



BUSINESS INTELLIGENCE SYSTEM

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DECLARATION OF ORIGINALITY AND EXCLUSIVENESS

I declare that this assignment report entitled
BUSINESS INTELLIGENCE SYSTEMS
is the result of my own research work except as cited in the references.

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Date:

ACKNOWLEDGEMENT

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1. Introduction:

The concept of business intelligence became more and more used during the last decades, and now, this association of terms is used across different fields from data technology to business modelling. Business intelligence represents a wide area of applications and technologies for collecting, storing, analyzing and providing access to information for improving businesses process modelling quality. The business intelligence statement getting the right information to the right people at the right time” focuses on the fact that business intelligence uses information and not data due to the included capabilities for processing raw data into intelligent information, that is valid and accepted by the entire company and which can be consistently used in process modelling. The business intelligence term was introduced by Gartner Group in middle of the 90s. The concept, on the other hand, existed long before being used in mainframe reporting systems.

The business intelligence term was used for the first time in 1958, when Hans Peter Luhn used it in an article. Business intelligence, as it is known today, it’s supposed to be developed from decision support systems which evolution began in the late 60s, reaching a major point in the middle 80s. Decision support systems had their origin within computer assisted models which were created with the purpose of helping company management in taking decisions and performance scheduling. From these decision support systems took birth in the late 80s the concepts of data warehouse, OLAP (onLine Analytical Processing) and business intelligence. In 1989, Howard Dresner used the term of business intelligence to group under the same topic all methods and techniques used for taking decisions which were based on solid facts. Starting with the 90s, the frequency of using the business intelligence term has increased even more. The 1990s represented a formative period for business intelligence applications and products during this period, organizations realized that they needed arrange of business intelligence capabilities to satisfy a diverse set of user needs. Ultimately, this range could be grouped into five distinct categories or “Styles of Business Intelligence” applications. The 5 styles of Business Intelligence applications include:

- a) **Data Mining and Advanced Analysis**
- b) **Visual and OLAP analysis**

- c) **Enterprise Reporting**
- d) **Dashboards and Scorecards**
- e) **Mobile Apps and Alerts**

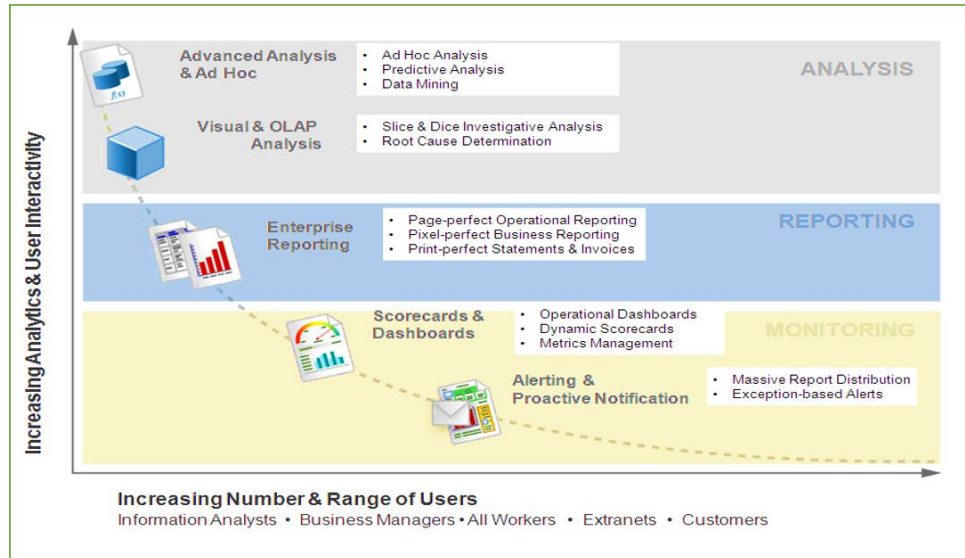


Figure 1: illustrates about Business Intelligence Styles

"Innovacons.com. (2017). *Business Intelligence*. [online] Available at:

<http://innovacons.com/wp/business-intelligence/> [Accessed 2 Feb. 2017].Nowadays,"

investments have risen in a field like business intelligence. Software developers haven't delayed in developing special solutions for business intelligence, so big processing machines were made for using such systems and the research in the field grew. Business intelligence is strictly tied to technologies like data mining, OLAP, data connections and data warehouses. Therefore, business intelligence is based on an aggregate of concepts and technologies which cooperate for helping companies and their decisional activities. As we said before, usually, an organization must own at least one storing and processing data system. In the current environment, everything is based on information; companies provide informational activities needs and the internet makes the information transfer without having distances barriers. Everything is information. Companies get to own, as we said before, data that can no longer be stored by the classic database systems. Researches in business intelligence revealed that storing, analyzing and exploiting an organizations data could provide precious information to a company such as predictions, patterns or complex reports.

2. Company Profile:



Sports Gear Asia (SGA) is the largest chain of sporting goods stores in around the Asia continent. The only place where more than 30 000 sports goods for all sports could be found among more than 100 worldwide brands. The extraordinary diversity and the best costs of sports goods in Malaysia make our stores the most favourite place for everyone when it is about buying sports goods.

In SGA, we will turn your shopping experience fun and we guarantee a 100% emotion!

2.1. Philosophy

- We believe that the passion, the desire to win and self-esteem is the most important moving force that pushes everyone to the way of success.
- We believe in the potential of every athlete.
- We are convinced that only a professional partner can unleash your potential by making you pursue your goals, provide the needed equipment and outfit, shows the steps that will guide your strength for a better presentation so the sport to be a part of you and to lead to a complete self-realization!
- We are the best professional partner of any athlete and understand the individual needs and help to achieve better results!
- As the biggest retailer of sports goods, shoes and outfit for all sports, our mission is to inspire for a complete healthy and active way of living and to make people combine sport and their way of living. In Sport Depot we believe that the sport and the active lifestyle can be adopted in any age from every person despite their social status and lifestyle.
- We are dedicated to provide sport equipment and variety of brands leading to a complete satisfaction and delight from the sport

3. Problem Statement:

Currently the issues being faced by Asia Gear Sports Company is managing product distribution at a global customer base. Also, the company is still using static reporting which leads to poor visualization of the sales trends and also lacking the drill down option which is troublesome for the company to make precise marketing strategies. By implementing a BI system, it will help the company to do analysis to product selling trends.

4. Aims and Objective

The aim of this project is to help the company to expand their market share by having a multidimensional view of their historical sales data in order to make good business decisions that would increase the revenue. The Business Intelligent system and reports are required to be accessible to them through computers, tablets and mobile phones with the most recent data and with the ability to drill down visualization and collaboration of data from many sources.

5. Business Intelligence system:

Business Intelligence (BI) - technology infrastructure for gaining maximum information from available data for the purpose of improving business processes. Typical BI infrastructure components are as follows: software solution for gathering, cleansing, integrating, analyzing and sharing data. Business Intelligence produces analysis and provides believable information to help making effective and high quality business decisions. The most common kinds of Business Intelligence systems are:

- EIS - Executive Information Systems
- DSS - Decision Support Systems
- MIS - Management Information Systems
- GIS - Geographic Information Systems
- OLAP - Online Analytical Processing and multidimensional analysis
- CRM - Customer Relationship Management

Business Intelligence systems based on Data Warehouse technology. A Data Warehouse (DW) gathers information from a wide range of company's operational systems, Business Intelligence systems based on it. Data loaded to DW is usually good integrated and cleaned that allows to produce credible information which reflected so called 'one version of the true'. A good Business intelligence system should compromise the principles:

5.1 BI Principles

- **Business strategy driven:** The report and dashboard should reflect the business processes and is only effective if people use it.
- **Multidimensional:** The data submitted should be as detailed as possible and exhibit the precise details as the data in the data source system of Aribika Data warehouse. This increases the verifiability of data and information in reports. It also allows for detailed reports because no information is lost. – e.g. Drill Down feature.
- **Real time and Availability:** The refresh rate of data in both the data warehouse and reports should accord with the uniformity and occurrence of events in the relevant business processes. This prevents the organization from missing out on important events.
- **Maintainability and scalability:** The calculations, the intelligence, measured values and dimensions are preferably recorded in one and the same place – thus also on one single platform. This improves maintainability and scalability by allowing changes if required.
- **Tool dependency:** However, an architecture should where possible be separate (independent) from the tools used – or to be used (e.g. ETL and Business Intelligence tools, computers and mobile phones).

5.2 BI Life Cycle

Business Intelligence (BI) applications need to be considered by almost every organization today. But what's needed now is a proven method for implementing the phases, processes and their interdependencies involved in the successful deployment of BI projects. Business intelligence is the process of converting raw data into useful and easy to understand information in helping companies to have effective strategies, obtain operational insights also to help in decision making. Any Business Intelligent project requires design, development and testing which are parts the BI life cycle. The life cycle can be further elaborated from the figure below.

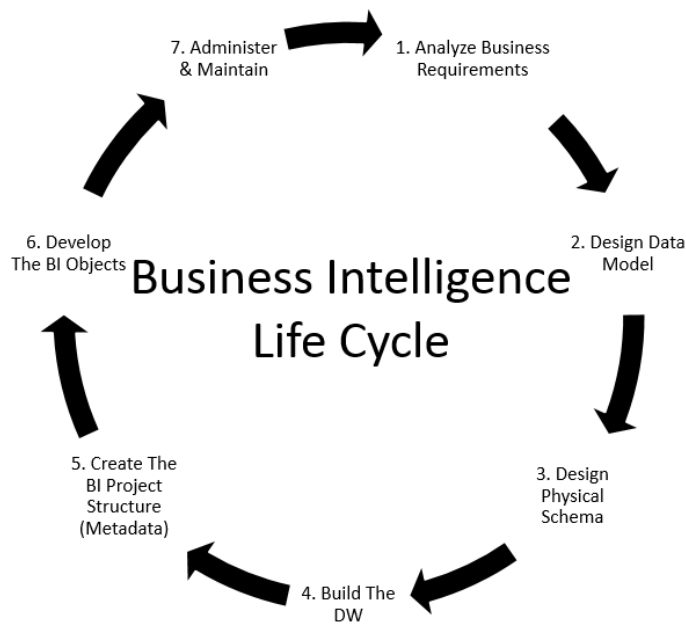


Figure 2: Business Intelligence life cycle

“Tan, N., Tan, N. and profile, V. (2017). *SDLC and BILC (Business Intelligence Life Cycle)*. [online] Nicobudidarmawan.com. Available at: <http://www.nicobudidarmawan.com/2015/04/sdlc-and-bilc-business-intelligence-life-cycle.html> [Accessed 2 Feb. 2017].”

5.3 Business Intelligence Architecture

BI architects are often tasked with developing specific data structures or implementations for a set of end users within a business. The business intelligence architect serves as a point person for programs that form an architecture for handling data, including databases, data warehouses and other storage resources. BI architects also commonly work on tasks like linking legacy or enterprise software to BI applications or platforms, and creating or handling metadata that help programs use data more efficiently and accurately.

Generally, a BI architect serves an employer by promoting clarity and efficiency in using data to drive decision-making. The BI architect often contemplates issues like good documentation, changes in IT structures, and bugs or glitches in applications and programs, in an attempt to preserve and create good systems for data use.

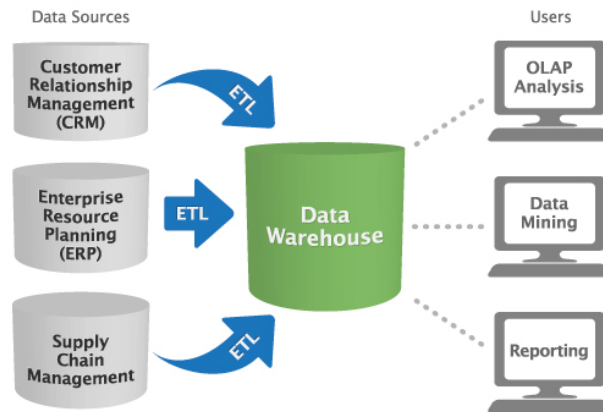


Figure 3 : Business Intelligence Architecture

“Softwareadvice.com. (2017). *Top Business Intelligence (BI) Tools - 2017 Reviews & Pricing*.
[online] Available at: <http://www.softwareadvice.com/bi/> [Accessed 2 Feb. 2017]”.

5.4 Data warehouse

A data warehouse is a relational database that is designed for query and analysis rather than for transaction processing. It usually contains historical data derived from transaction data, but it can include data from other sources. It separates analysis workload from transaction workload and enables an organization to consolidate data from several sources.

In addition to a relational database, a data warehouse environment includes an extraction, transportation, transformation, and loading (ETL) solution, an online analytical processing (OLAP) engine, client analysis tools, and other applications that manage the process of gathering data and delivering it to business users.

6. Software Used for this Project

6.1 SQL Analysis Services

Analysis Services is an online analytical data engine used in decision support and business analytics, providing the analytical data for business reports and client applications such as Power BI, Excel, Reporting Services reports, and other data visualization tools.

6.2 SQL Server Data Tools

SSDT is a modern development tool to build SQL Server relational databases, Integration Services packages, Analysis Services data models, and Reporting Services reports. With

SSDT, can design and deploy any SQL Server content type with the same ease as you would develop an application in Visual Studio

6.3 Microsoft Power BI



Power BI is a suite of business analytics tools to analyze data and share insights. Power BI dashboards provide a 360-degree view for business users with their most important metrics in one place,

updated in real time, and accessible from most of the devices. With one click, users can explore the data behind their dashboard using intuitive tools that make finding answers easy

7. BI Solution

For this project i will be using Microsoft SQL analysis service along with SSDT to design and deploy BI solution for the organization. The diagram below shows the high-level data source view of the design we I am proposing based on the existing database of the organization.

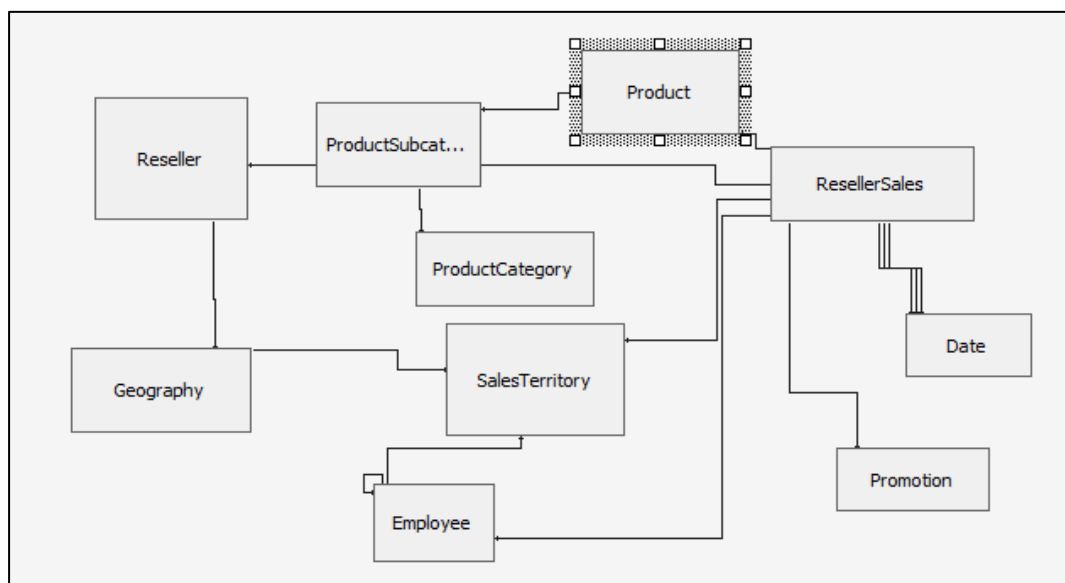


Figure 4: High Level Database Diagram

As the porotype, we are proposing is solely on Sales related data we will considering following dimensions and measures to be included in the dashboard and the reports.

7.1 Dimensions

- Customer
- Product
- Date
- Reseller
- Geography
- Promotion
- Sales territory
- Employee

7.2 Measures

- Internet Sales
- Reseller Sales
- Total Sales
- Total Product Cost
- Gross Profit

Based on the above mentioned dimensions and measures, I have designed a cube which high-level design is shown below.

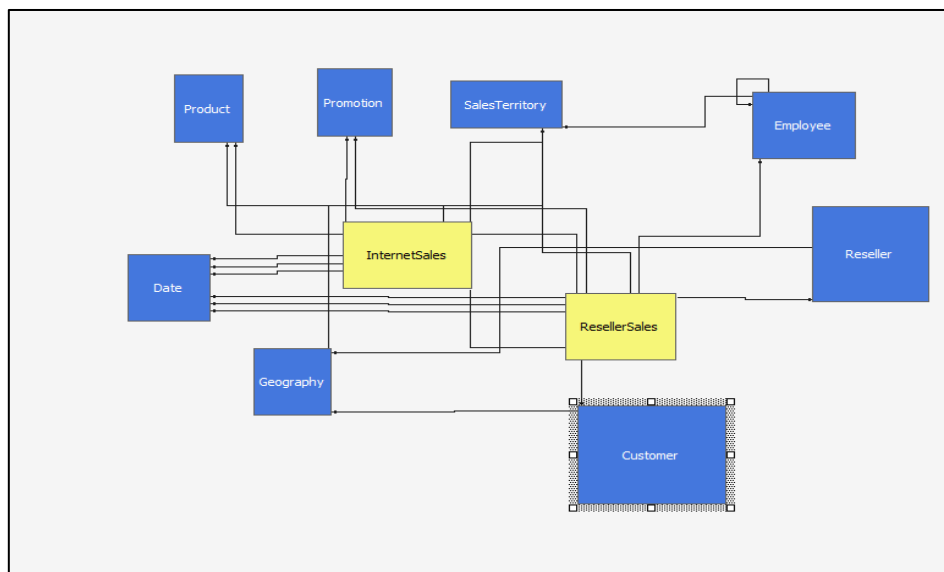


Figure: 5 Data Source View of the Cube

This cube looks like the data source view shared earlier however the fact table color changed to yellow and the dimension tables are blue. Key to the concept of cube is the ability to assign hierarchies and relationship (multidimensional) to the data which allow the data to be analyzed in the most logical way and the quickest time possible.

Cubes enables users to navigate around the data, not even realizing that they are performing analysis by finding trends and spotting patterns using drilling down, slicing and dicing options

Measure Groups		
Dimensions	Internet Sales	Reseller Sales
Product	Product Name	Product Name
Customer	Full Name	
Reseller		Reseller Name
Geography		
Sales Territory	Sales Territory Region	Sales Territory Region
Employee		Employee Name
Promotion	Promotion Name	Promotion Name
Date (Ship Date)	Date Key	Date Key
Date (Due Date)	Date Key	Date Key
Date (Order Date)	Date Key	Date Key

Figure: 6 Dimensions and Measure in Cube

Above fig 6 illustrates the Dimension usage under the cube for the two fact tables that we have created i.e. Internet Sales and Reseller Sales.

Following Figure 7 shows the measures that are being calculated under the cube for both sales i.e. Internet Sales and Reseller Sales separately

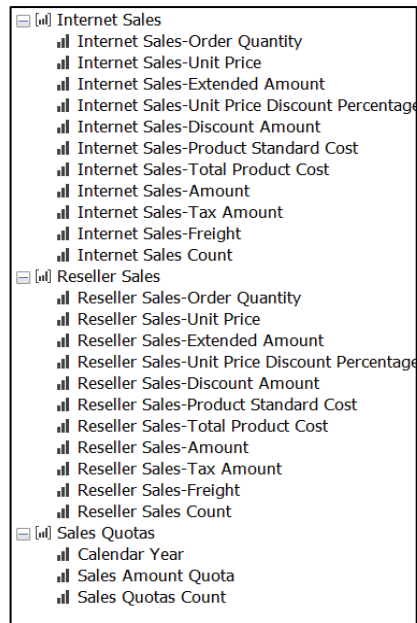


Figure 7: Measures in the cube

Along with the above defined measures there are some aggregated summaries that were required by the business are as follows.

- **Total Sales (Sum of Internet and Reseller Sales)**

The screenshot shows the configuration for a measure named "Total Sales". The interface includes the following sections:

- Name:** A text box containing "[Total Sales]".
- Parent Properties:**
 - Parent hierarchy:** A dropdown menu set to "Measures".
 - Parent member:** A text box with a "Change" button next to it.
- Expression:** A text box containing the formula: `[Measures].[Internet Sales Amount] + [Measures].[Reseller Sales Amount]`.
- Additional Properties:**
 - Format string:** A dropdown menu set to "Currency".
 - Visible:** A dropdown menu set to "True".
 - Non-empty behavior:** A dropdown menu set to "Internet Sales Amount, Reseller Sales Amount".
 - Associated measure group:** A dropdown menu set to "(Undefined)".
 - Display folder:** A text box.

Figure 8: Total Sales calculation

- **Total Product Cost (Sum of Internet and Reseller Sales)**

Name: [Total Product Cost]

Parent Properties

Parent hierarchy: Measures

Parent member: [Change]

Expression

[Measures].[Internet Product Cost] + [Measures].[Reseller Product Cost]

Additional Properties

Format string: *Currency*

Visible: True

Non-empty behavior: Internet Product Cost, Reseller Product Cost

Associated measure group: (Undefined)

Display folder: []

Figure 9: Calculation of Total Product Cost

- **Total Gross Profit**

Name: [Gross Profit]

Parent Properties

Parent hierarchy: Measures

Parent member: [Change]

Expression

([Measures].[Total Sales] - [Measures].[Total Product Cost])

Additional Properties

Format string: Standard

Visible: True

Non-empty behavior: Internet Product Cost, Internet Sales Amount, Res...

Associated measure group: (Undefined)

Display folder: []

Figure 10: Calculation of Total Gross Profit

8. BI Reports

The BI solution prototype we have proposed is consisting of 5 reports along with a top header with static summaries derived from above mentioned dimensions and measures. The prototype of main screen is shown in Figure 10 along with the details and types of reports.

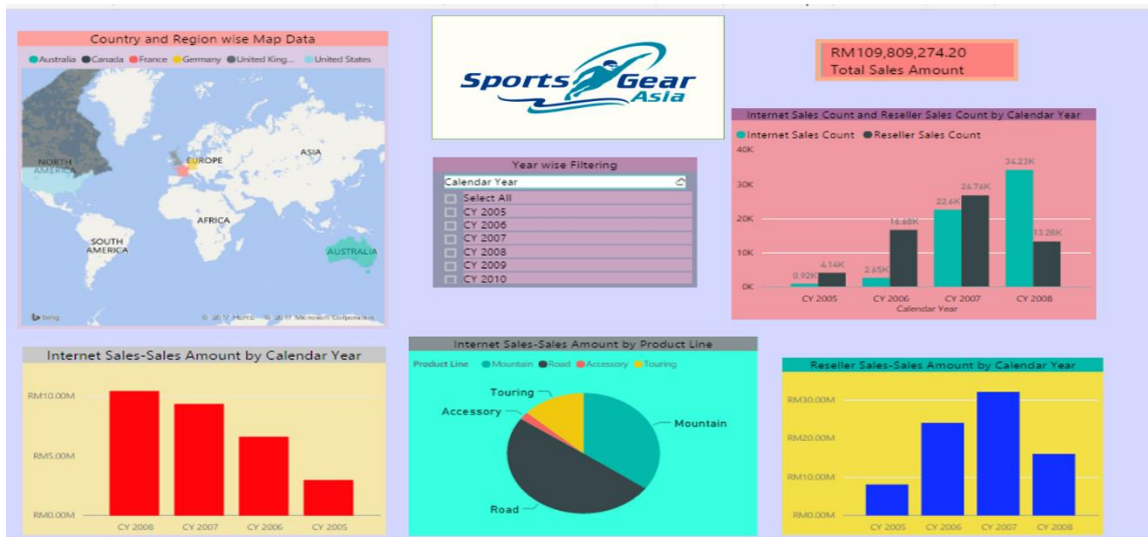


Figure 11 Dashboard of my company sales

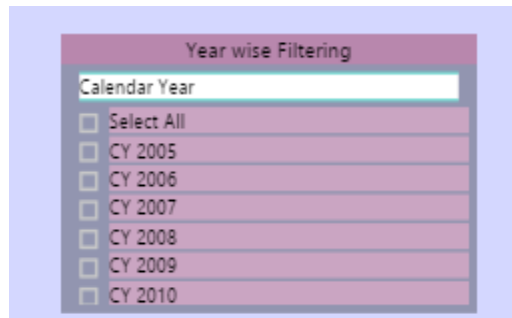
❖ **Drill Down - Country → State**



Figure 12. Geographical Spread of Customer

❖ Year wise Filter:

In this report we use filtering by yearly. The purpose of this report is to see data and product line sales by selected year wise. Selected year is illustrate in figure 14



A screenshot of a 'Year wise Filtering' dialog box. It features a 'Calendar Year' text input field at the top. Below it is a list of years from 2005 to 2010, each preceded by an unchecked checkbox. The options are: 'Select All', 'CY 2005', 'CY 2006', 'CY 2007', 'CY 2008', 'CY 2009', and 'CY 2010'.

Figure 13. calendar year by Filtering

❖ Internet & Reseller Sales Amounts by Calendar Years

The purpose of this report is to display the percentage and amount of sales (internet & reseller) over the years as illustrated in Figure 11. This reports can be drill down from Years to Months and the selection will filter and update rest of the reports on the dashboard according to the year or month selected.

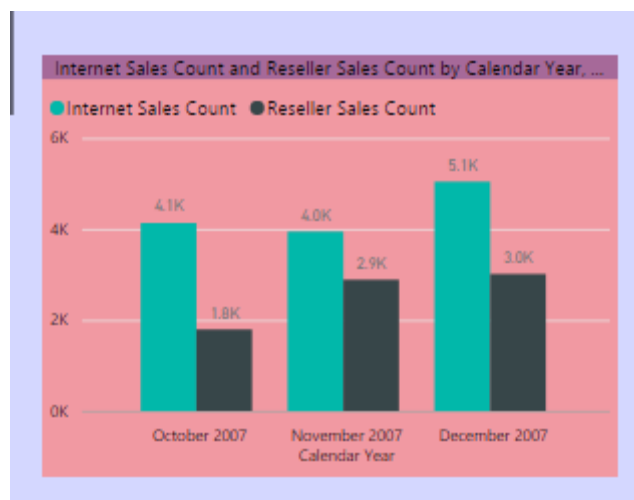


Figure 12 Internet & Reseller Count

❖ **Drill Down - Year → Month**

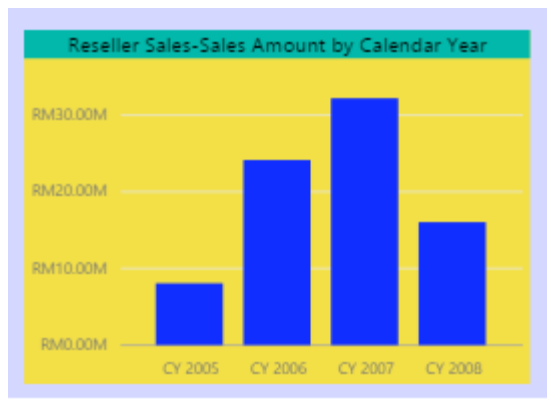


Figure 13. Reseller Sales

❖ **Internet Counts by Product Line:**

The purpose of this report is to display the count internet sales by product line as illustrated in Figure 12. This reports can be drill down from Product Line to Model and the selection will filter and update rest of the reports on the dashboard according to the Product Line or Item selected.

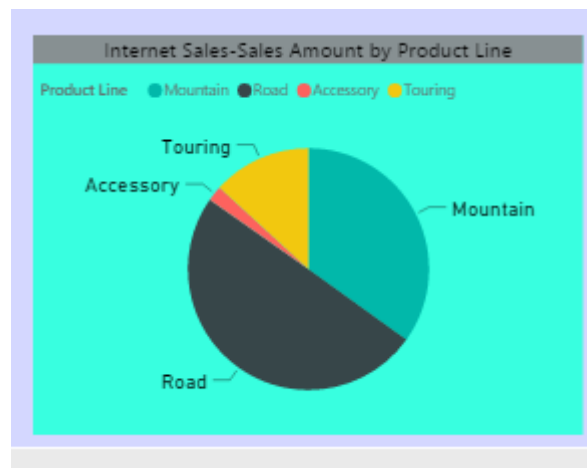


Figure 14. Product Line

❖ Internet sales amount by year

The purpose of this report is to display internet sales by yearly wise. This reports cannot be drill down however selection will filter and update rest of the reports on the dashboard according to the Product Line selected.

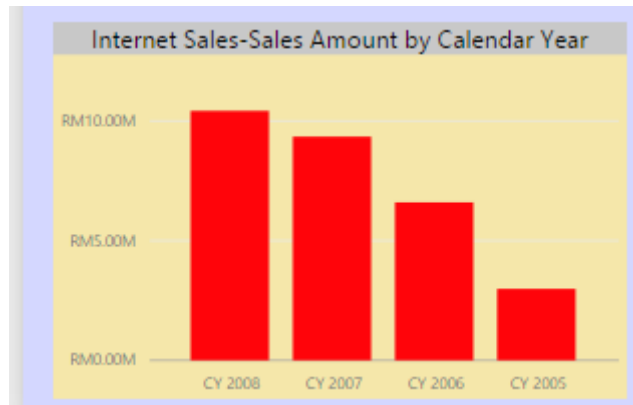


Figure 15. Internet Sales

9. Conclusion

Business intelligence is, at this time, one of IT fields with continuous improvements. Starting with basic theoretical notions and ending with the new technologies that are developing this way, business intelligence concepts are in the sight of all IT people. As we mentioned before, business intelligence appeared as an answer to the economics' environment needs. Big organizations and multinational companies have already implemented a solution for business intelligence. Though implementing this kind of system is extremely laborious and expensive, the benefits proved to be many more. As it was proven in the paper, integrating storing and exploiting an organization's data can bring important advantages. The main advantage in using business intelligence is the ability to transform data into information. This allows companies to develop an efficient mechanism of making decisions, in other words to make better and faster decisions. The benefits can be important for the company's management in making strategic decisions, but it can also help department leaders, analysts or any other member of a team faced with having to take decisions. Analyzing intelligent data has always been important because through this analyze intelligence is being generated. Business intelligence is like an endless story, applicable in fields like audit, risk management,

diplomacy or lobby 20 Business Intelligence Systems activities. And new fields are just shaping up. This would be the case of merge between business intelligence and artificial intelligence, merger that would lead to a new concept, artificial business intelligence (ABI). In these conditions we must admit that these technologies are just at the beginning of a long journey, in a world where the key of success stands within the capacity of making better decisions in a shorter time than the competition. Besides, a company's life depends more and more on such decisions, which will make impossible not to admit the benefit brought by business intelligence.

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