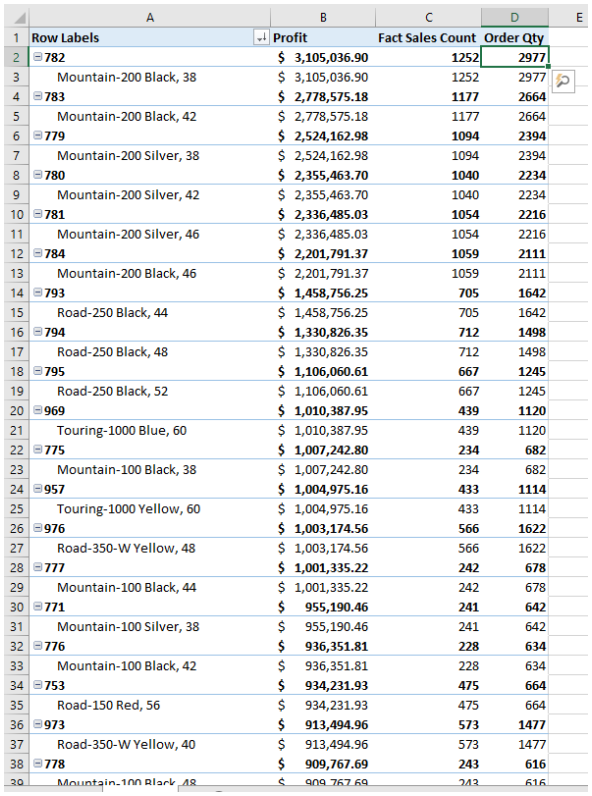


Post-deployment screenshot of cube and cube structure

Task 5. DW Usage (browsing cubes)

Scenario 1

The user can use the cube to find the most profitable products



Row Labels	Profit	Fact Sales Count	Order Qty
782	**$ 3,105,036.90**	**1252**	**2977**
Mountain-200 Black, 38	$ 3,105,036.90	1252	2977
783	**$ 2,778,575.18**	**1177**	**2664**
Mountain-200 Black, 42	$ 2,778,575.18	1177	2664
779	**$ 2,524,162.98**	**1094**	**2394**
Mountain-200 Silver, 38	$ 2,524,162.98	1094	2394
780	**$ 2,355,463.70**	**1040**	**2234**
Mountain-200 Silver, 42	$ 2,355,463.70	1040	2234
781	**$ 2,336,485.03**	**1054**	**2216**
Mountain-200 Silver, 46	$ 2,336,485.03	1054	2216
784	**$ 2,201,791.37**	**1059**	**2111**
Mountain-200 Black, 46	$ 2,201,791.37	1059	2111
793	**$ 1,458,756.25**	**705**	**1642**
Road-250 Black, 44	$ 1,458,756.25	705	1642
794	**$ 1,330,826.35**	**712**	**1498**
Road-250 Black, 48	$ 1,330,826.35	712	1498
795	**$ 1,106,060.61**	**667**	**1245**
Road-250 Black, 52	$ 1,106,060.61	667	1245
969	**$ 1,010,387.95**	**439**	**1120**
Touring-1000 Blue, 60	$ 1,010,387.95	439	1120
775	**$ 1,007,242.80**	**234**	**682**
Mountain-100 Black, 38	$ 1,007,242.80	234	682
957	**$ 1,004,975.16**	**433**	**1114**
Touring-1000 Yellow, 60	$ 1,004,975.16	433	1114
976	**$ 1,003,174.56**	**566**	**1622**
Road-350-W Yellow, 48	$ 1,003,174.56	566	1622
777	**$ 1,001,335.22**	**242**	**678**
Mountain-100 Black, 44	$ 1,001,335.22	242	678
771	**$ 955,190.46**	**241**	**642**
Mountain-100 Silver, 38	$ 955,190.46	241	642
776	**$ 936,351.81**	**228**	**634**
Mountain-100 Black, 42	$ 936,351.81	228	634
753	**$ 934,231.93**	**475**	**664**
Road-150 Red, 56	$ 934,231.93	475	664
973	**$ 913,494.96**	**573**	**1477**
Road-350-W Yellow, 40	$ 913,494.96	573	1477
778	**$ 909,767.69**	**243**	**616**
Mountain-100 Black, 48	$ 909,767.69	243	616

Here is the browser view of the cube in descending order of Profits. An assumption I have made here is that the price for each good is the list price from the Product table and the cost is StandardCost from the same table (The formula I used to calculate profits was (OrderQty*ListPrice)-(OrderQty*StandardCost)). This screenshot shows the most profitable products sold by AWC. Managerial staff can use this as a factor in deciding which products to increase production for.

Profit	Column Labels									
	2005					2005 Total	2006	2007	2008	Grand Total
	3			3 Total	4					
Row Labels	August	July	September							
771	120514.6836	20829.6984	80343.1224	221687.5044	251444.2164	473131.7208	482058.7344			955190.4552
776	119628.5436	25107.2252	59075.824	203811.5928	261410.5212	465222.114	471129.6964			936351.8104
775	104859.5876	36922.39	73844.78	215626.7576	276179.4772	491806.2348	515436.5644			1007242.799
777	97475.1096	42829.9724	82706.1536	223011.2356	285040.8508	508052.0864	493283.1304			1001335.217
778	94521.3184	33968.5988	63506.5108	191996.428	242210.8784	434207.3064	475560.3832			909767.6896
753	85825.5238	40802.2982	57686.0078	184313.8298	257476.5714	441790.4012	492441.53			934231.9312
773	84806.6292	34220.2188	74391.78	193418.628	242517.2028	435935.8308	458253.3648			894189.1956
772	84806.6292	10414.8492	74391.78	169613.2584	246980.7096	416593.968	465692.5428			882286.5108
774	62489.0952	14878.356	59513.424	136880.8752	217223.9976	354104.8728	397252.1052			751356.978
749	57686.0078	35174.395	47837.1772	140697.58	246220.765	386918.345	457267.135			844185.48
758	41276.2824	26370.9582	24651.1131	92298.3537	109496.8047	201795.1584	205234.8486			407030.007
754	30957.2118	15478.6059	21211.4229	67647.2406	93444.9171	161092.1577	172557.7917			333649.9494
752	29546.4918	16883.7096	35174.395	81604.5964	177278.9508	258883.5472	385511.3692			644394.9164
770	26072.9392	9184.7854	13036.4696	48294.1942	59256.68	107550.8742	353762.3796	210953.7808	296.2834	672563.318
751	25325.5644	39395.3224	40802.2982	105523.185	182906.854	288430.039	405209.0304			693639.0694
750	21104.637	32360.4434	32360.4434	85825.5238	184313.8298	270139.3536	344709.071			614848.4246
760	21036.1214	12740.1862	14517.8866	48294.1942	58367.8298	106662.024	348725.5618	203546.6958	2370.2672	661304.5488
762	18962.1376	13629.0364	14814.17	47405.344	57478.9796	104884.3236	351984.6792	209472.3638	1481.417	667822.7836
761	18073.2874	5925.668	10666.2024	34665.1578	48590.4776	83255.6354	295098.2664	182510.5744	888.8502	561753.3264
763	15999.3036	6221.9514	9777.3522	31998.6072	48886.761	80885.3682	296875.9668	181029.1574	592.5668	559383.0592
765	13925.3198	9777.3522	7999.6518	31702.3238	49183.0444	80885.3682	291839.149	180732.874	888.8502	554346.2414
755	12612.1974	6306.0987	15478.6059	34396.902	57901.4517	92298.3537	108350.2413			200648.595
745	12359.6368	650.5072	10408.1152	23418.2592	22767.752	46186.0112	39030.432			85216.4432
748	12345.996	1234.5996	8024.8974	21605.493	33334.1892	54939.6822	249389.1192	316674.7974	123459.96	744463.5588
756	12038.9157	8025.9438	12038.9157	32103.7752	57901.4517	90005.2269	108350.2413			198355.4682
742	9259.497	1851.8994	11111.3964	22222.7928	21605.493	43828.2858	123459.96	163584.447	69754.8774	400627.5702
741	9207.646	1315.378	11180.713	21703.737	34199.828	55903.565	57876.632			113780.197
747	8547.826	2442.236	10379.503	21369.565	21369.565	42739.13	123943.477	163629.812	72045.962	402358.381
743	7937.267	610.559	12821.739	21369.565	31749.068	53118.633	243002.482	303447.823	121501.241	721070.179
732	6309.9556	3883.0496	3397.6684	13590.6736	19657.9386	33248.6122	27424.0378			60672.65
729	6152.5789	2401.0064	3751.5725	12305.1578	13355.5981	25660.7559	88537.111	35264.7815		149462.6484
725	5702.3902	2250.9435	4351.8241	12305.1578	13655.7239	25960.8817	87636.7336	35114.7186		148712.3339
768	5629.3846	4444.251	5036.8178	15110.4534	28739.4898	43849.9432	174510.9226	101625.2062		319986.072
738	5171.2011	2519.3031	3182.2776	10872.7818	11800.9461	22673.7279	77700.6114	83137.0023	26121.1953	209632.5369
766	5036.8178	3259.1174	5629.3846	13925.3188	29924.6234	43849.9432	178066.2234	103895.4734		325811.74

Here we can also drill down to particular times of the year. As an example, I have shown the most profitable products for the month of August 2005. This can be done with any month or even week using the hierarchies that I have included in the cube.

Scenario 2

Which products are the least profitable?

Row Labels	Profit	Fact Sales Count	Order Qty
911	**$ 150.79**	**6**	**10**
LL Road Seat/Saddle	$ 150.79	6	10
897	**$ 534.27**	**2**	**4**
LL Touring Frame - Blue, 58	$ 534.27	2	4
710	**$ 549.33**	**44**	**90**
Mountain Bike Socks, L	$ 549.33	44	90
943	**$ 904.04**	**6**	**8**
LL Mountain Frame - Black, 40	$ 904.04	6	8
942	**$ 1,153.00**	**5**	**7**
ML Mountain Frame-W - Silver, 38	$ 1,153.00	5	7
914	**$ 1,372.16**	**43**	**91**
LL Touring Seat/Saddle	$ 1,372.16	43	91
946	**$ 1,435.06**	**30**	**56**
LL Touring Handlebars	$ 1,435.06	30	56
927	**$ 1,695.08**	**9**	**15**
LL Mountain Frame - Black, 52	$ 1,695.08	9	15
805	**$ 1,806.44**	**46**	**95**
LL Headset	$ 1,806.44	46	95
915	**$ 1,827.99**	**41**	**84**
ML Touring Seat/Saddle	$ 1,827.99	41	84
898	**$ 2,003.52**	**9**	**15**
LL Touring Frame - Blue, 62	$ 2,003.52	9	15
903	**$ 3,339.20**	**14**	**25**
LL Touring Frame - Blue, 44	$ 3,339.20	14	25
913	**$ 3,921.89**	**60**	**134**
HL Road Seat/Saddle	$ 3,921.89	60	134
923	**$ 4,648.07**	**1488**	**1488**
Touring Tire Tube	$ 4,648.07	1488	1488
902	**$ 4,808.45**	**20**	**36**
LL Touring Frame - Yellow, 58	$ 4,808.45	20	36
713	**$ 4,932.51**	**429**	**429**
Long-Sleeve Logo Jersey, S	$ 4,932.51	429	429
882	**$ 5,054.00**	**407**	**407**
Short-Sleeve Classic Jersey, M	$ 5,054.00	407	407
908	**$ 5,232.31**	**153**	**347**
LL Mountain Seat/Saddle	$ 5,232.31	153	347
919	**$ 5,256.07**	**16**	**44**
LL Mountain Frame - Silver, 48	$ 5,256.07	16	44

tmpE65B

Here is the browser view of the cube in ascending order of Profits. This shows the least profitable products sold by AWC. We can see here that LL Road Seat/Saddle is the least profitable item.

Managerial staff can use this as a factor in deciding which products to decrease production for. Their marketing team can also use this information to create deals that will help increase the rate at which people purchase these products. They could bundle these goods with more profitable goods and have an overall discount.

Scenario 3

What are the most/least popular products? How do these correlate to revenue/cost?

Row Labels	Profit	Fact Sales Count	Order Qty
969	**$ 1,010,387.95**	**439**	**1120**
Touring-1000 Blue, 60	$ 1,010,387.95	439	1120
795	**$ 1,106,060.61**	**667**	**1245**
Road-250 Black, 52	$ 1,106,060.61	667	1245
794	**$ 1,330,826.35**	**712**	**1498**
Road-250 Black, 48	$ 1,330,826.35	712	1498
793	**$ 1,458,756.25**	**705**	**1642**
Road-250 Black, 44	$ 1,458,756.25	705	1642
784	**$ 2,201,791.37**	**1059**	**2111**
Mountain-200 Black, 46	$ 2,201,791.37	1059	2111
781	**$ 2,336,485.03**	**1054**	**2216**
Mountain-200 Silver, 46	$ 2,336,485.03	1054	2216
780	**$ 2,355,463.70**	**1040**	**2234**
Mountain-200 Silver, 42	$ 2,355,463.70	1040	2234
779	**$ 2,524,162.98**	**1094**	**2394**
Mountain-200 Silver, 38	$ 2,524,162.98	1094	2394
783	**$ 2,778,575.18**	**1177**	**2664**
Mountain-200 Black, 42	$ 2,778,575.18	1177	2664
782	**$ 3,105,036.90**	**1252**	**2977**
Mountain-200 Black, 38	$ 3,105,036.90	1252	2977
Grand Total	**$ 20,207,546.30**	**9199**	**20101**

When limited to just the Top 10 products by profit we can see that there is a strong correlation between profit and order quantity. We can also see that Mountain-200 Black, 38 is the most popular product and also happens to have a very large profit margin.

Row Labels	Profit	Fact Sales Count	Order Qty
897	**$ 534.27**	**2**	**4**
LL Touring Frame - Blue, 58	$ 534.27	2	4
942	**$ 1,153.00**	**5**	**7**
ML Mountain Frame-W - Silver, 38	$ 1,153.00	5	7
943	**$ 904.04**	**6**	**8**
LL Mountain Frame - Black, 40	$ 904.04	6	8
911	**$ 150.79**	**6**	**10**
LL Road Seat/Saddle	$ 150.79	6	10
927	**$ 1,695.08**	**9**	**15**
LL Mountain Frame - Black, 52	$ 1,695.08	9	15
946	**$ 1,435.06**	**30**	**56**
LL Touring Handlebars	$ 1,435.06	30	56
915	**$ 1,827.99**	**41**	**84**
ML Touring Seat/Saddle	$ 1,827.99	41	84
710	**$ 549.33**	**44**	**90**
Mountain Bike Socks, L	$ 549.33	44	90
914	**$ 1,372.16**	**43**	**91**
LL Touring Seat/Saddle	$ 1,372.16	43	91
805	**$ 1,806.44**	**46**	**95**
LL Headset	$ 1,806.44	46	95
Grand Total	**$ 11,428.16**	**232**	**460**

As seen in the top 10 there is a correlation between order quantity and profit. However, the correlation is much weaker in this case. We can see also that the least popular product is the LL Touring Frame – Blue, 58.

Row Labels	Profit	Fact Sales Count	Order Qty
712	**$ 17,184.65**	**3382**	**8311**
AWC Logo Cap	$ 17,184.65	3382	8311
870	**$ 21,288.02**	**4688**	**6815**
Water Bottle - 30 oz.	$ 21,288.02	4688	6815
711	**$ 147,696.65**	**3090**	**6743**
Sport-100 Helmet, Blue	$ 147,696.65	3090	6743
715	**$ 75,792.84**	**1635**	**6592**
Long-Sleeve Logo Jersey, L	$ 75,792.84	1635	6592
708	**$ 143,074.97**	**3007**	**6532**
Sport-100 Helmet, Black	$ 143,074.97	3007	6532
707	**$ 137,248.58**	**3083**	**6266**
Sport-100 Helmet, Red	$ 137,248.58	3083	6266
864	**$ 168,822.50**	**682**	**4247**
Classic Vest, S	$ 168,822.50	682	4247
873	**$ 5,540.48**	**3354**	**3865**
Patch Kit/8 Patches	$ 5,540.48	3354	3865
884	**$ 47,981.99**	**904**	**3864**
Short-Sleeve Classic Jersey, XL	$ 47,981.99	904	3864
714	**$ 41,805.64**	**1218**	**3636**
Long-Sleeve Logo Jersey, M	$ 41,805.64	1218	3636
859	**$ 53,105.54**	**1086**	**3464**
Half-Finger Gloves, M	$ 53,105.54	1086	3464
863	**$ 75,393.92**	**364**	**3378**
Full-Finger Gloves, L	$ 75,393.92	364	3378
877	**$ 16,517.67**	**1327**	**3319**
Bike Wash - Dissolver	$ 16,517.67	1327	3319
867	**$ 144,409.96**	**648**	**3296**
Women's Mountain Shorts, S	$ 144,409.96	648	3296
869	**$ 142,131.64**	**707**	**3244**
Women's Mountain Shorts, L	$ 142,131.64	707	3244
876	**$ 237,829.92**	**796**	**3166**
Hitch Rack - 4-Bike	$ 237,829.92	796	3166
921	**$ 9,667.85**	**3095**	**3095**
Mountain Tire Tube	$ 9,667.85	3095	3095
716	**$ 34,263.15**	**1076**	**2980**
Long-Sleeve Logo Jersey, XL	$ 34,263.15	1076	2980
782	**$ 3,105,036.90**	**1252**	**2977**
Mountain-200 Black, 38	$ 3,105,036.90	1252	2977

Here is the browser view of the cube in ascending order of Order Quantity. This shows the most popular products sold by AWC.

Managerial staff can use this as a factor in deciding which products to increase production for. The high amount of orders for those products could indicate that there is high demand for these goods, it could also indicate that these goods have lower responsiveness to changes in price as they may be more necessary to people who shop at this store. If this assumption is correct, AWC may be able to increase prices to increase revenues.

Row Labels	Profit	Fact Sales Count	Order Qty
897	**$ 534.27**	**2**	**4**
LL Touring Frame - Blue, 58	$ 534.27	2	
942	**$ 1,153.00**	**5**	
ML Mountain Frame-W - Silver, 38	$ 1,153.00	5	
943	**$ 904.04**	**6**	**8**
LL Mountain Frame - Black, 40	$ 904.04	6	8
911	**$ 150.79**	**6**	**10**
LL Road Seat/Saddle	$ 150.79	6	10
898	**$ 2,003.52**	**9**	**15**
LL Touring Frame - Blue, 62	$ 2,003.52	9	15
927	**$ 1,695.08**	**9**	**15**
LL Mountain Frame - Black, 52	$ 1,695.08	9	15
744	**$ 11,058.62**	**13**	**17**
HL Mountain Frame - Black, 44	$ 11,058.62	13	17
903	**$ 3,339.20**	**14**	**25**
LL Touring Frame - Blue, 44	$ 3,339.20	14	25
902	**$ 4,808.45**	**20**	**36**
LL Touring Frame - Yellow, 58	$ 4,808.45	20	36
919	**$ 5,256.07**	**16**	**44**
LL Mountain Frame - Silver, 48	$ 5,256.07	16	44
946	**$ 1,435.06**	**30**	**56**
LL Touring Handlebars	$ 1,435.06	30	56
827	**$ 9,799.30**	**31**	**64**
ML Road Rear Wheel	$ 9,799.30	31	64
830	**$ 11,079.97**	**33**	**68**
ML Mountain Frame - Black, 40	$ 11,079.97	33	68
950	**$ 9,697.37**	**28**	**68**
ML Crankset	$ 9,697.37	28	68
888	**$ 33,379.80**	**39**	**83**
HL Touring Frame - Yellow, 50	$ 33,379.80	39	83
915	**$ 1,827.99**	**41**	**84**
ML Touring Seat/Saddle	$ 1,827.99	41	84
887	**$ 34,988.47**	**41**	**87**
HL Touring Frame - Yellow, 46	$ 34,988.47	41	87
710	**$ 549.33**	**44**	**90**
Mountain Bike Socks, L	$ 549.33	44	90
733	**$ 21,842.15**	**44**	**90**

Order Qty
Value: 4
Row: 897
Column: Order Qty

Here is the browser view of the cube in descending order of Order Quantity. This shows the least popular products sold by AWC.

Managerial staff can use this as a factor in deciding which products to decrease production for. It could also indicate that either customers are less reliant on these types of products or that the prices are too high, in response to this managerial staff may reduce prices to increase sales and in turn profit.

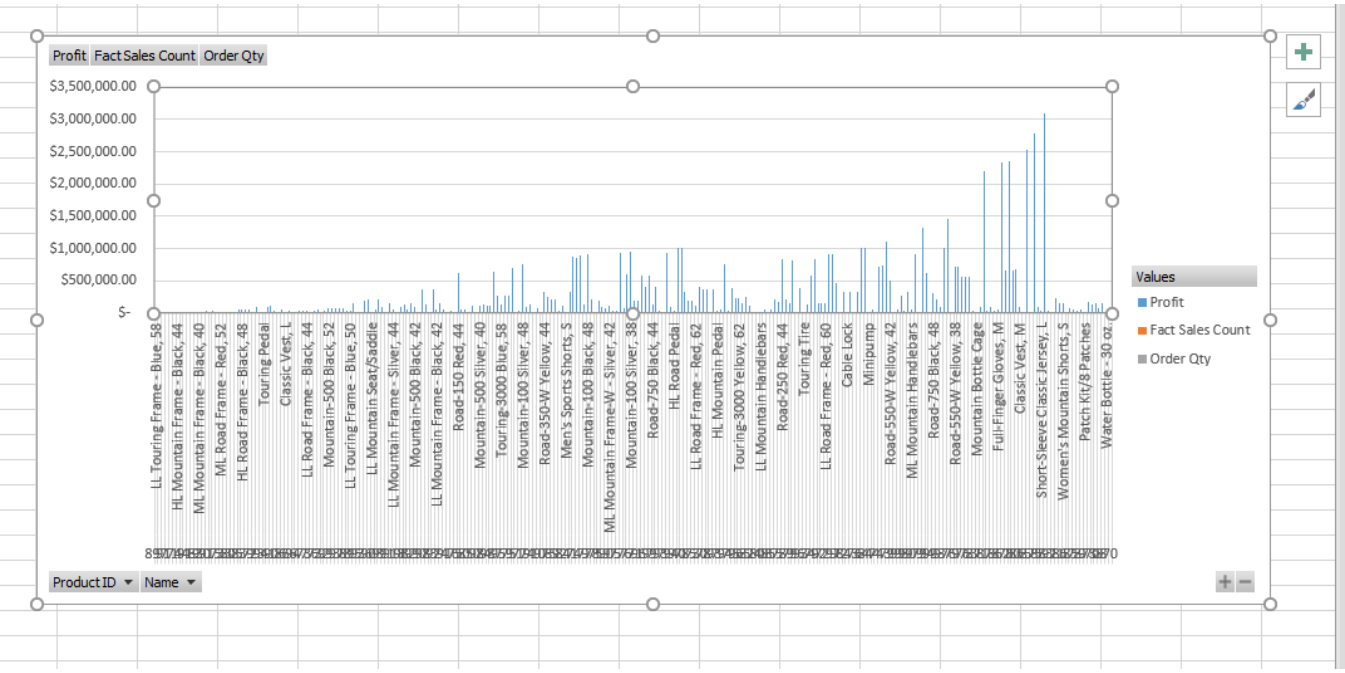
When the top 10 products are shown next to their total cost to produce there doesn't seem to be any apparent correlation

	A	B	C	D
1	Row Labels	Total Cost	Order Qty	
2	707	81998.7558	6266	
3	708	85479.7116	6532	
4	711	88240.9209	6743	
5	712	57531.2353	8311	
6	714	139958.0028	3636	
7	715	253741.2416	6592	
8	864	100862.003	4247	
9	870	12718.8345	6815	
10	873	3310.3725	3865	
11	884	160635.3672	3864	
12	**Grand Total**	**984476.4452**	**56871**	
13				
14				
15				

The same lack of correlation can be seen with the bottom ten products by order quantity as shown below.

	A	B	C	D
1	Row Labels	Total Cost	Order Qty	
2	744	11884.5776	17	
3	897	799.4076	4	
4	898	2997.7785	15	
5	902	7194.6684	36	
6	903	4996.2975	25	
7	911	120.413	10	
8	919	6362.1272	44	
9	927	2051.775	15	
10	942	1395.6299	7	
11	943	1094.28	8	
12	Grand Total	38896.9547	181	
13				
14				

With this, we can make a graph showing the correlation between OrderQty and Total Profit made by each product as shown below.



Overall, we can see that more profit is made when more items are sold. We can also see that some items' profits are more responsive to changes in the quantity sold than others. Management can use this information to help increase revenue for more profitable products such as Short Sleeve Classic Vest, L because these products have higher prices but still remain popular in terms of items sold. This

may show that there is an opportunity to increase prices slightly and increase revenue as the negative impact on quantity sold may not be as high as with other goods