

# ALY 6030 - Group 2 - Week 3 Case Study

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**Case #4:** An executive state that R&D has been increasing its cost by 15% every quarter and believes that the cost is associated with Accessory product churn. The executive believes that the churn is unnecessary and is losing money for the company. What data can you provide to support or refute the executive's claim?

**Problem Statement:** After analyzing the problem statement we understood that the executive is making the following claims:

**Claim #1:** R & D department in the company has been increasing its cost by 15% every quarter.

**Claim #2:** The increased cost is associated with accessory product churn.

We should provide the data along with our findings to support or to refute the aforesaid executive's claims. In order to do so, we should make the following observations:

1. Did R&D department actually increased its cost by 15% or is there a decline in the overall cost?
2. If the R & D department shows an increase in the cost, we should identify if this cost is associated only with accessory product churn.

**Solution:** To identify the quarterly costs associated with R&D department, we started with analyzing the table "dimproductcategory" from the database "aw". We notice that there are 4 product categories in the table. Product categories from the table can be retrieved by executing the following query:

```
USE aw;
SELECT *
FROM aw.dim product category;
```

This would display the product categories details as shown below:

ProductCategoryKey	ProductCategoryAlternateKey	EnglishProductCategoryName	SpanishProductCategoryName	FrenchProductCategoryName
1	1	Bikes	Bicideta	Vélo
2	2	Components	Componente	Composant
3	3	Clothing	Prenda	Vêtements
4	4	Accessories	Accesorio	Accessoire
NULL	NULL	NULL	NULL	NULL

We notice that the resulted table data contains a column called, "*Accessories*". We will now dwell on the "Accessories" and identify the number of sub-products available in this column. We will retrieve these details by executing the below query:

```

SELECT COUNT (productcategorykey) AS
        ' The total number of subcategories available in Accessories '
FROM    dimproductsubcategory
WHERE   productcategorykey = 4;

```

The output displays a total of 12 subcategories available in “Accessories”.

The total number of subcategories available in Accessories
12

We checked the cost associated with “Accessories”. To retrieve the cost, we filtered the ProductCategoryKey with value 4, as number 4 is the key associated with Accessories. We used “JOIN” function and join the tables, “dimproduct”, “dimproductsubcategory” and “dimproductcategory” along with a “WHERE” Clause that specifies the conditions to filter the values with key 4 (for accessories) AND displays the products in “Current Status”. We also used ORDER BY function and ASC functions to sort the resulting ProductSubCategoryKey values in ascending order. The following query retrieves the Standard Cost associated only with Accessories.

```

/* Getting the details of the subcategory*/
SELECT dimproductsubcategory.productcategorykey,
        dimproductcategory.englishproductcategoryname,
        dimproductsubcategory.productssubcategorykey,
        dimproductsubcategory.englishproductssubcategoryname,
        dimproduct.englishproductname,
        dimproduct.standardcost,
        dimproduct.status
FROM    dimproduct
        JOIN dimproductsubcategory
            ON dimproduct.productssubcategorykey =
               dimproductsubcategory.productssubcategorykey
        JOIN dimproductcategory
            ON dimproductcategory.productcategorykey =
               dimproductsubcategory.productcategorykey
WHERE   ( dimproductsubcategory.productcategorykey = 4 )
        AND ( status = 'Current' )
ORDER   BY productssubcategorykey ASC;

```

ProductCategoryKey	EnglishProductCategoryName	ProductSubcategoryKey	EnglishProductSubcategoryName	EnglishProductName	StandardCost	Status
4	Accessories	26	Bike Racks	Hitch Rack - 4-Bike	45.00	Current
4	Accessories	27	Bike Stands	All-Purpose Bike Stand	59.00	Current
4	Accessories	28	Bottles and Cages	Water Bottle - 30 oz.	2.00	Current
4	Accessories	28	Bottles and Cages	Mountain Bottle Cage	4.00	Current
4	Accessories	28	Bottles and Cages	Road Bottle Cage	3.00	Current
4	Accessories	29	Cleaners	Bike Wash - Dissolver	3.00	Current
4	Accessories	30	Fenders	Fender Set - Mountain	8.00	Current
4	Accessories	31	Helmets	Sport-100 Helmet, Red	13.00	Current
4	Accessories	31	Helmets	Sport-100 Helmet, Black	13.00	Current
4	Accessories	31	Helmets	Sport-100 Helmet, Blue	13.00	Current
4	Accessories	32	Hydration Packs	Hydration Pack - 70 oz.	21.00	Current
4	Accessories	37	Tires and Tubes	Patch Kit/8 Patches	1.00	Current
4	Accessories	37	Tires and Tubes	Mountain Tire Tube	2.00	Current
4	Accessories	37	Tires and Tubes	Road Tire Tube	1.00	Current

The resulted output contains details like the ProductCategoryKey, name of the ProductCategory, ProductSubCategoryKey and name of the ProductSubCategory in English, the cost associated with Accessories and the current status of the ProductCategory.

*/\* Getting the details of Expenditures by R&D department by each quarter \*/*

```

SELECT dimt.fiscalyear,
       dimt.fiscalquarter,
       dimde.departmentgroupname,
       dimsc.scenarioname,
       dima.accounttype,
       dima.accountdescription,
       SUM(ff.amount) AS 'Expenditure
by each quarter' FROM
       factfinance ff
JOIN dimtime dimt
  ON dimt.timekey = ff.timekey
JOIN dimaccount dima
  ON ff.accountkey = dima.accountkey
JOIN dimscenario dimsc
  ON ff.scenariokey = dimsc.scenariokey
JOIN dimdepartmentgroup dimde
  ON ff.departmentgroupkey = dimde.departmentgroupkey
WHERE ( ff.departmentgroupkey = 6 )
      AND ( ff.scenariokey = 1 )
      AND ( dima.accounttype = 'Expenditures' )
GROUP BY dima.accountdescription,
         dimt.fiscalquarter,
         dimt.fiscalyear
ORDER BY dima.accountdescription,
         ff.timekey;

```

Result Grid   Filter Rows:   Export:   Wrap Cell Content:							
	FiscalYear	FiscalQuarter	DepartmentGroupName	ScenarioName	AccountType	AccountDescription	Expenditure by each quarter
▶	2018	1	Research and Development	Actual	Expenditures	Amortization of Goodwill	1930.729995727539
	2018	2	Research and Development	Actual	Expenditures	Amortization of Goodwill	1998.3199996948242
	2018	3	Research and Development	Actual	Expenditures	Amortization of Goodwill	1964.7399978637695
	2018	4	Research and Development	Actual	Expenditures	Amortization of Goodwill	1977.4899978637695
	2019	1	Research and Development	Actual	Expenditures	Amortization of Goodwill	2574.3599891662598
	2019	2	Research and Development	Actual	Expenditures	Amortization of Goodwill	2588.619993209839
	2019	3	Research and Development	Actual	Expenditures	Amortization of Goodwill	2468.6099891662598
	2019	4	Research and Development	Actual	Expenditures	Amortization of Goodwill	2554.320002555847
	2020	1	Research and Development	Actual	Expenditures	Amortization of Goodwill	3977.5100297927856
	2020	2	Research and Development	Actual	Expenditures	Amortization of Goodwill	4395.490005493164
	2020	3	Research and Development	Actual	Expenditures	Amortization of Goodwill	4482.100021362305
	2020	4	Research and Development	Actual	Expenditures	Amortization of Goodwill	4683.309989929199
	2018	1	Research and Development	Actual	Expenditures	Building Leasehold	11017.610046386719
	2018	2	Research and Development	Actual	Expenditures	Building Leasehold	11368.2900390625
	2018	3	Research and Development	Actual	Expenditures	Building Leasehold	11188.539978027344

The output snippet is not a comprehensive list. We observed that there are fluctuations in the cost incurred by the R&D department for every quarter of the year. With this, we proceed to compare the expenses incurred by the R&D department in the second fiscal quarter in the year 2020.

### Computing Cost Growth Rate:

We tried to see if there is a trend in “Cost of Accessories” over the quarterly time. To compute the cost growth rate, we used:

Cost Growth Rate Formula =  $(2020\_2nd\ cost - 2020\_1st\ cost) / 2020\_1st\ cost$

To compute the cost, we used the aggregate function SUM on the Amount column from FactFinance table and use JOIN operator to join the tables “dimtime, dimaccount, dimscenario, dimdepartmentgroup”. Further we set filters in WHERE clause to sort out the records with departmentgroupkey = 6 for R&D, scenariokey = 1 and accounttype = expenditures(to assess the cost)

We add the total expenditures incurred for the R & D department (using SUM function) in the second quarter of the year 2020. In order to do this, we use GROUP BY to group the data as per the fiscal year and quarter and filtered the records using HAVING to compare quarterly cost data.




Likewise, we computed the cost incurred by the R&D department for the first quarter of the year 2020. We use the aggregate function SUM to calculate the total cost incurred on expenditures by the department and JOIN the tables “dimtime, dimaccount, dimscenario, dimdepartmentgroup”. However, this time we changed the filters to point to the cost data incurred in the first quarter of the year 2020. The query data is shown below:

```
SELECT ((SELECT SUM(ff.amount)
FROM factfinance ff
JOIN dimtime dimt
ON dimt.timekey = ff.timekey
```

```

        JOIN dimaccount dima
            ON ff.accountkey = dima.accountkey
        JOIN dimscenario dimsc
            ON ff.scenariokey = dimsc.scenariokey
        JOIN dimdepartmentgroup dimde
            ON ff.departmentgroupkey = dimde.departmentgroupkey
        WHERE ff.departmentgroupkey = 6
            AND ff.scenariokey = 1
            AND dima.accounttype = "expenditures"
    GROUP BY dimt.fiscalyear, dimt.fiscalquarter
    HAVING dimt.fiscalyear = 2020 AND
        dimt.fiscalquarter = 2) -
(SELECT SUM(ff.amount)
FROM factfinance ff
JOIN dimtime dimt
    ON dimt.timekey = ff.timekey
JOIN dimaccount dima
    ON ff.accountkey = dima.accountkey
JOIN dimscenario dimsc
    ON ff.scenariokey = dimsc.scenariokey
JOIN dimdepartmentgroup dimde
    ON ff.departmentgroupkey = dimde.departmentgroupkey
WHERE ff.departmentgroupkey = 6
    AND ff.scenariokey = 1
    AND dima.accounttype = "expenditures"
GROUP BY dimt.fiscalyear, dimt.fiscalquarter
HAVING dimt.fiscalyear = 2020 AND dimt.fiscalquarter = 1)) /
(SELECT SUM(ff.amount)
FROM factfinance ff
JOIN dimtime dimt
    ON dimt.timekey = ff.timekey
JOIN dimaccount dima
    ON ff.accountkey = dima.accountkey
JOIN dimscenario dimsc
    ON ff.scenariokey = dimsc.scenariokey
JOIN dimdepartmentgroup dimde
    ON ff.departmentgroupkey = dimde.departmentgroupkey
WHERE ff.departmentgroupkey = 6
    AND ff.scenariokey = 1
    AND dima.accounttype = "expenditures"
GROUP BY dimt.fiscalyear, dimt.fiscalquarter
HAVING dimt.fiscalyear = 2020 AND dimt.fiscalquarter = 1)
AS 2020_2nd_quarter_inceasing_rate;

```

Result Grid			 Filter Rows:	
	2020_2nd_quarter_inceasing_rate			
	-0.2041847232735732			

**Observations:** We notice that the cost incurred by the R&D department in the second quarter of the year 2020 is -20.4%, which is negative. Additionally, we observed the fluctuations in the cost of every quarter. This shows that the quarterly cost did not increase by 15% as stated by the executive.

**Conclusions:**

1. We found that the cost incurred in the second quarter of 2020 is negative (-20.4%). Similarly, we observed fluctuations in the cost. We did not find “a trend” in the expenses pattern of the R &D department. Hence, we can refute the executive’s claim that R&D has been increasing its cost by 15% every quarter.
2. We observed that the tables “dimProduct, dimProductCategory and dimProductSubCategory” does not contain any data related to accessory product churn. There is no break-up of the expenses provided which can prove that the 15% increase in the cost by R & D department is associated with Accessory product churn.
3. Hence, with the aforesaid data, we say that we can refute the executive’s claim.

**Case #5:** Your manager has asked you to prepare a revenue forecast. Select the data that is necessary to predict revenue 12 months into the future.

**Revenue Details:** To obtain the total revenue from each department as per the fiscal quarter and year, we used the aggregate function SUM and add the revenue by joining the data from the tables “FactFinance, dimtime, dimaccount, dimscenario, dimdepartmentgroup” tables. We set up filters in the WHERE clause to obtain the data with ScenarioKey = 1 AND AccountType = Revenue and group the data as per the department group names, fiscal quarter and year. We will then sort the department group key and time key in ascending order using the ASC operator.

```
/* Solution 1: Revenue details */
SELECT ff.timekey,
       dimt.fulldatealternatekey,
       ff.departmentgroupkey,
       dimde.departmentgroupname,
       dimsc.scenarioname,
       dima.accounttype,
       dima.accountdescription,
       dimt.fiscalyear,
       dimt.fiscalquarter,
       SUM(ff.amount) AS 'Sum_Revenue'
FROM factfinance ff
     JOIN dimtime dimt
       ON dimt.timekey = ff.timekey
     JOIN dimaccount dima
       ON ff.accountkey = dima.accountkey
     JOIN dimscenario dimsc
```



```

        ON ff.scenariokey = dimsc.scenariokey
    JOIN dimdepartmentgroup dimde
        ON ff.departmentgroupkey = dimde.departmentgroupkey
WHERE ff.scenariokey = 1
        AND dima.accounttype = 'Revenue'
GROUP BY dimde.departmentgroupname,
        dimt.fiscalyear,
        dimt.fiscalquarter
ORDER BY ff.departmentgroupkey,
        ff.timekey ASC;

```

The resulted total revenue is displayed below:

FiscalYear	FiscalQuarter	DepartmentGroupName	ScenarioName	AccountType	Sum_Revenue
2018	1	Corporate	Actual	Revenue	6401.089950561523
2018	2	Corporate	Actual	Revenue	6179.479965209961
2018	3	Corporate	Actual	Revenue	6428.47004699707
2018	4	Corporate	Actual	Revenue	6177.619964599609
2019	1	Corporate	Actual	Revenue	9065.110084533691
2019	2	Corporate	Actual	Revenue	9215.090023040771
2019	3	Corporate	Actual	Revenue	8683.11996459961
2019	4	Corporate	Actual	Revenue	8949.139961242676
2020	1	Corporate	Actual	Revenue	13132.779972076416
2020	2	Corporate	Actual	Revenue	13461.930015563965
2020	3	Corporate	Actual	Revenue	13312.320091247559
2020	4	Corporate	Actual	Revenue	13718.1801071167
2018	1	Executive General and	Actual	Revenue	979.9799957775391

We also obtained the total revenue from the Internet Sales group by fiscal year and quarter. To obtain this data, we use join operators and join the tables, “factinternetsales, dimtime, dimproduct”. We will use the SUM function to add the revenue and obtain total revenue. We will also group the data and order the data according to the fiscal quarter and year using GROUP BY and ORDER BY functions.

```

/* Case 5 - solution 2- provide Internet Sales data group by year*/
SELECT dimt.fiscalyear,
        dimt.fiscalquarter,
        SUM(fis.salesamount) AS SUM_Revenue
FROM factinternetsales fis
JOIN dimtime dimt
    ON fis.orderdatekey = dimt.timekey
JOIN dimproduct dimp
    ON fis.productkey = dimp.productkey
GROUP BY dimt.fiscalyear,
        dimt.fiscalquarter
ORDER BY dimt.fiscalyear,
        dimt.fiscalquarter;

```

The resulted total revenue from Internet sales group is displayed below:

FiscalYear	FiscalQuarter	SUM_Revenue
2018	1	1453431.00
2018	2	1812737.00
2018	3	1791585.00
2018	4	2013891.00
2019	1	1396826.00
2019	2	1327758.00
2019	3	1413447.00
2019	4	1623858.00
2020	1	2743944.00
2020	2	4008648.00
2020	3	4283086.00
2020	4	5435716.00

**Conclusion:** The data we obtained shows “Total Revenue” from all the departments in every fiscal year and quarter. Hence, this data would be sufficient for the manager to forecast the revenue 12 months into the future.