Business Process Evaluation & Dashboard Design

BUSINESS INTELIGENCE

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Introduction

The original system design was based on a provided repository and although it was a functional system, it had poor usability. In order to improve usability, I added extra code to enhance charts, carefully selected colours for better appearance and changed the layout. In each case I ensured that the right type of chart was used to provide optimal feedback of data without overloading the page with clutter and irrelevant information. Unnecessary charts were deleted. The system originally was designed using multiple tabs, so all the data could not be viewed on a single page. This ineffective and the fractured nature of the dashboard meant the user had to work harder to remember information from tab to tab. For a dashboard to be effective it was important that all the relevant important data be present on a single page without scrolling (Few, 2006). The minimalistic nature and effect of this was to reduce visual memory (iconic memory) and working memory load and provide immediate access to the most important data (Few, 2006).

Original Dashboard System Designs

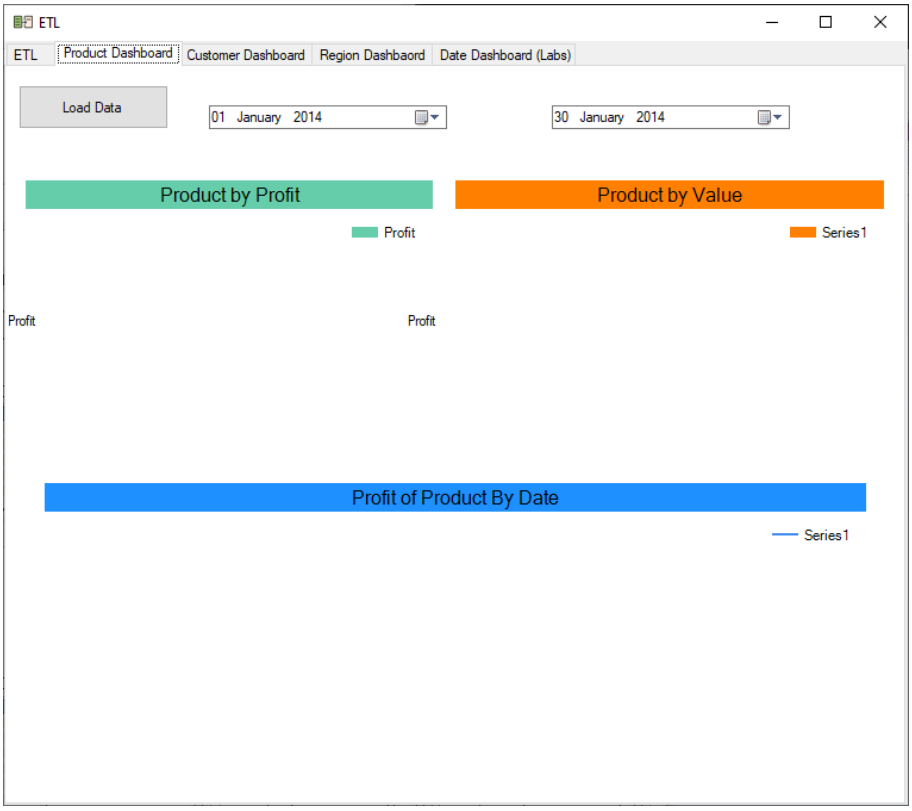

Fig 1.0Original Product Dashboard tab before loading data

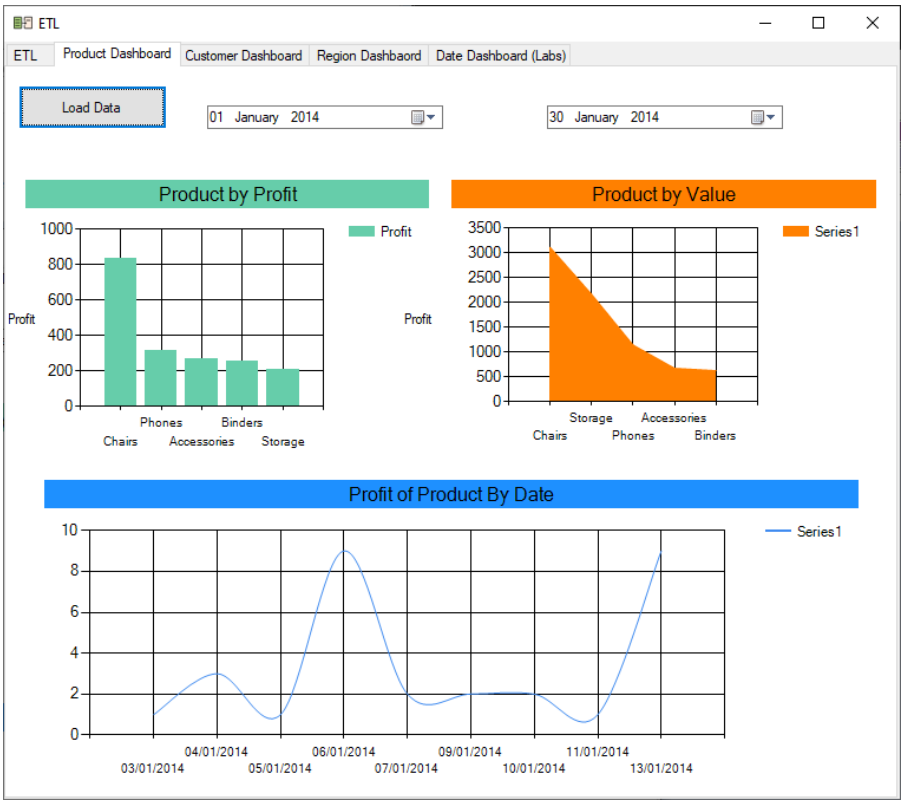

Fig 2.0 Original Product Dashboard tab after loading data

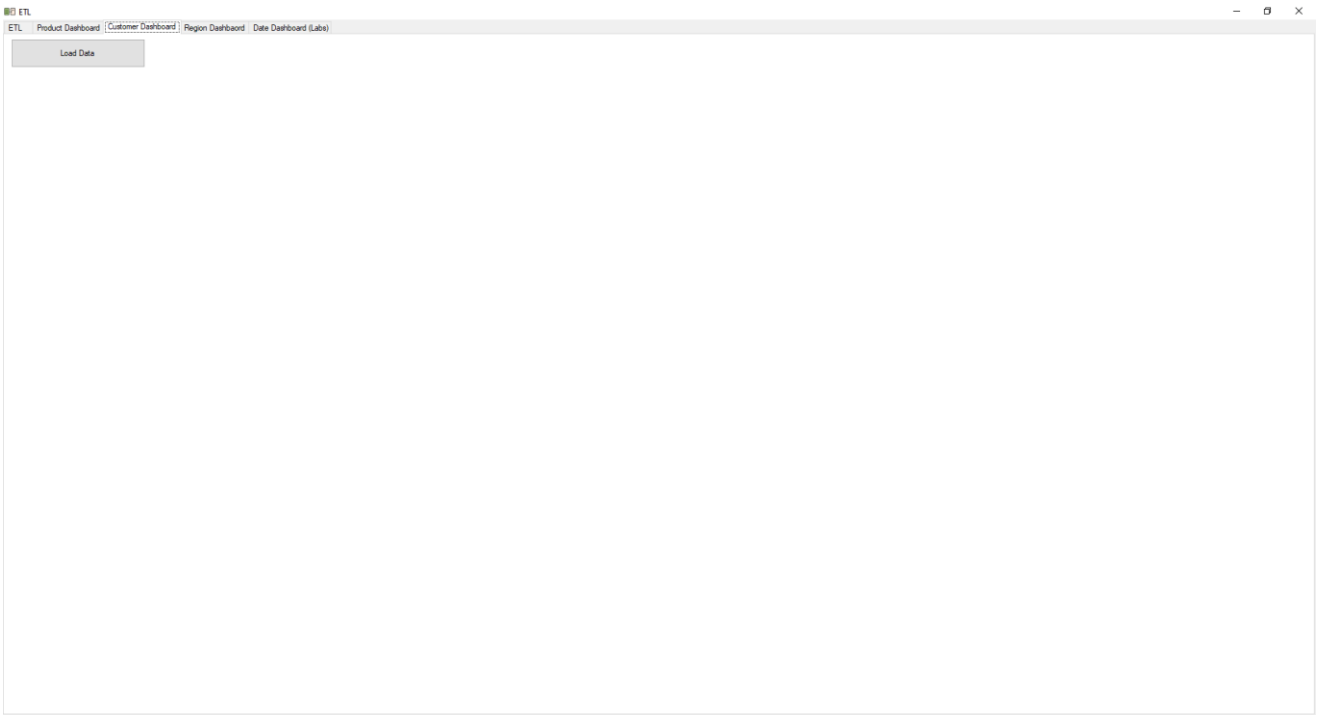

Fig 3.0 Original Customer Dashboard tab before loading data

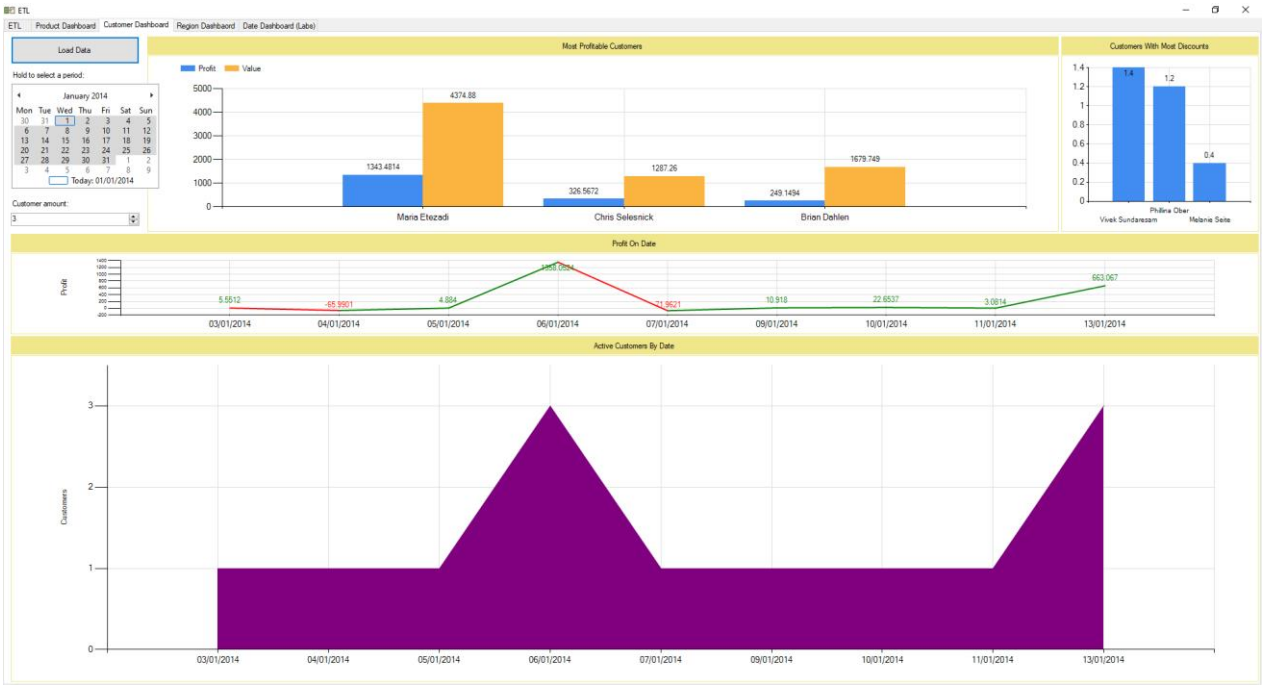

Fig 4.0 Original Customer Dashboard tab after loading data

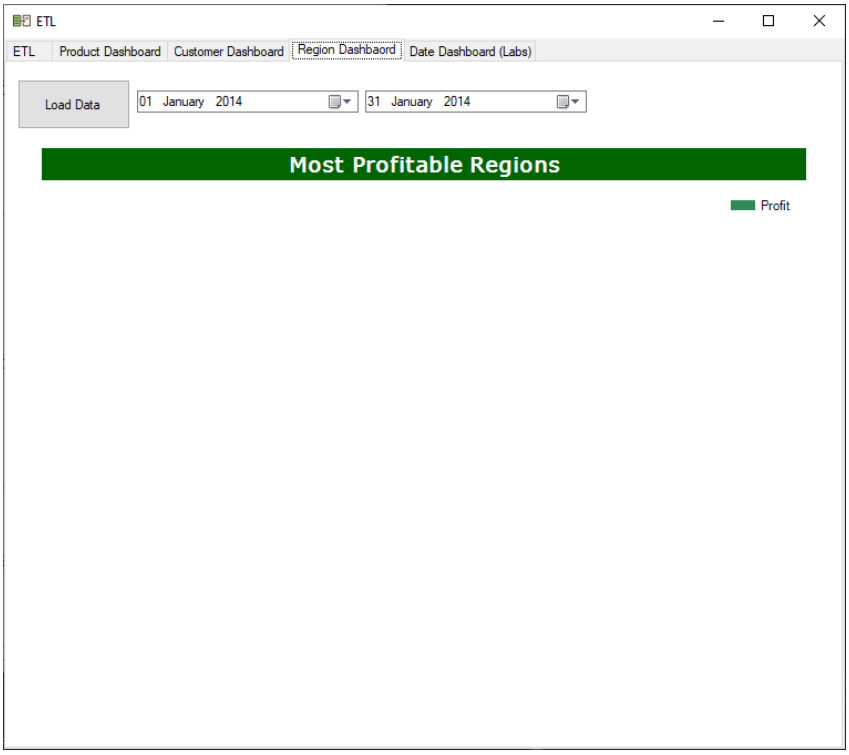

Fig 5.0 Original Region Dashboard tab before loading data

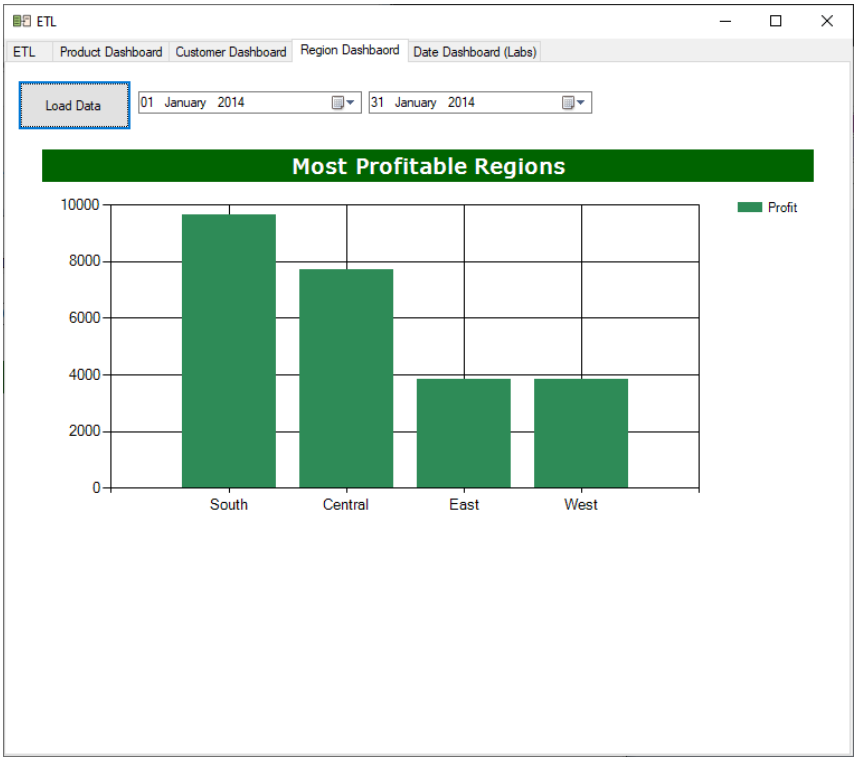

Fig 6.0 Original Region Dashboard tab after loading data

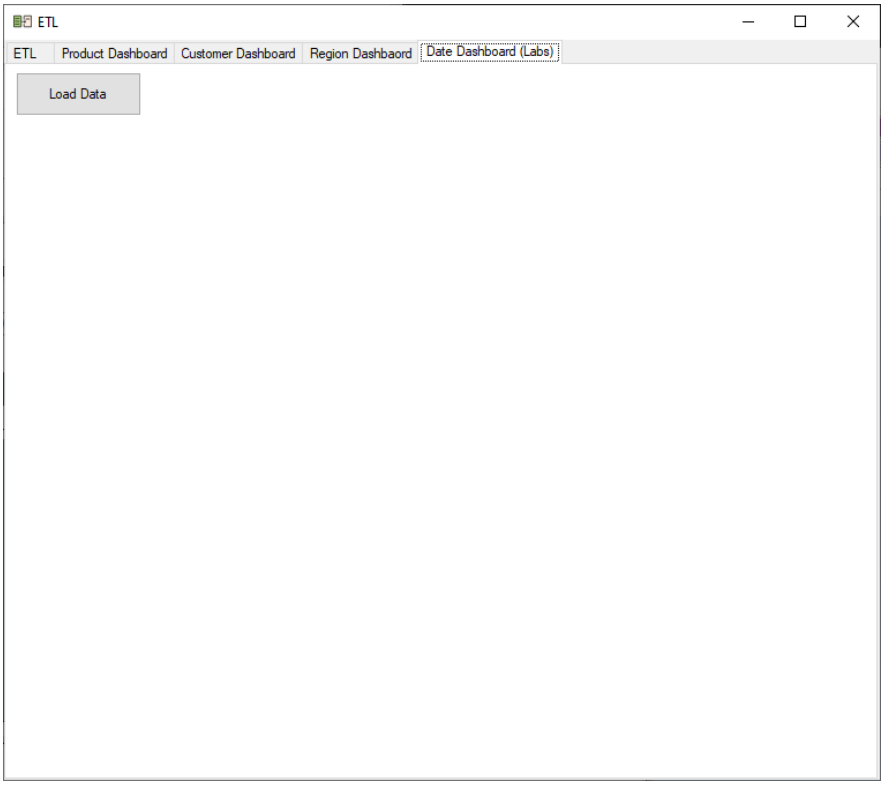

Fig 7.0 Original Date Dashboard tab before loading data

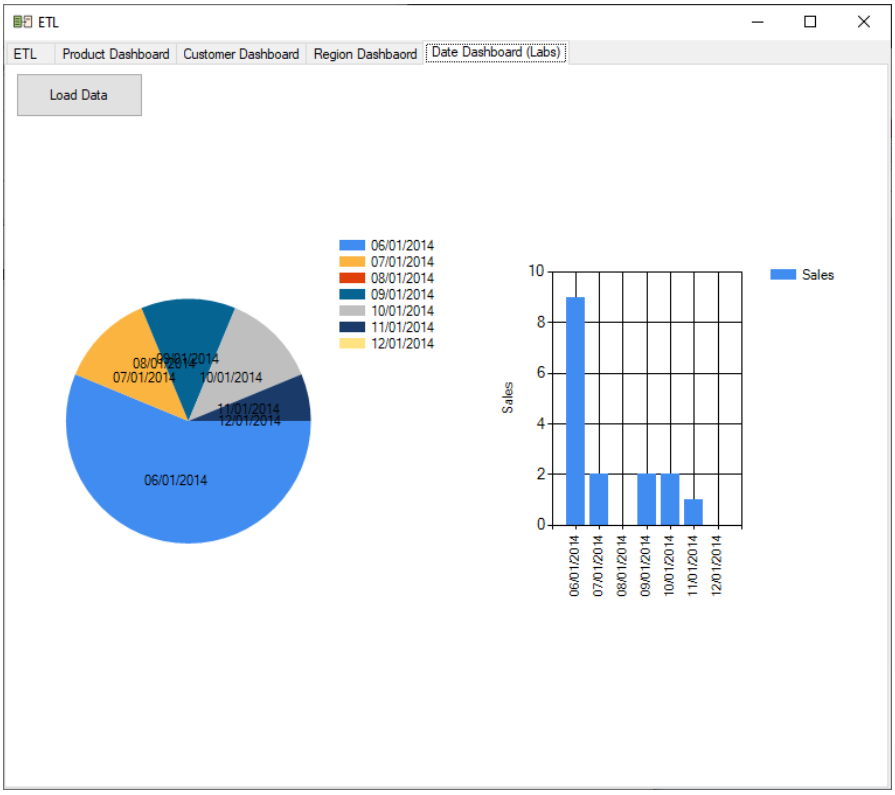

Fig 8.0 Original Date Dashboard after loading data

Re-designed Dashboard System Designs

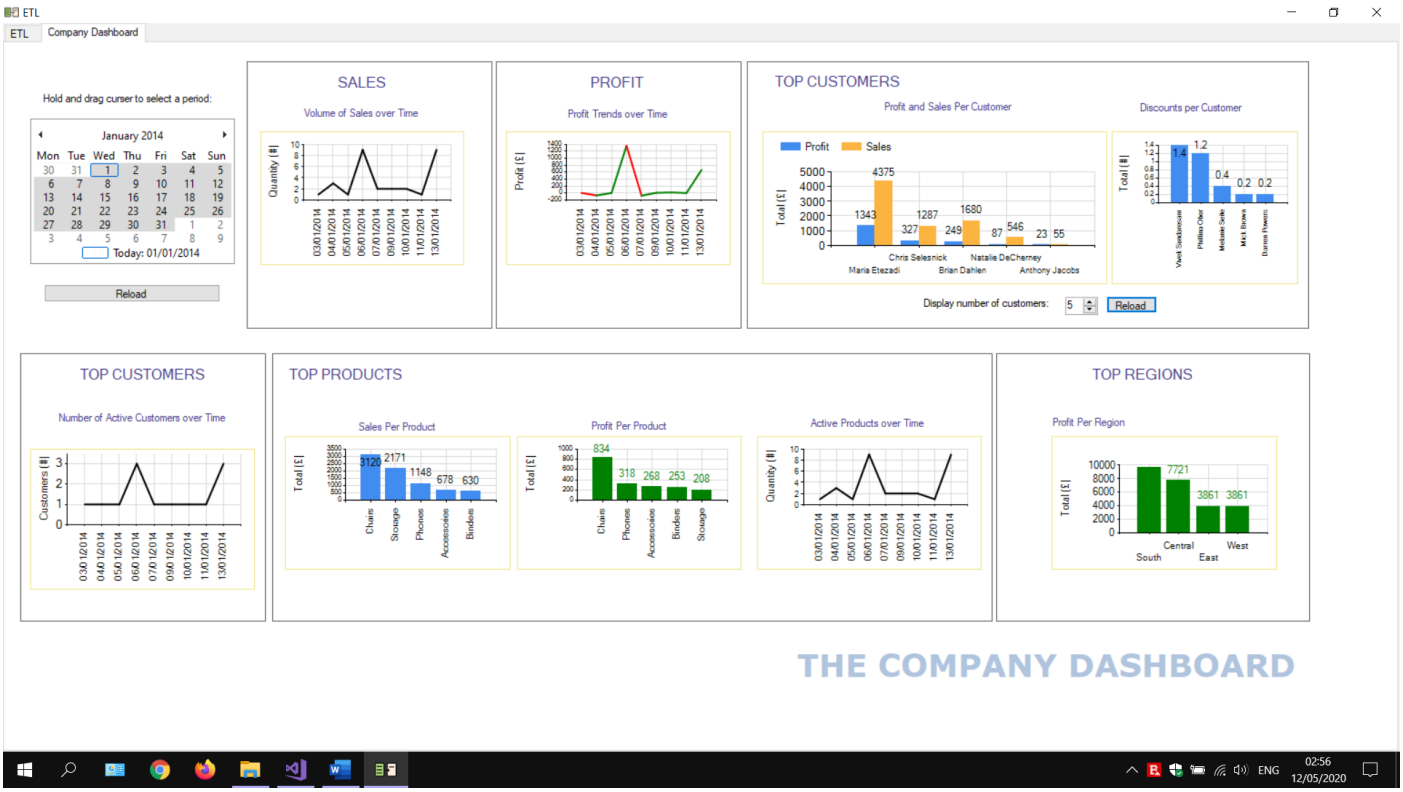

Fig 9.0 Finished Company Dashboard tab after loading data (default state)

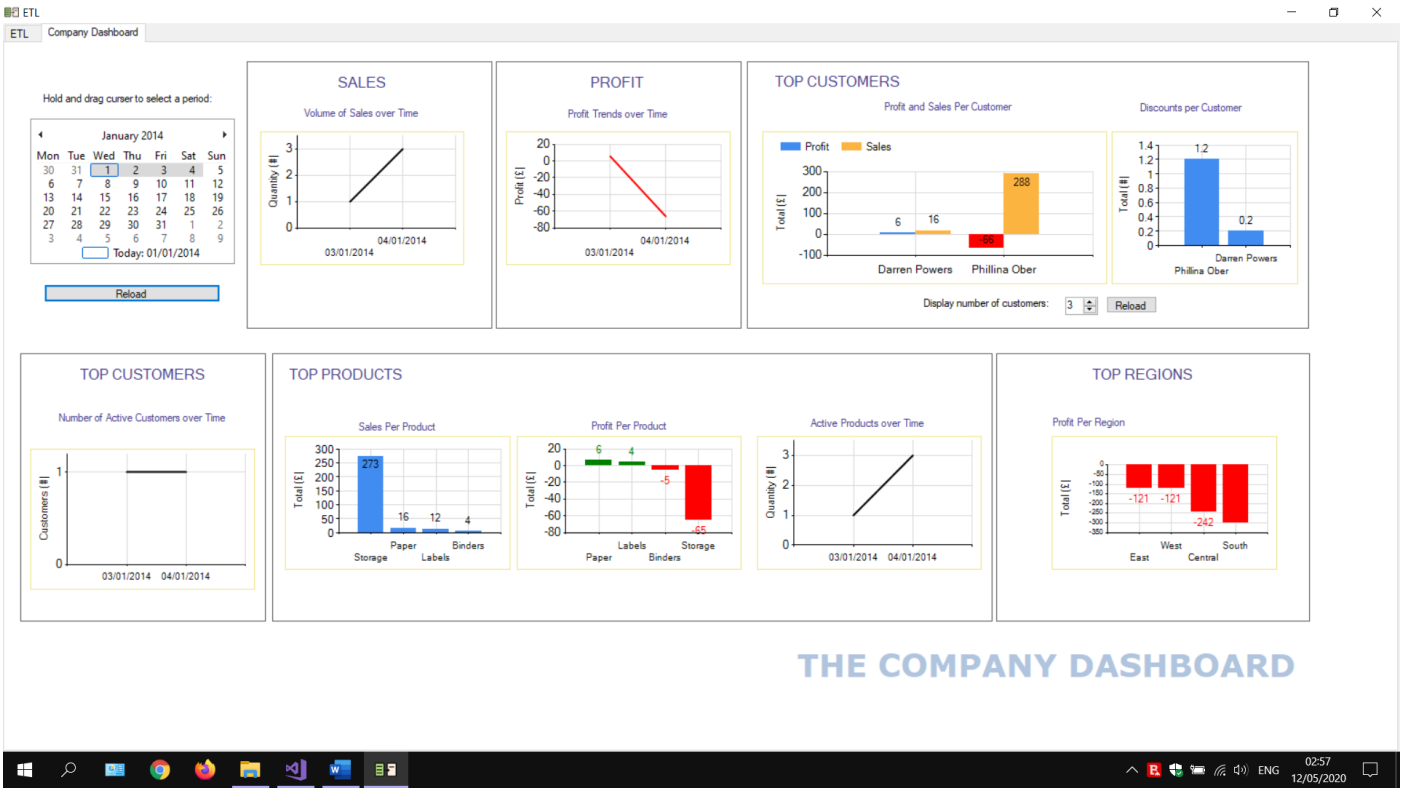

Fig 10.0 Finished Company Dashboard tab after selecting date period

Justifying Design Decisions

Single Page Design

So why did I get rid of the multiple tabs and settle with a single Company Dashboard tab all on one page without scrolling? In Few (2006) "The limited capacity of short-term memory is also the reason why information that belongs together should never be fragmented into multiple dashboards". It's easy to see correlations between data when it's all on one page, and also within the same date range (which is why I used a single calendar date range picker control for all charts). Having information on different pages means we have to use short-term memory to remember information from page to page. According to Few (2006) we can only store between 3 to 9 pieces of visual information in short term memory. If the information isn't visible it's no longer there (true also for scrolling).

Grouping Related Pieces of Data

In my design I used borders to group objects and information. Based on the principle of connection (Few, 2006) the information presented is viewed as being related and contributes to festering an intuitive design. For example, the Top Products and Top Customers charts are grouped using boundaries and headings. This intuitively suggests the charts are related.

Limiting Clutter

To reduce clutter, we have to eliminate all visual content that is unnecessary (Few 2006). In many of the original designs (see section Original System) the headings of the charts were large coloured banners. A large amount of space was taken up by the coloured banners, making the dashboard look really cluttered and their bright colours distracted from the data and charts. I opted for headings which were coloured dark slate blue, that were not so eye catching and did not compete for the attention of the user over important information.

Too many hues can make the dashboard look cluttered (Few 2006). I therefore decided to use a limited number of colours with no variation in hues.

In addition, the bar charts that display values above and below the bars are useful in providing an overview of the measure that each bar represents. These were originally in decimal, but the accuracy of extra decimal places was excessive, caused clutter and went beyond providing an overview, so the values where limited to whole numbers (Few, 2006).

Clutter can also be caused by useless decoration which distracts from the data (Few, 2006). This is true with the charts in the original system, in which the background prominent gridlines had the effect of distracting from the data (Few, 2006). Thus, in my designs I opted for faded gridlines to make the bar chart data the focus of attention. Clutter was also caused by individual date time picker controls for each chart, so they were removed and a single calendar control for date range selection was used for all charts.

Colour Coding

I used traffic light colours (see Fig 9.0 and 10.0) which helped to evaluate the measures displayed in the charts of the dashboard (Few, 2006). The red and green colours are commonly associated with bad and good respectively. This convention is used to highlight when profit is showing positive (good) or a negative loss (bad). The red colour selected is very bright, to attract the attention of the user and immediately highlight a problem. These act as simple visual indicators (Few, 2006).

Space Allocation

Due to the dashboard being designed to be viewed on a single page without scrolling, the design had to be kept to a minimum with only the most relevant information visible and still preserve clarity (Few, 2006). The most important information had to be placed in the top and left, more prominent parts of the page (Few, 2006). In my opinion Sales is a driving factor of any retail business, as is profit, so placing these two charts close to the top left corner takes up the most prominent positions (Few, 2006). Additionally, the health and wealth of the company depends on customers and so are given a position at the top and then bottom left corner. Followed by individual product profit and sales information charts. As each product is only a contributing factor to the overall profit and overall sales, these charts are

given less priority as are Active Products over Time. Top Regions simply provides an overall view of performance within the 4 regions, and takes up least prominent bottom left corner. Finally, left over space, was used for the logo “The Company Dashboard”. This was deliberately faded out to avoid drawing attention away from the data (Few, 2006).

Avoiding Deficient Measures

Few (2006) states: “A measure is deficient if it isn't the one that most clearly and efficiently communicates the meaning that the dashboard viewer should discern”. For this reason, many of the charts chosen are bar and line charts. One chart that failed to convey any meaning was the pie chart in Fig 8.0. Pie charts show individual pieces that add up to a whole. The pie chart only displayed a bunch of dates, and dates cannot be added to make a whole, thus making the pie chart deficient of measure. In a similar way the bar chart in Fig 8.0 shows the sales on the Y-axis but fails in specifying what the meaning of the Y-axis measure (whether quantity or currency). For these reasons, I discarded the use of the pie chart and labelled bar charts Y-axis in my design to provide correct measure. In addition, the bar chart information is presented in ascending and descending order providing the ability to visually compare the measures of bars relative to one another.

Implementation of the BI System

Study of Tesco

Tesco operates 6,814 stores in 11 countries and is one of the largest global retailers with headquarters in the UK (Carpenter, 2019). An overview of some the operations within Tesco can be summarised in the following diagram in Fig 1.0 taken from Xie and Allen (2013). We see the four main entities (supplier, warehouse, retailer and customer) and how they are connected in the flow of retail products. The diagram highlights the flow of data from the various entities in the supply chain, given by the doted lines marked EDI (Electronic Data Interchange) and POS (Point of Sale). It shows how the different aspects of the data is collected and stored in databases. Notice that the customer data is collected by the retailer (which includes products purchased) and how the resource of data is used to provide marketing knowledge to each entity. Similarly, the BI system dashboard collects data from a database and uses this to provide marketing information about suppliers, warehouses, retailers and customers.

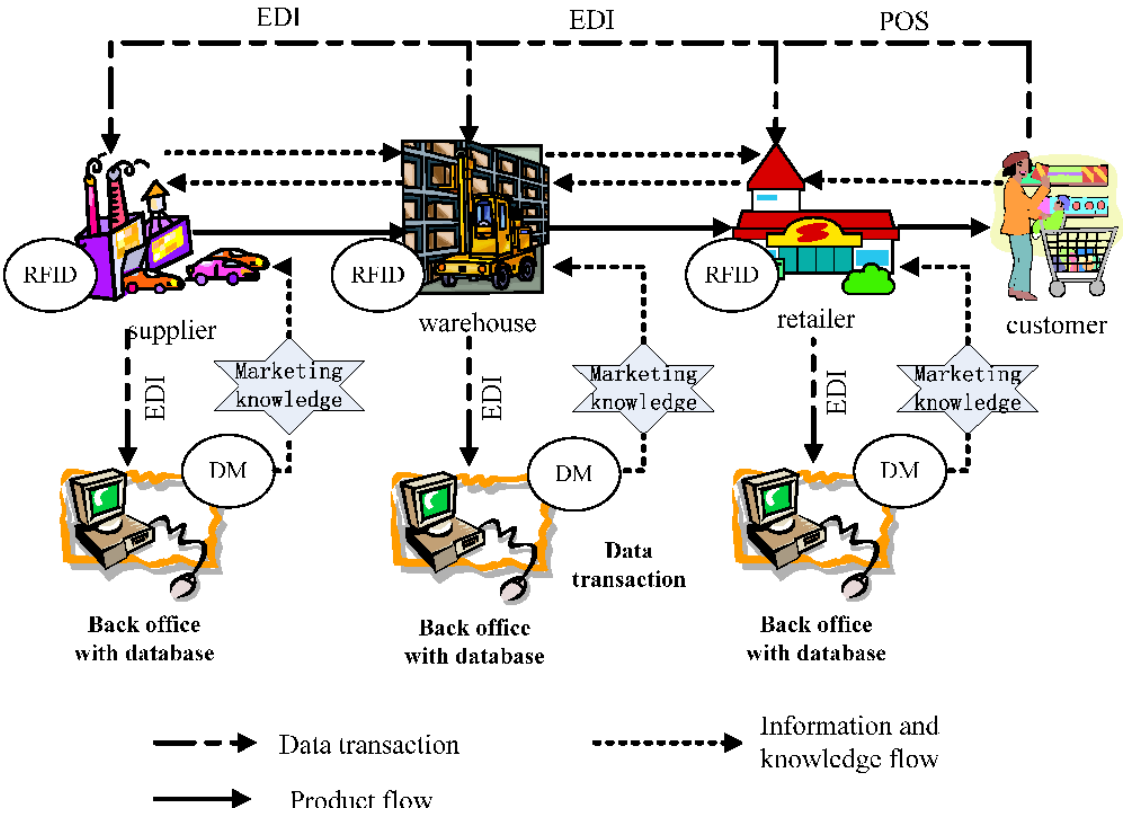

Fig 1.0 Summary of Retail Supply Chain Stream

UKEssays (2018) describes the operations in more detail. The first stage of the process being Inbound logistics where the products arrive at the warehouses from the supplier and are transported, handled and stored on shelves. The next stage is operations where services and products are provided to customers. This also includes the task of opening the store in accordance with trading hours and maintaining the shelves with stock. In addition to these, a number of business support activities are identified within the company infrastructure. These include Planning and Control functions (that focus on controlling cost and cash within operations), human Resources (in charge of recruitment and training) and Technology Management (in charge of providing innovative new product ranges or solutions that anticipate customer needs).

BI System's Assistance in Operational Decision Making

The dashboard provides information on the most profitable customers to the business. These customers (alpha customers) are most important to the business (Gaetto, 2016). It is important for a business to identify who they are, for the purpose of customer retention and profit. There is a section on the dashboard called TOP CUSTOMERS that provides chart data for those customers with most sales and also those who contribute the most profit. The business

can adapt their behaviour to ensure those high value customers are not lost. One way of doing this is via Marketing, by offering alpha customer promotions, discounts (during POS) or good will gestures through sales (vouchers). The discount section for TOP Customers provides the data to ensure those customers receive fair discount. The ETL part of the system provides customer data for tracing customers who could be sent promotions. Customer churn (when the company loses customers e.g. to competitors) is a critical metric to business (Gaetto, 2016). This is monitored using Number of Active Customers chart. It is less expensive for a business to have to retain a customer, than attract new customers. Having to attract new customers requires utilising marketing and sales resources throughout the process in an attempt to gain the trust of new customers (Gaetto 2016; Al-Azmi 2013).

The dashboard provides the BI tools to determine customer buying habits and behaviour by providing import information on the most sold products and the time periods of most activity. This provides important information to the logistics operations, utilised for predicting future trends in ordering products and managing stock levels in the warehouse. The ETL part of the system provides tables of suppliers to quickly look up and trace suppliers for specific products. Ensuring stock levels meet and satisfy the demands of customers, keeps customers from going to other competitors and can be used in decision making strategies that focus on customer retention and reduce customer churn. Ultimately Customer relationship with the business is about keeping customers satisfied and happy. Thus, understanding buying habits i.e. most sold products, can be used as a metric to improve customer relationship management (CRM). Al-Azmi (2013) states: “Mining tools provide better customers’ relationship management CMR, through mining real habits, patterns, and even customers churn”. The dashboard is essentially a mining technology and serves that purpose.

Competitive pressure can be felt by the business from rivals. This pressure is lessened by the use of the BI dashboard system by providing a competitive advantage in several ways (Al-Azmi, 2013). Market research teams using the dashboard can help to provide a competitive advantage by using the chart for most sold products to identify those products that dominate sales and investigate what hidden attributes and reasons help them lead in sales. Azami (2013) states “Marketing use mining tools to get the market’s baskets, …market basket are associations of certain products that are highly likely bought together.”

Conclusions

We can see many advantages of the use of the dashboard. Information provided is automatically updated and can be accessed rapidly without requiring additional administrative support (Xie and Allen, 2013). As the information is current and based on data, there is limited room for human error, so the information provided is more accurate (Xie and Allen, 2013). The dashboard can help with marketing strategy by identifying the basket of products most sold and ordering more stock. It helps in supporting decision making for customer relationship management, and customer retention, by providing and monitoring discounts to most profitable customers, and keeping customers happy with products in demand. It provides decision making support for management of operations such as stock levels in warehouse, and thus managing labour required for the operations. Ultimately, maintaining optimal stock levels and staff levels to meet consumer demand for products, increases product sales and reduces labour costs. Thus, the result is improved cash flows and increased productivity for the business (Xie and Allen, 2013). The ETL part of the system can be used in the logistics operation to trace customers, products and suppliers (Xie and Allen, 2013).

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