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Evans & Carter DSS

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1. Introduction

The case of fictional company Evans & Carter presents an enterprise needing to strengthen their IT infrastructure. As the business has grown – weaknesses in their information systems have prevailed. Evans & Carter lack an integrated view of their operational performance with several different sources for their business data. The following report takes the perspective of business analysts tasked with creating a Qlik application, integrating the business' different data sources and providing the identified decision makers with valuable insights. The developed decision support system consists of one dashboard, two analysis and one reports sheet, following the Decision-Analysis-Report (DAR) methodology presented by Qlik (2013). The case description presented three different user roles – CEO, CMO and Sales Manager – and they, given their different abstraction level needs, were provided different kinds of DAR sheets. To ensure the aforementioned users gain coherent and reliable insights, the underlying data needed to be heterogenous and integrated by an Extract, Transform, Load (ETL) process (Sharda et. al., 2024). This ETL process aimed to load all data into a star schema using a dimensional design process (Kimball & Ross, 2002). The resulting Qlik application enabled Evans & Carter to accommodate their Business Intelligence (BI) needs, letting them monitor sales and order trends, identifying customer groups and salespeople of interest and gaining detailed insights for reporting.

2. Research Questions & KPI's

2.1 Roles and research questions

In the case of Evans and Carter – three user stories and perspectives were noted. The roles and their respective research questions are formulated below.

- **The CEO**
  This user needs a prompt, high-level overview of the enterprise's KPI's. No interactive elements are to be implemented for this user group as they possess limited technical knowledge and only need a dashboard to acquire information.

  Research question:
  - How do orders, sales and margin differ across different divisions, product categories, time periods and other relevant dimensions?

- **The CMO**
  The Chief Marketing Officer creates value to the enterprise by creating plans to improve brand recognition and facilitating sales growth. To do this, the CMO needs both high-level analytics as well as more detailed metrics.

  Research questions:
  - What customers have not placed an order the last six months?
  - Is there a correlation between average order value and average number of orders per customers?
  - What one-visit customers received discounts for their order?
  - What are the major target groups for a given marketing campaign?

- **The Sales Manager**
  Measuring salespeople's individual sales performance over time means a detailed view is necessary for the Sales Manager. The sales manager has a higher technical expertise and will need detailed data to measure performance.

  Research questions:
  - How are the salespeople performing in terms of sales amount and top products?
  - Do the respective salespeople have customers who tend to place multiple or single orders?
  - How does discount relate to average deal size?

2.2 KPI's

Fourteen KPIs have been implemented for the CEO, Sales Manager and Chief Marketing Officer. The KPIs in question gives the stakeholders a quick overview of some of the most important information regarding both the current year to date (CYTD) and last year to date (LYTD). All the KPIs for the stakeholders, along with names, descriptions, and expression/formulas can be found in table 2.2.1 below.

Measure	Description	Expression
Total Sales	Sum of the LinesSalesAmount field.	Sum(Sales)
Total Sales CYTD	Sum of the LineSalesAmount field starting from the beginning of the current year and continuing up to the present day.	Sum(Sales * CYTDFlag)
Total Sales LYTD	Sum of the LineSalesAmount field starting from the beginning of the last year and continuing up to the last day of the year.	Sum(Sales * LYTDFlag)
Margin	Sum of the margin field	Sum(Margin)
Margin CYTD	Sum of the Margin field starting from the beginning of the current year and continuing up to the present day.	Sum(Margin * CYTDFlag)
Margin LYTD	Sum of the Margin field starting from the beginning of the last year and continuing up to the last day of the year.	Sum(Margin * LYTDFlag)
Margin %	Gross profit margin.	Sum(Margin)/Sum(Sales)
Orders	Number of individual orders.	Count(DISTINCT OrderID)
Avg. deal size	Sales divided by Orders.	Sum(Sales)/Count(DISTINCT OrderID)
No. of products	Number of unique products.	Count(DISTINCT ProductID)
Discount	Average % discount per order	Avg(Discount)
Growth vs LYTD	Calculates the percentual growth current year to date compared to last year to date	((Sum(Sales * CYTDFlag) - Sum(Sales * LYTDFlag)) / Sum(Sales * LYTDFlag))
Nbr of orders CYTD	Calculates the total number of distinct OrderIDs current year to date, i.e. the number of orders current year to date	Count({<CYTDFlag={1}>} DISTINCT OrderID)
Nbr of orders LYTD	Calculates the total number of distinct OrderIDs last year to date, i.e. the number of orders last year to date	Count({<LYTDFlag={1}>} DISTINCT OrderID)

Table 2.2.1 – KPI Table

3. Data

The data associated with the case description of Evans-carter included several different data types. These different types of data were in five folders:

- Database
- ExcelFiles
- MasterCalendar
- TextFiles
- XMLFiles

According to Sharda et. al. (2024), the ETL (Extract, transform, load) process is performed to ensure all data is heterogeneous and available to use for centralized analytics. By using a dimensional modelling approach, OLAP (Online analytical processing) is simplified (Sharda et. al., 2024, Kimball & Ross, 2002). The data included in the five folders will, thus, be loaded to accommodate a star schema. A star schema is chosen instead of a snowflake schema to simplify the querying and ease of use (Kimball & Ross, 2002).

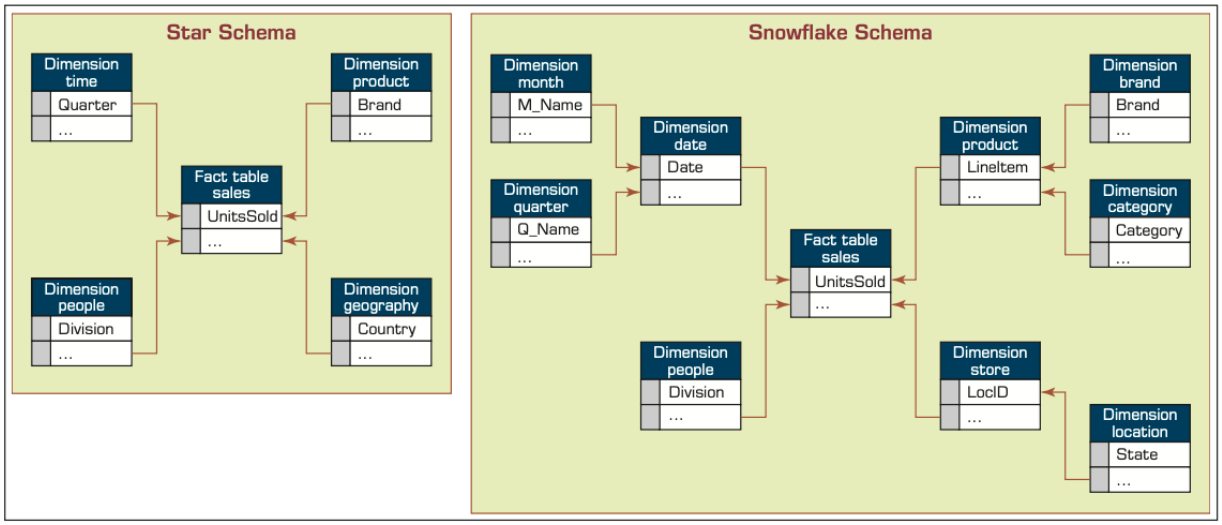

Figure 3.1 – Star / snowflake schema (Sharda et. al. 2024, p. 158).

3.1 Facts

In the folder ”Database”, the file “abc_4.0” contained sheets such “Orders” and “OrderDetails”. These two sheets represented different abstractions of an order. “Orders” contained associations – OrderID, CustomerID, EmployeeID, ShipperID as well as FreightWeight and OrderDate. “OrderDetails”, on the other hand, contained OrderID, LineNo, ProductID, Quantity, UnitPrice and Discount as column names. In other words, there was a 1:M (One to many) relationship between these two entities. For “OrderDetails”, OrderID and LineNo are the primary key. Also – the file “abc_4.0” contained a table called “shipments” – including several foreign keys and, primarily, a column named ShipmentDate. To further illustrate the difference between transactional and analytical processing – the file included a table “invoices”. This normalization is not helpful, and the date of payment, invoice issuing etc. should be accounted as a fact. To properly implement the star/snowflake schema, these four tables will be combined. This follows the principles of declaring the grain – the second step of the dimensional design process (Kimball, 2002) – where the single row in the fact table will represent every order row. The result, after scripting the merge of these tables, included the following attributes:

OrderID, LineNo, ProductID, UnitPrice, Quantity, Discount, OrderDate, CustomerID, EmployeeID, ShipperID, FreightWeight, InvoiceDate, PaymentDate, InvoiceAmount, InvoiceHandledBy, ShipmentDate, UnitCostAtSale, Sales, Cost, Margin.

In database terms, OrderID and LineNo are the composite key for the table, uniquely identifying each row. Foreign keys, which will, in the following chapters be addressed as dimensions, include ProductID, CustomerID, EmployeeID and ShipperID.

Several formatting actions were taken. Date formatting varied amongst the different sheets, ranging from e.g. “2015-Mar-15” to “03-15-2015”. These varying formats were parsed to employ a unified DD/MM/YYYY or “15/03/2015” format across all columns. Further, some raw data was collected and used to create derived fields in the table. For example – the script loads UnitCost from the products table, calculates UnitPrice (raw data from the orderDetails table) – UnitCost to populate the column Margin. These derived fields simplify aggregation at a later stage – allowing KPI expressions like “Sum(Margin)”.

3.2 Dimensions

The dimensions Products, Customers and Shippers were also located in the database folder and file “abc_4.0”. These sheets could be loaded similarly to FactSales, though some other actions needed to be taken in these ETL-processes.

The “products” sheet included a categoryID and SupplierID in accordance with normalization standards. For OLAP purposes – Category and Supplier was merged into product. Some information, like SupplierFax, could possibly have been omitted. It was kept, letting a user access such contact information in the “Report” segment (Qlik, 2024) of the application. Loading the separate tables presented a common issue – synthetic keys. Aliasing attributes was necessary to prevent this. For example, Products’ ItemPrice was renamed ProductItemPrice and Suppliers’ PostalCode was renamed SupplierPostalCode. By doing this, no circular references and synthetic keys appeared in the loading process.

CustomerID is also referenced in FactSales and loading Customers as a dimension also required aliasing of attributes. To accommodate analysis over larger divisions – DivisionName (from Divisions in "abc_4.0) was merged into the Customers table.

The dimension Employees was loaded by combining two sets of data, "employees" and "employees_new" – both from the folder "ExcelFiles". The sources' date format needed to be formatted to accommodate the DD/MM/YYYY format set in the "Main" section. Also, as the attribute Gender was a value 1 or 0 – it instead was transformed to be displayed as "Male" or "Female". The Office dimension already used column names such as "OfficeAddress" and did not need any aliasing. This data came from a .csv file "office" which was easily loaded into the Qlik application and merged into employee to keep the star schema.

Additionally, a custom "SalesPerson" column was added to DimEmployees. This column is comprised of the combination of an employee's first name and last name. This was done in the data load editor. The purpose of this new column is to provide a descriptive and intuitive dimension in the visualizations, especially the sales manager dashboard. The other alternative was EmployeeID. However, this would mean that the sales manager would have to either memorize or look up what employee has what EmployeeID which would not be intuitive enough for a dashboard. The current choice of combining first name and last name could hypothetically lead to duplicates and subsequent confusion. However, since we have not identified any current duplicates, the combination of first name and last name is sufficient for now. Finally, to ensure all dates are easily filtered, with attributes like year, month, quarter and flags for current and last year, a MasterCalendar dimension was implemented.

3.3 Data Model & Associations

Qlik's data model viewer presents a data model with a clear star schema. The data is defined on a grain (Kimball & Ross, 2002) Order Row and contains keys to dimensions, raw data and derived fields to assist with aggregated data analysis. FactSales has a one-to-many relationship with all dimensions, including the MasterCalendar that is associated on OrderDate.

Implication: current year to date (CYTD) is the latest date an order was placed. This was implemented in MasterCalendar because the latest order was placed several years before this application was created.

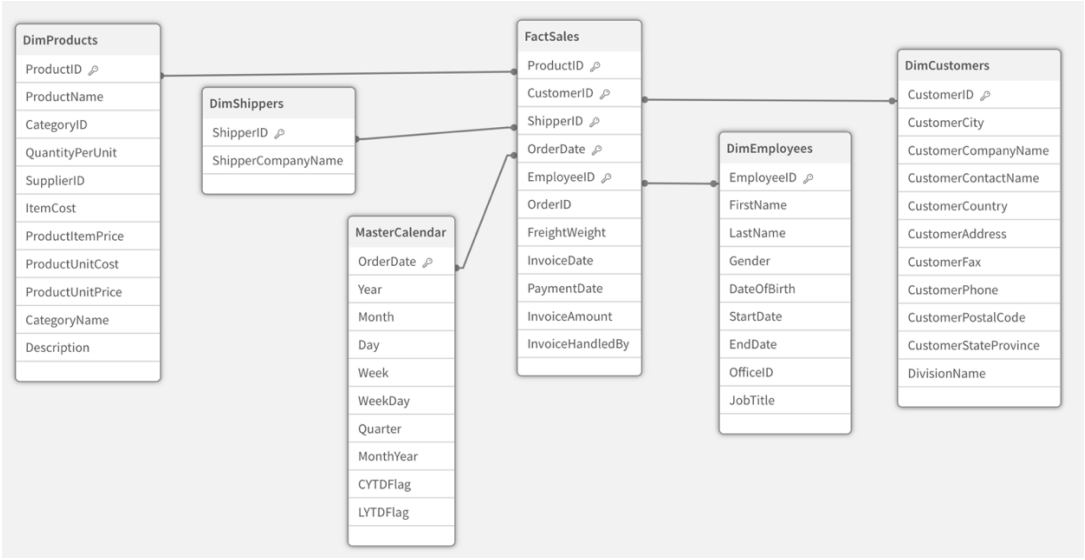

Figure 3.3.1 – Data Model for the case Evans-Carter. Note: Not all attributes are visible in the model.

4. Qlik Application

In compliance with Qlik's (2013) DAR methodology – four different sheets are implemented. These sheets can be divided in the three categories and respective cognitive layers. The dashboard supports fast monitoring, system 1 thinking (Kahnemann, 2012) and perception (Qlik, 2013). For the case of Evans & Carter – the CEO's needs were decided to be most suitable for this. The analysis pages – more cognitive in nature – were more applicable for the CMO and sales manager. Finally, the CMO and sales manager needed specific reports – aligning with the "action" layer of information processing (Qlik, 2013) – resulting in a "Reports" page.

Making sure all KPIs, across all different sheets, are consistent – master measures were implemented. This let the respective sheets for the different users reuse the same measurements with common names. These were, mainly, implemented in accordance with table 3.1 and are used ubiquitously throughout the Qlik application.

4.1 Dashboard

The CEO's user story presented that they lack the technical expertise to modify the application and need a quick overview of the company's key performance indicators on a weekly basis. The figure 4.1.1 presents the CEO Dashboard with no filters applied.

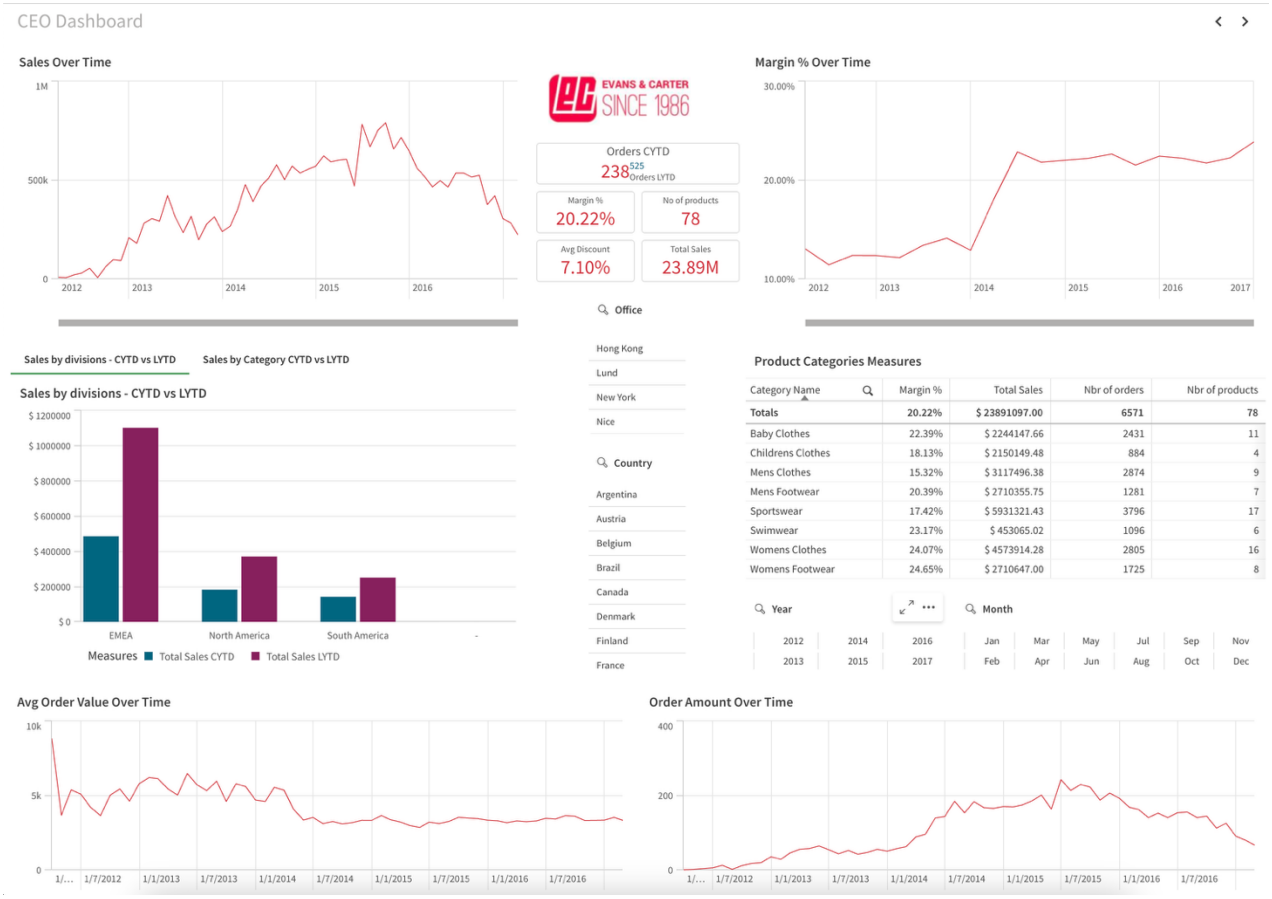

Figure 4.1.1 – CEO Dashboard Page

The top of the dashboard provides the user with a quick overview of trends and KPI's. As per Qlik (2013), the most important KPI's (for the user) are displayed and not all, as it would be too much information to process. Further, size matters - the line charts "Sales Over Time" and "Margin % Over Time" are on the sides of the KPI's and larger in size – to let the user quickly recognize trends for the company (Knaflic, 2015). Line charts are used as the measurements are ordinal and sequential over time. It could be interesting to combine the two charts into one, but that would require two Y-axes and as per Knaflic (2015), clutter should be avoided. This is also the reason a minimalistic approach was chosen for labels, titles and borders for the graphs. The title "Sales Over Time", for example, should provide the reader with enough context to understand that the Y-axis (with values 0 – 500k – 1M) represented the sales and the X-axis (with year values) represented time. These charts are also scrollable and zoomable – meaning the user may get more time-specific details should they request it.

Moving down, the defined KPI's Sales by Divisions and Category (CYTD & LYTD) were organized in a single container with tabs due to their similarities. As the dimensional data points are nominal, bar charts were chosen for easy comparison between data. Some filtering options may be present in a dashboard but not too many (Qlik, 2013). Hence, the only filters are for time (month and year) and place (office and customer country), easily understandable for a non-technical user, though very relevant for high-level insight This filter did not, however, apply to the bar charts as they handled specific time periods (CYTD and LYTD) as well as specific dimensions (Division and Product Category). This exception was implemented using an alternate state for the charts. A simple, straight table was chosen for "Product Categories Measures", satisfying visualization needs for the KPI's total sales, number of products, number of products and margin % per product category. Finally, the dashboard concludes with two simple line graphs illustrating average order value and order amount over time. These two charts conclude the CEO dashboard – providing the user with quick, actionable insights, with little to no need for filtering and searching.

4.2 Analysis

According to Qlik (2013), an analysis page' purpose is to be able to answer questions that may have arised on the dashboard page. Analysis pages should allow for more in-depth exploration of the data and application (Qlik, 2013). This can be achieved by the use or introduction of more tables, plots, charts, vertical scrolling for pages, and more filters and list boxes (Qlik, 2013). Most importantly, analysis pages should be interactive to enable user exploration (Qlik, 2013). As opposed to the dashboard's high-level, intuitive design, the analysis pages should be designed to require deliberate cognitive effort by the user (Qlik, 2013). The different analysis pages should be designed to cover a "specific technical objective" of the business (Qlik, 2013). Below, two different analysis pages have been created: one for the sales manager, and one for the Chief Marketing Officer (CMO).

4.2.1 Sales Manager Analysis

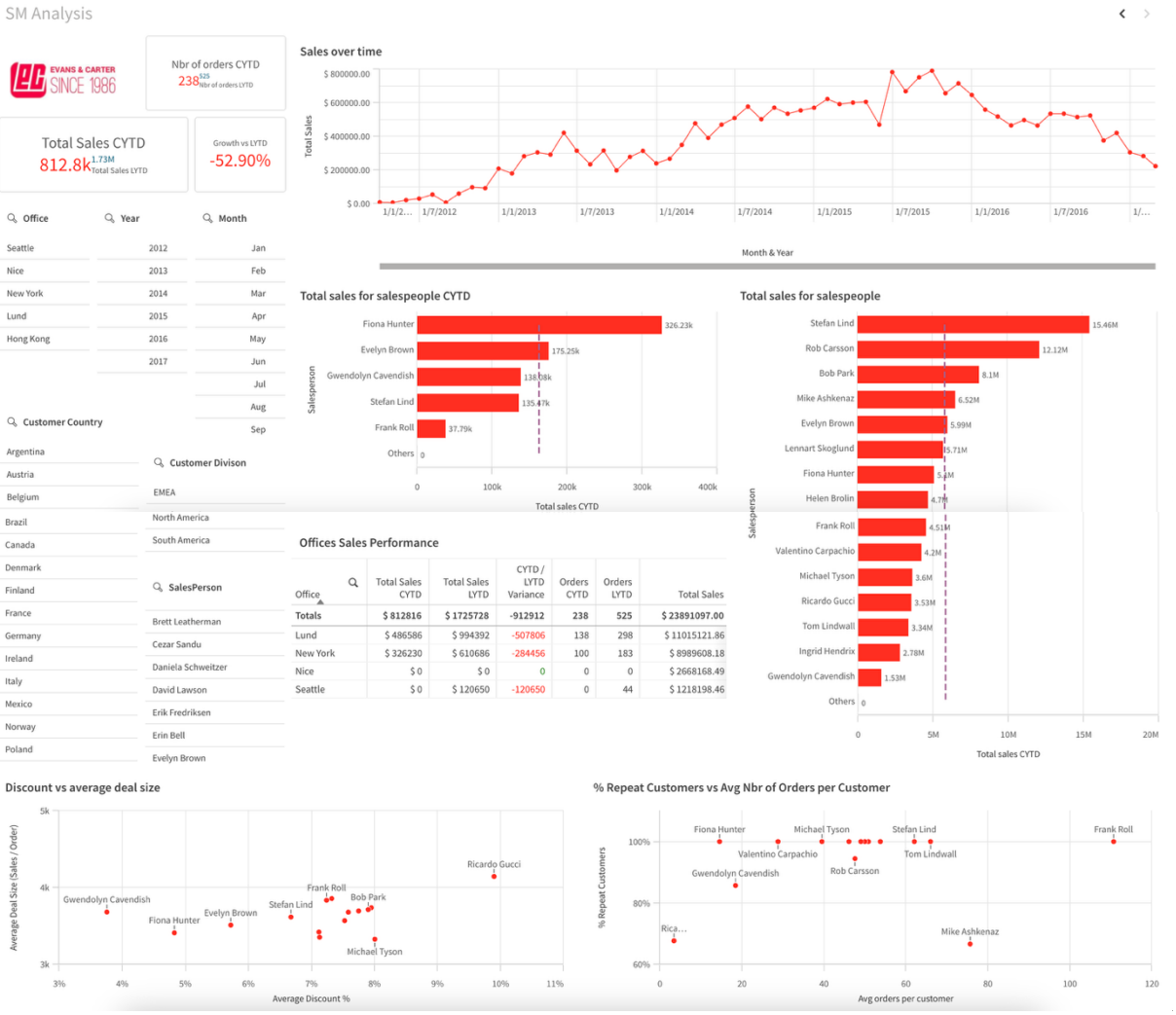

Figure 4.2.1.1 – Sales Manager Analysis page

The Sales Manager conducts meetings with staff from the sales department and uses Qlik Sense daily to create and share reports for these meetings. Considering that the Sales Manager is responsible for the *global* sales team, the analysis page should not be limited to a specific region but rather provide a comprehensive view of the entire global sales team.

In figure 4.2.1.1, we have the Sales Manager Analysis. In the top left corner of the analysis page for the Sales Manager, we have KPIs. The first KPI is named “Nbr of Orders CYTD” and displays the number of orders that have been placed current year to date. Additionally, we have the number of orders last year to date but with a smaller text size. This is because, in our interpretation, the sales manager is more concerned with current information, rather than historical information. However, we still chose to include last year to date as a sidenote so that comparisons can be made. We had a similar approach to the total sales KPI where we chose to include current year to date sales and last year to date sales in smaller text size. There’s also an additional KPI in the top left corner of the analysis: “Growth vs LYTD”. This KPI compares the percentual sales growth between last year to date and current year to date.

In the top right corner of figure 4.2.1.1 there is a line chart titled “Sales over time”. This chart displays how sales have changed from time in terms of money. The dimension is month and year. As is custom for an analysis page, the chart is interacting (Qlik, 2013) and allows for zooming and hovering over a specific data point lets the user see a specific value for a specific date.

As per Evans and Carter Sales Application, we included the performance of salespeople in terms of sales as seen in figure 4.2.1.1. In the bar chart titled “Total sales for salespeople CYTD”, the total sales for current year to date is displayed. These are the only salespeople who had any sales CYTD. Therefore, we only chose to include salespeople whose sales were greater than zero. The bar chart titled “Total sales for salespeople” is similar. However, this bar chart displays the total sales for salespeople without any specific date limitations. Again, if the total amount of sales is not greater than zero for an individual salesperson, their name is not included in the bar chart. Because there were salespeople in the data sets who did not have any sales, it would not be sensible to include the bottom salespeople based on sales. There is a dashed purple line in both bar charts. This line is a trend line that represents the average sales of the salespeople in the bar charts respectively. This allows the Sales Manager to compare and see the differences in performance between salespeople.

In the bottom left of figure 4.2.1.1, we have a scatter plot titled “Discount vs average deal size”. In accordance with Evans and carter Sales Application, we chose to include how discounts are related to average deal sizes. The x-axis represents the average discount. The y-axis represents the average deal size (Sales / Order).

We have an additional scatter plot in the bottom right corner of figure 4.2.1.1, titled “% Repeat Customers vs Avg Nbr of Orders per Customer”. The x-axis represents the average orders per customer for a salesperson. The y-axis represents how many percent of a salesperson’s customers who are repeat customers.

4.2.2 CMO Analysis

The CMO's main mission is to facilitate growth for the company by overseeing all marketing activities, ensuring that it delivers something of value for the customers. To assist with this an analysis board for the CMO was created. In short it contains charts with data over sales and product success. These charts can also be filtered in many ways making them interactive and a good tool to get a holistic understanding of marketing success.

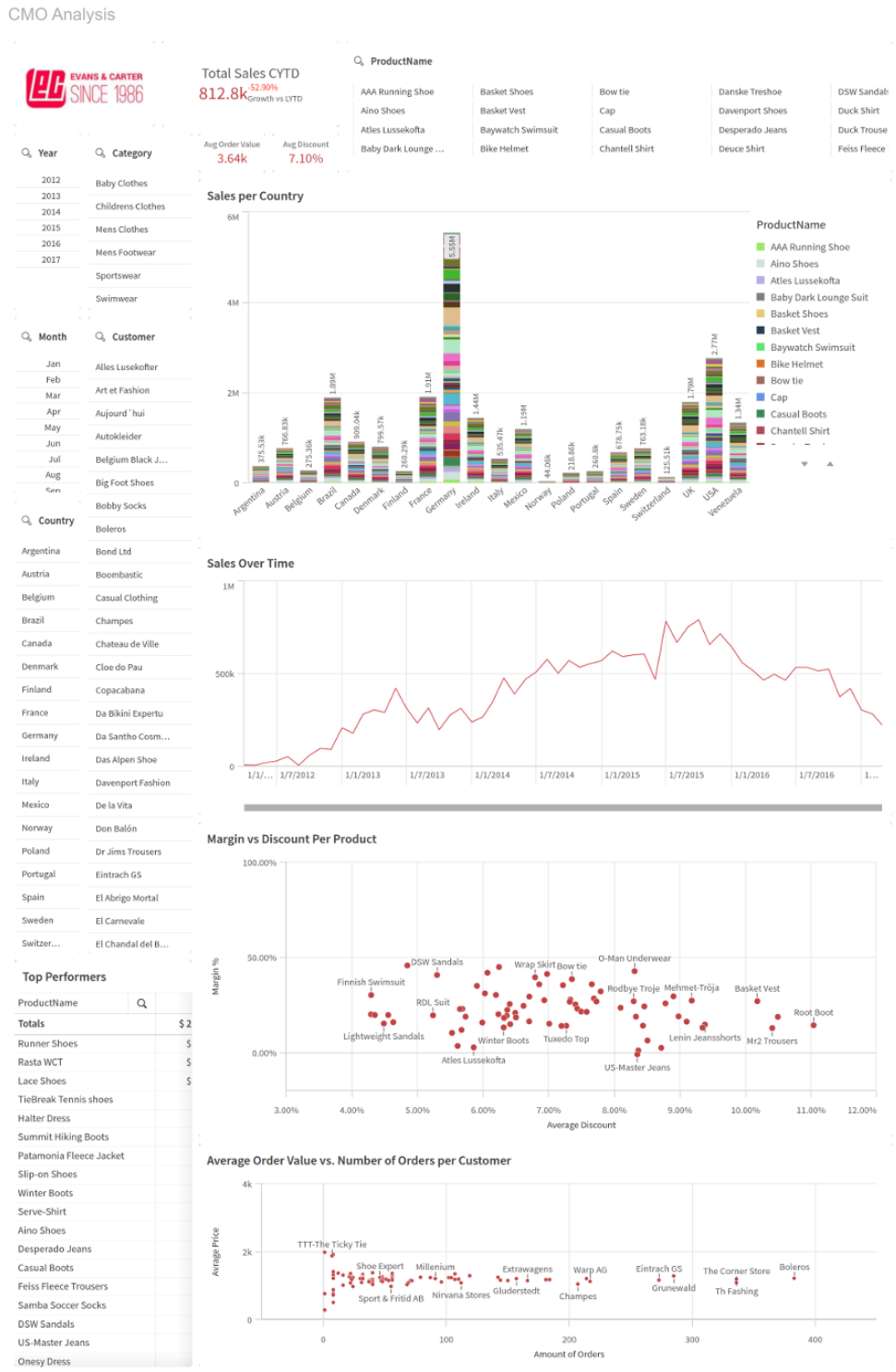

Figure 4.2.2.1 – CMO Analysis page

In the top left part of figure 4.2.2.1 there are three KPI's, those are "Total Sales CYTD" which shows how much Evans and Carter sold for in in total the last year, "Average Order Value" and "Average Discount". These are some data that is important to have easy access to since it is often used. This data can also be filtered to answer more specific questions.

On the top and left part of figure 4.2.2.1 there are several filters that can be used on the charts. These filters include Product Name, Year, Month, Category, Customer and Country.

On the bottom left there is a table chart with the title "Top Performers". In this chart there are two columns, "ProductName" and "TotalSales". "ProductName" is the first column and it has a search function, making it very easy for the user to quickly find data on sales per product. With the filters the CMO can further narrow down the data shown to answer more specific questions.

In the center of figure 4.2.2.1 are four charts. The one on the top is "Sales per Country". We choose to make this a bar chart since it is the simplest way to get a visual representation of the data and to compare different bars. The y-axis is sales, the x-axis is country and the bars for each country are made up of how many sales each product has. Before filtering every country and product for every year is shown, but by filtering the CMO can get straightforward data answering a variety of questions, such as "How many sales a specific product made a specific year in a specific country with a specific customer".

"Sales Over Time" is the next chart below "Sales per Country". This is a line chart with the y-axis as sales and x-axis as time. We choose this to be a line chart since it is supposed to show change over time, and this format makes it clearer than others. Without filters this chart shows all sales for all products combined over time, but with the filters the user can easily filter for example "Product Name" or "Customer", showing sales data for specific products or customers over time. This is crucial since it is necessary in the CMO's job to have easy access to this data to make informed decisions.

Next chart below the last one is a scatter plot chart called "Margin vs. Discount per Product". The y-axis is discount (in percent), x-axis is discount (in percent) and the points are specific products. This chart is meant to show the relationship between product discounts and profit margins. The CMO then gets a clearer picture of how discounts affect profit and can then make decisions about future discounts.

"Average Order Value vs. Number of Orders per Customer" is the last chart in figure 4.2.2.1. This is also a scatter plot chart with the y-axis as average price, x-axis is amount of orders and the points are specific customers. This chart visualizes the correlation between amounts of orders and their average value for each customer. This information is crucial since it provides insight in customer value.

4.3 Report

In accordance with the DAR methodology (Qlik, 2013), a reporting page should let the user receive granular, specific and actionable data. In contrast to the dashboard (which is perception-oriented), the report page focuses on the cognition phase of information processing. In the context of the case Evans & Carter, five reports were identified as necessary:

Orders - This table lets the user follow up on specific orders and the granularity for this table, when not expanded, is order, not order row. This might be relevant for all three users and the pivot table enables the user to expand a specific order and view all order rows. The measures (not all are visible) for this table include Sales (Price * Quantity), Cost (Unitcost * Quantity), Discount, Margin, Salesperson (Employees FirstName + LastName), Customer (CustomerCompanyName), InvoiceDate, PaymentDate and Days from invoice to payment.

Order ID | Order Row | Values

	OrderDate	Sales	Cost	Discount	Margin
Total	-	**23891097.00**	**19061021.91**	**8.1 %**	**4830075.09**
6571	**19/4/2012**	**8840.16**	**7214.2**	**15.5 %**	**1625.96**
1	19/4/2012	800.00	757	20.0 %	43.00
2	19/4/2012	3078.00	2336.4	10.0 %	741.60
3	19/4/2012	918.00	715.2	10.0 %	202.80
4	19/4/2012	3380.16	2800	20.0 %	580.16
5	19/4/2012	664.00	605.6	17.0 %	58.40
6570	**17/5/2012**	**7307.28**	**6328.08**	**10.0 %**	**979.20**
6569	**31/5/2012**	**56.25**	**41.95**	**10.0 %**	**14.30**
6568	**14/6/2012**	**11216.39**	**10501.1**	**18.4 %**	**715.29**
6566	**16/6/2012**	**6186.02**	**5061.55**	**12.5 %**	**1124.47**
6567	**16/6/2012**	**1038.54**	**980.86**	**19.9 %**	**57.68**
6565	**17/6/2012**	**3123.26**	**2706**	**10.9 %**	**417.26**
6564	**2/7/2012**	**8681.48**	**7972.76**	**15.4 %**	**708.72**
6563	**5/7/2012**	**1668.00**	**1493.2**	**14.9 %**	**174.80**
6561	**20/7/2012**	**1640.00**	**1409**	**13.7 %**	**231.00**

Figure 4.3.1 – Orders tab in report sheet with order 6571 expanded.

Products – A detailed table containing information of product categories and products. Like the table "Orders", the granularity of the table is rolled up (Sharda et. al., 2024) one step to aggregate the measures Total Sales, Cost, Margin %, Quantity Sold, Nbr of orders, Growth vs LYTD and Supplier on product categories. At the user's discretion, the product category may be expanded to display measures for products (drill-down). As there is no supplier for a whole product category, supplier data is only visible for drilled-down product rows.

CategoryName | ProductName | Values

	Total Sales	Cost	Margin %	Quantity Sold	Nbr of orders
Baby Clothes	**2244147.66**	**1741703.16**	**22.39%**	**9240**	**2431**
Aino Shoes	693181.25	533266.50	23.07%	1189	370
Baby Dark Lounge Suit	22365.59	19420.00	13.17%	971	307
Deuce Shirt	326734.56	264399.66	19.08%	791	250
Duck Shirt	11950.66	7754.60	35.11%	1337	433
Duck Trousers	23699.20	17868.80	24.60%	1396	385
Mehmet-Napp	0.00	0.00	-	0	0
Mehmet-Skor	0.00	0.00	-	0	0
Mehmet-Tröja	157947.20	114660.00	27.41%	1092	295
Onesy Dress	497824.20	404001.00	18.85%	585	159
Rodbye Troje	380212.80	277412.80	27.04%	868	259
Sapporoo Gloves	130232.20	102919.80	20.97%	1011	311
Childrens Clothes	**2150149.48**	**1760293.80**	**18.13%**	**3037**	**884**
Mens Clothes	**3117496.38**	**2639798.30**	**15.32%**	**11601**	**2874**
Mens Footwear	**2710355.75**	**2157731.16**	**20.39%**	**4673**	**1281**

Figure 4.3.2 – Products tab in report sheet with category Baby Clothes expanded.

Dormant & 1-Order Customers – The case description stated how the CMO wanted to identify two identify two categories: customers who had not placed an order in the last six months (Dormant Customers) and the ones who have only placed one order (One-visit Customers). For category Dormant, columns Last Order, Dormant Status (If an order has been placed in the last six months), Country, Average Order Value, Address, Contact Name, Phone Number and Fax. This information quickly lets the user know what customers are dormant and prioritize who to contact based on last order date and average order value. The sheet also provides contact information for said user to act on. The 1-Visit-Companies table contains the same kind of contact information, but the first columns, instead, display whether and how much discount has been applied to the customers' order.

Dormant Customers (More than 6 mo since last order)

CustomerCompa...	Last Order	Dormant Status
Bobby Socks	27/8/2014	Dormant
TTT-The Ticky Tie	31/12/2014	Dormant
Fast Sunglasses	1/3/2015	Dormant
Leningrad Cowboys Shop	13/5/2015	Dormant
Pour l´homme	7/6/2015	Dormant
Eye Fashion	10/8/2015	Dormant
Da Santho Cosmethia	16/11/2015	Dormant
La Camisas Cansadas	21/11/2015	Dormant
La Boheme	22/11/2015	Dormant
Belgium Black Jeans	6/1/2016	Dormant
Das Alpen Shoe	19/1/2016	Dormant
SSS-Sport Shoes Store	25/1/2016	Dormant
Dr Jims Trousers	27/1/2016	Dormant
La Legion Mercenaire	22/2/2016	Dormant
Las Corbatas	27/2/2016	Dormant
Kohl Industries AG	2/3/2016	Dormant

Figure 4.3.3 – Dormant Customers

Customer companies with only one order

1 order companies	Discount Amount	Discount	Latest Order	SalesPerson	Office	Customer Country	Fax	Phone
Fawtly Towers	844.11	16.00%	4/6/2013	Mike Ashkenaz	Nice	UK	(171) 555-2530	(171) 555-7733
Bobby Socks	0.00	0.00%	27/8/2014	Rob Carsson	New York	USA	-	(415) 555-5938
Fast Sunglasses	0.00	0.00%	1/3/2015	Mike Ashkenaz	Nice	UK	(171) 555-5646	(171) 555-1717

Figure 4.3.4 – 1-Visit-Customers

Salespeople – Finally, the sales manager needs a place to follow up on salespeople's performance. This table includes the dimension SalesPeople (First + Last Name of employees with a sale) and the measures Total Sales, Nbr of orders, Orders CYTD and LYTD, Average Order Value, Average Discount, Margin %, Margin % CYTD and LYTD. The purpose of this report is not to visually compare performance between salespeople – that is done in the analysis page – but rather display detailed metrics of the employees' performance.

Salespeople

Salespeople	Total Sales	Nbr of orders	Orders CYTD	Orders LYTD	Avg Order Value	Average Discount	Margin %	Margin % CYTD
Stefan Lind	4264453.34	1179	46	110	3617.0087728635	0.067	20.59%	23.2%
Rob Carsson	3150591.18	856	0	98	3680.5971704557	0.076	19.72%	0.0%
Bob Park	2184259.23	588	0	52	3714.7265805617	0.079	19.94%	0.0%
Evelyn Brown	1780981.07	507	50	111	3512.7831745562	0.057	21.78%	21.9%
Mike Ashkenaz	1751840.30	454	0	0	3858.6790678135	0.073	19.49%	0.0%
Lennart Skoglund	1607635.15	430	0	0	3738.6864068498	0.080	19.14%	0.0%
Fiona Hunter	1538752.46	451	100	0	3411.8679733925	0.048	23.01%	25.3%
Frank Roll	1273640.28	332	10	33	3836.2659154054	0.072	19.82%	23.8%
Helen Brolin	1218198.46	356	0	44	3421.9057945504	0.071	20.41%	0.0%
Valentino Carpachio	1064363.22	288	0	0	3695.7056264094	0.077	18.78%	0.0%
Michael Tyson	1051642.10	316	0	33	3327.9813238211	0.080	19.37%	0.0%
Tom Lindwall	942508.26	264	0	26	3570.1070404848	0.075	19.64%	0.0%
Ricardo Gucci	916328.20	221	0	0	4146.2814353674	0.099	17.81%	0.0%
Ingrid Hendrix	670883.83	200	0	18	3354.419164229	0.071	20.53%	0.0%
Gwendolyn Cavendish	475019.92	129	32	0	3682.3249689922	0.038	23.88%	23.7%

Figure 4.3.5 - Salespeople

5. Discussion

5.1 Decision support

The developed application satisfies the three key stakeholders identified in the case description. In accordance with DAR methodology (Qlik, 2013) – the three users are now able to access information at cognitive levels that are suitable for their respective needs. The different layers range from a perception-oriented dashboard for, mainly, the CEO to cognitively demanding report sheets for the sales manager and CMO.

5.1.1 CEO Decision Support

The user story for the CEO expressed that they were non-technical and unable to modify a Qlik application. They needed a "prompt, thorough, and accurate overview of the company's key performance indicators". Aligning this with the DAR methodology, the CEO needed a dashboard – including KPIs such as total sales, number of orders and margin percentage. Its minimalistic design ensures rapid comprehension and recognition of trends without forcing cognitive load or interaction on the user. Knaflic (2015) expresses how minimalism and clarity in visualization reduces said cognitive load with letting the user focus on insights rather than graphical user interface components. This dashboard lets the CEO monitor performance across divisions, countries, offices and product categories – consistent with how Sharda et. al. (2024) illustrates the need for strategic alignment of a DSS.

5.1.2 Sales Manager Decision Support

Contrary to the CEO, the sales manager uses Qlik on a daily basis and has knowledge how to perform more complex tasks within the system. The user needed a DSS that let them identify top performing salespeople, monitor sales trends – including deal sizes, discounts and average number of orders per customers – as well as create reports for individual follow-up for these salespeople. To accommodate this range of needs – the sales manager will use both the "Sales Manager Analysis" page as well as the "Reports" page. The analysis page provide insight into top performers, visualises trends and highlights outliers to support the user's decision cycle. As the sales manager expressed a need to create reports for individual one-on-ones with sales staff – the "Reports" page satisfies this need by showing relevant metrics for a salesperson. Should the need arise – the sales manager may also acquire specific order details from the "Orders" tab amongst the reports.

5.1.3 CMO Decision Support

The CMO also needed a two-layered approach to their decision support. They noted how they, as well, were experienced in Qlik and had the technical competence to modify applications and perform more complex action. This user needed to both identify trends as well as create reports. Hence, a "CMO Analysis" page was created and the user-specific tabs are utilized in the "Reports" page. The CMO analysis supports tactical decisions by emphasizing top performing countries, regions, products and categories. By visualizing relationships between margin and discount as well as order value against order quantity, the CMO may notice outlier data that need

action. For example, the current data set notes how the product “US-Master Jeans” has a margin percentage of -0.87% but an average discount of 8.35% - easily discovered in a scatter plot. The “Reports” page lets the CMO get immediate reports of relevant information such as product and product category performance, one-visit customers and customers who have not made an order in the last six months.

5.2 Needed improvements

Although the Qlik application fulfils its purpose, several areas of improvement have been identified. Firstly, the user interface in the “Report” sheet suffers from limited flexibility. In order to rapidly find a specific row – a search functionality should be included. It would also add value to the user to quickly be able to make screenshots or prints of the reports. This, of course, is possible for the user, but given how wide the columns are – very little information is visible on a single page. Currently, some columns in the pivot table are so wide that only 2-3 columns are visible at the same time. This seemed to be a Qlik issue, and the application would benefit greatly from adjustable column width as it would let the user view more information on a single page.

An issue arising from the data sources are dates. As the data ranges from 2012 to 2017, having KPIs with flags CYTD (current year to date) and LYTD would just result in a zero value for this data. To mitigate this, MasterCalendar in the data load editor takes the highest value of the attribute OrderDate (i.e. the latest order of the whole data set) and sets it as “Today”. This lets 2017 become CYTD and 2016 become LYTD. Should this application be realistically applied – this would have to be changed to let “Today” become the actual, real, current day.

Other limitations of the loaded data are profitability and slowly changing dimensions (SCD). As the data for the case of Evans-Carter does not include operating costs and overhead (like salaries, shipping costs, customs etc.), there is no way for a Qlik application to tell business stakeholders how much profit the enterprise actually is making. Also, order rows have been referencing a specific product, customer and employee etc. with their respective attributes. However – there is no support for SCD type 2 (Kimball & Ross, 2002), meaning that a customer’s address attribute is overwritten when the value changes, instead of creating a new row for the dimension once an attribute is changed. This worsens data integrity over time.

5.3 Conclusion

The Evans & Carter decision support system demonstrate how data integration, dimensional modelling and following visualization best practices may be implemented to create business value. By implementing an ETL process and applying the DAR framework (Qlik, 2013), the application successfully let different data sources combine into a unified, user specific DSS with appropriate, tailored, cognitive demands. While technical limitations remain, the application – developed in Qlik – adds value to the identified stakeholders CEO, CMO and sales manager. Next steps include:

- Add data-quality monitors and metadata to strengthen trust (Sharda et. al., 2024)
- Introduce SCD type 2 for key dimensions to preserve history (Kimball & Ross, 2002)
- Implement scheduled transformations to ensure relevant, up-to-date data

References

Kahnemann, D. (2012), *Thinking, Fast and Slow.* London: Penguin Books.

Knaflic, C. (2015), *Storytelling with data: a data visualization guide for business professionals. New Jersey: John Wiley & Sons.*

Kimball, R. & Ross, M. (2002), *The Data Warehouse Toolkit: the complete guide to dimensional modeling*, 2nd edition. New York: John Wiley and Sons, Inc.

Sharda, Ramesh, Delen, Dursun & Turban, Efraim (2024), *Business Intelligence, Analytics, Data Science and AI – A Managerial Perspective, Global Edition.* 5th edition. London: Pearson Education.

QlikView Technical Brief (2013), *Dashboard, Analysis, Reporting (DAR).* Available at: https://community.qlik.com/cyjdu72974/attachments/cyjdu72974/qlik-design-blog/2580/1/Technical%20Paper%20-%20DAR%20-%20US%20LETTER.pdf [Accessed 4 Oct 2025].

1. AI contribution statement

AI tools were used in the creation of this report and Qlik application. ChatGPT and Google Gemini were used for brainstorming ideas, finding relevant passages in literature and assisting in creating scripts in load editor as well as creating expressions for querying data. No parts of the report have neither been taken directly from a large language model, nor has any literature reference not been double-checked.

2. Author contribution and personal responsibility for submitted content

All group members are responsible for all submitted text, code, graphics, and illustrations. This applies regardless of whether the content has been authored by the group member themselves, by another group member, or if it has been generated using AI-based tools or other tools. All group members should thus be able to account for, argue for, explain, extend, and/or modify the submitted content upon request.