POWER BI ASSIGNMENT 1

1. What do you mean by BI? Explain

Business intelligence (BI) is software that ingests business data and presents it in user-friendly views such as reports, dashboards, charts and graphs. BI tools enable business users to access different types of data — historical and current, third-party and in-house, as well as semi-structured data and unstructured data like social media. Users can analyze this information to gain insights into how the business is performing. Organizations can use the insights gained from business intelligence and data analysis to improve business decisions, identify problems or issues, spot market trends, and find new revenue or business opportunities.

BI is important because:-

- Creating KPI (Key Performance Indicators) based on historic data.
- Identify and set benchmarks for varied processes. With BI systems organizations can identify market trends and spot business problems that need to be addressed.
- BI helps on data visualization that enhances the data quality and thereby the quality of decision making.
- BI systems can be used not just by enterprises but SME (Small and Medium Enterprises)

Business Intelligence systems are implemented as follows:-

Step 1) Raw Data from corporate databases is extracted. The data could be spread across multiple systems heterogeneous systems.

Step 2) The data is cleaned and transformed into the data warehouse. The table can be linked, and data cubes are formed.

Step 3) Using BI system the user can ask quires, request ad-hoc reports or conduct any other analysis.

Examples of Business Intelligence System used in Practice:-

a. In an Online Transaction Processing (OLTP) system information that could be fed into product database could be add a product line, change a product price. Correspondingly, in a Business Intelligence system query that would be executed for the product subject area could be did the addition of new product line or change in product price increase revenues. In an advertising database of OLTP system query that could be executed changed in advertisement options and increase radio budget. Correspondingly, in BI system query that could be executed would be how many new clients added due to change in radio budget.

   In OLTP system dealing with customer demographic data bases data that could be fed would be increase customer credit limit and change in customer salary level. Correspondingly in the

OLAP system query that could be executed would be can customer profile changes support higher product price.

b. A hotel owner uses BI analytical applications to gather statistical information regarding average occupancy and room rate. It helps to find aggregate revenue generated per room. It also collects statistics on market share and data from customer surveys from each hotel to decides its competitive position in various markets. By analyzing these trends year by year, month by month and day by day helps management to offer discounts on room rentals.

c. A bank gives branch managers access to BI applications. It helps branch manager to determine who the most profitable customers are and which customers they should work on. The use of BI tools frees information technology staff from the task of generating analytical reports for the departments. It also gives department personnel access to a richer data source.

2. How Power-BI helps in BI, and how does it help Analysts? Explain.

Every business market is unique, and it has its own complications and challenges. Their customers are diverse in nature with clearly defined budgets, plans, and goals. Hence, businesses adopt different selling & marketing methods to offers various services and products.

In any business, systems generate a wide variety of data in the size of terabytes, petabytes or in some cases exabyte. Businesses analyse this data and create actionable information (decisions) and the entire process is called Business Intelligence (BI). It is quite evident that the company's success relies on these decisions that derive from business intelligence.

BI is an ever-growing technology dominating all businesses across the world. BI services are very much successful in ensuring a personalized experience to the customers. BI Services are widely diversified, and businesses are leveraging the potential of this technology. One such technology is Power BI which helps to make complex business decisions.

Microsoft Power BI is business intelligence (BI) platform that provides nontechnical business users with tools for aggregating, analyzing, visualizing and sharing data. Power BI's user interface is fairly intuitive for users familiar with Excel, and its deep integration with other Microsoft products makes it a versatile self-service tool that requires little upfront training.

Below are the top 6 reasons why Power BI is best BI Platform currently in the market.

1. Ease of Use

Power BI has very simple and easy to use Interface. No programming experience is required to use Power BI. It has inbuilt intelligence which helps you to select attributes for your reports by suggesting the best reporting element. Example: After selecting a right data source, when you opt

for sales and category, it will automatically identify the column chart for you. Similarly, if you select sales and location, it will automatically identify the map chart.

It has a very simple user interface (UI) to connect to the data source. Upon selecting of data source, it allows selection of attributes by a simple drag & drop for your reports. Among other features, QA is where you can write a question and Power BI will return a result with value or graph depending on the question. E.g. "What was this year's revenue by month" generates a graph for you displaying month-wise revenue. The marketplace that comes with it provides a lot of reporting capabilities.

2. Easy to Learn

Power BI is developed on the founding platform of Excel and it follows a similar approach to design a report. Microsoft Excel is globally accepted and widely used software which makes Power BI easy to learn. Data modeling is purely derived on the fundamentals of Microsoft SQL Server and Microsoft Access database. Hence users/programmers can very easily adopt the data modeling of Power BI. Power BI comes with learning guides on their website.

3. Easy to Collaborate

Power BI comes with easy to collaborate options. The user can collaborate with co-workers to create interactive reports and dashboards in "app" workspaces. The user can compile dashboards and reports into apps and can publish them to a larger audience. Sharing dashboards or reports with a small audience is facilitated even over the Mobile App with Power BI. The user can print the report and can export it in the form of PowerPoint Presentation. They can even publish reports and dashboards to public websites where anyone in the world can view and interact with it.

4. Cost Effective

Power BI desktop is free and the user can develop reports and dashboards that are easy and complex. The pro licenses of Power BI are within the affordable range (USD 10 per month). For a larger audience, Power BI has a premium option which allows you to customize costing based on your audience usage.

5. Wide Coverage of Data Sources

Power BI comes with a wide range of connectors for data sources like Microsoft Excel, SQL Server database, MySQL database, Oracle database, IBM DB2 database, IBM Netezza, IBM Informix, PostgreSQL database, Sybase database, SAP Hana, Amazon Redshift, Azure SQL Database, Azure SQL Data warehouse, Azure Analysis services database, Azure Blob Storage, MailChimp, Facebook, GitHub, Salesforce and many more.

6. Powerful Tool

Visualization:

Microsoft has opened up the visualization SDK in Power BI. It has a huge library for custom visualization. Use this functionality; the users can customize the UI as per their need.

Data Shaping:

Power BI offers a tool called Query Editor which is very flexible and powerful with tons of features. The most important aspect is that it is self-documenting. It also offers you an opportunity to go deeper inside the DAX language.

Data Modeling:

Any BI solution is strong if the BI model is well-developed. Power BI comes with very efficient data modeling options based on their experience of SQL database and Cube technology.

There are many more competitors of Power BI which offer similar features, like ZOHO Reports, IBM Watson Analytics, Sisense, Google Analytics to name a few. But Power BI stands tall in the market, mainly based on the ease of use and prompt Microsoft Help available for the tool.

3. Explain Descriptive analytics?

Descriptive analytics is a statistical interpretation used to analyze historical data to identify patterns and relationships. Descriptive analytics seeks to describe an event, phenomenon, or outcome. It helps understand what has happened in the past and provides businesses the perfect base to track trends. Descriptive analytics is about finding meaning within data. Data needs context: analytics provide the where and when turning figures into measurable patterns. As a form of data analysis, descriptive analytics is one of the four key types of data analytics. The others are diagnostic analysis, predictive analysis, and prescriptive analytics. Descriptive analytics can be leveraged on its own or act as a foundation for the other three analytics types.

Descriptive analytics is relatively accessible and likely something your organization uses daily. Basic statistical software, such as Microsoft Excel or data visualization tools, such as Google Charts and Tableau, can help parse data, identify trends and relationships between variables, and visually display information.

Descriptive analytics is especially useful for communicating change over time and uses trends as a springboard for further analysis to drive decision-making.

Descriptive analytics can be applied to a wide variety of everyday operational activities of a business. Reports on inventory, various workflows, sales figures, and revenue statistics are all based on descriptive analytics. Together, these reports offer a company a historical overview of its operations. The data within such statements can be collected to serve as a base to create specific snapshots of various business-related functions.

Social analytics is an example of descriptive analytics to create such snapshots. For every post put up on social media, analysis can be drawn on the page's followers, the likes a post gets, the interactive comments, the number of page views, and the available response time. All of these factors ascertain

the impact of the page on its target audience and, when aggregated, will focus on any gaps or areas for improvement. It helps with a better understanding of consumer attitudes.

However, it must be understood that descriptive analytics only determines patterns and does not venture beyond surface data analysis. They do not make inferences or create predictions. While the annual revenue sales report may show that a business has been profitable this year, management will need other methodologies to compare it with previous years' accounts to understand whether this profit has been higher or lower than in earlier years. Such comparisons will help organizations arrive at a trend.

How Do Descriptive Analytics Work?

For descriptive analytics to work, the organization first needs to create a set of metrics that will measure business performance against business goals. For example, a manufacturing business may have year-on-year raw materials price changes or monthly revenue growth metrics. A technology company may examine how many subscribers they have added each month or how many upgrades to their technology they have created. With the necessary metrics in place, relevant data must be collected. It will then have to be managed, cleansed, and prepped for the next step, which is data analytics.

The historical data collection for descriptive analytics is done using two main techniques – data aggregation and data mining. A company collects and organizes data into manageable data sets with data aggregation. The data collected is analyzed with various tools and methods like summary statistics or pattern tracking. Analysts use these to study data and uncover patterns and, in turn, performance.

Examples of how companies might use descriptive analytics:

a. Some outcomes of descriptive analytics include creating a wide range of reports related to sales, revenue, and workflow, including inventory reports
b. Insights into the use of social media and engagement within it from various platforms and based on multiple metrics
c. Summary of events that have concluded like marketing campaigns, operational data, sales-related measurable.
d. Collation of survey results
e. Reportage on general trends
f. This form of analysis is precious in assessing data from learners to create better outcomes from training programs.

For example, when a multi-country board of directors digital meets, descriptive analytics can ascertain how many members were active participants in the discussion, the interaction levels, and how many were posted on the discussion forum. Another example would be reporting financial metrics such as a year-on-year change in pricing, monthly sales growth (or decline) figures, and revenue from subscribers. This data is based on what has occurred within a fixed business period.

How to Apply Descriptive Analytics to an Organization

Understanding the basics of descriptive analytics seems simple enough, but applying it in real life can be challenging. There are several steps that an organization needs to follow to apply descriptive analytics to their business.

Identify Relevant Metrics:

First, the organization needs to know the metrics to be created. These metrics should reflect primary business goals for each sector of the company or from the organization. Management may want to look at growth from a quarterly perspective or may need to track outstanding payments to understand delays. Identifying various data metrics is the first step. An example is in the marketing and sales department; sales representatives will track revenue from sales per month. An accountant will want to examine financial metrics like gross profit margin.

Identify Data to Support These Metrics:

The next step is to find the data needed to support the required metrics. The data can be found across several siloes and files for some organizations. Most of the data required may already be within the company if an organization already functions with enterprise resource planning (ERP) systems. Identify any external sources required; particularly those related to industry benchmarks, non-company databases, e-commerce sites, and the many social media sites.

Data Extraction and Preparation:

If an organization is working across multiple data sources, it will need to extract data, merge it, and prepare it for analysis to ensure uniformity. This is a drawn-out process but is critical for accuracy. Data cleansing is a part of removing redundancies and mistakes and creating data in a format suitable for analysis.

Data Analysis:

There are several tools available to provide descriptive analytics. These can range from basic spreadsheets to a wide range of more complex business intelligence (BI) software. These can be cloud-based, on-site. These programs use various algorithms to create accurate summaries and insights into the provided data.

Data Presentation:

The final aspect of descriptive analytics is presenting the data. This is usually done using visualization techniques, with compelling and exciting forms of presentation to make the data

accessible for the user to understand. Options such as bar charts, pie charts, and line graphs present information. While such a visually appealing presentation is how some departments prefer their knowledge, financial professionals may opt for data in tables and numbers. The end-user should be accommodated.

Benefits of Descriptive Analytics

- Simple Analysis: Descriptive analysis doesn't require great expertise or experience in statistical methods or analytics.
- Many Tools Available: Many apps make this function a plug-and-play form of analysis.
- It Answers Most Common Business Performance Questions: Most stakeholders and salespeople want simple answers to basic questions such as "How are we doing?" or "Why did sales drop?" Descriptive analytics provides the data to effectively and efficiently answer those questions.
- Challenges to Descriptive Analytics: Like any other tool, descriptive analysis is not without problems. There are three significant challenges for organizations wanting to use descriptive analytics.
- It Is a Blunt Tool without Insight: The descriptive analysis examines the relationship between a handful of variables, and that is all. It simply describes what is happening. Organizations must ensure that users understand what descriptive analytics will provide.
- It Tells an Organization What, Not Why: Descriptive analysis reports events as they happened, not why they happened or what could happen next. The organization will need to run the full analytics suite entirely to grasp a situation.
- Can Measure the Wrong Thing: If the incorrect metrics are used, the analysis is useless. Organizations must analyze what they want to measure and why. Thought must be put into this process and matched with the outcomes that current data can provide.
- Poor Data Quality: While vast amounts of data can be collected, it will not produce accurate results if it is not helpful or full of errors. After an organization decides on the metrics it requires, the data must be checked to ensure it can provide this information. Once it is ascertained that it will provide the relevant information, the data must be thoroughly cleansed. Erroneous data duplicates, and missing data fields must be resolved.

4. Explain Predictive analytics?

Predictive analytics is the process of using data to forecast future outcomes. The process uses data analysis, machine learning, artificial intelligence, and statistical models to find patterns that might

predict future behavior. Organizations can use historic and current data to forecast trends and behaviors seconds, days, or years into the future with a great deal of precision.

How does predictive analytics work?

Data scientists use predictive models to identify correlations between different elements in selected datasets. Once data collection is complete, a statistical model is formulated, trained, and modified to generate predictions.

The workflow for building predictive analytics frameworks follows five basic steps:

- Define the problem: A prediction starts with a good thesis and set of requirements. For instance, can a predictive analytics model detect fraud? Determine optimal inventory levels for the holiday shopping season? Identify potential flood levels from severe weather? A distinct problem to solve will help determine what method of predictive analytics should be used.
- Acquire and organize data: An organization may have decades of data to draw upon, or a continual flood of data from customer interactions. Before predictive analytics models can be developed, data flows must be identified, and then datasets can be organized in a repository such as a data warehouse like BigQuery.
- Pre-process data: Raw data is only nominally useful by itself. To prepare the data for the predictive analytics models, it should be cleaned to remove anomalies, missing data points, or extreme outliers, any of which might be the result of input or measurement errors.
- Develop predictive models: Data scientists have a variety of tools and techniques to develop predictive models depending on the problem to be solved and nature of the dataset. Machine learning, regression models, and decision trees are some of the most common types of predictive models.
- Validate and deploy results: Check on the accuracy of the model and adjust accordingly. Once acceptable results have been achieved, make them available to stakeholders via an app, website, or data dashboard.

What are predictive analytics techniques?

In general, there are two types of predictive analytics models: classification and regression models. Classification models attempt to put data objects (such as customers or potential outcomes) into one category or another. For instance, if a retailer has a lot of data on different types of customers, they may try to predict what types of customers will be receptive to market emails. Regression models try to predict continuous data, such as how much revenue that customer will generate during their relationship with the company.

Predictive analytics tends to be performed with three main types of techniques:

- Regression analysis

  Regression is a statistical analysis technique that estimates relationships between variables. Regression is useful to determine patterns in large datasets to determine the correlation between inputs. It is best employed on continuous data that follows a known distribution. Regression is often used to determine how one or more independent variables affects another, such as how a price increase will affect the sale of a product.

- Decision trees

  Decision trees are classification models that place data into different categories based on distinct variables. The method is best used when trying to understand an individual's decisions. The model looks like a tree, with each branch representing a potential choice, with the leaf of the branch representing the result of the decision. Decision trees are typically easy to understand and work well when a dataset has several missing variables.

- Neural networks

  Neural networks are machine learning methods that are useful in predictive analytics when modeling very complex relationships. Essentially, they are powerhouse pattern recognition engines. Neural networks are best used to determine nonlinear relationships in datasets, especially when no known mathematical formula exists to analyze the data. Neural networks can be used to validate the results of decision trees and regression models.

Uses and examples of predictive analytics

Predictive analytics can be used to streamline operations, boost revenue, and mitigate risk for almost any business or industry, including banking, retail, utilities, public sector, healthcare, and manufacturing. Sometimes augmented analytics are used, which uses big data machine learning. Here are some more use case examples, including data lake analytics.

- Fraud detection: Predictive analytics examines all actions on a company’s network in real time to pinpoint abnormalities that indicate fraud and other vulnerabilities.
- Conversion and purchase prediction: Companies can take actions, like retargeting online ads to visitors, with data that predicts a greater likelihood of conversion and purchase intent.
- Risk reduction: Credit scores, insurance claims, and debt collections all use predictive analytics to assess and determine the likelihood of future defaults.
- Operational improvement: Companies use predictive analytics models to forecast inventory, manage resources, and operate more efficiently.
- Customer segmentation: By dividing a customer base into specific groups, marketers can use predictive analytics to make forward-looking decisions to tailor content to unique audiences.
- Maintenance forecasting: Organizations use data to predict when routine equipment maintenance will be required and can then schedule it before a problem or malfunction arises.

5. Explain prescriptive analytics?

Prescriptive analytics is a type of data analytics that attempts to answer the question "What do we need to do to achieve this?" It involves the use of technology to help businesses make better decisions through the analysis of raw data. Prescriptive analytics specifically factors information about possible situations or scenarios, available resources, past performance, and current performance, and suggests a course of action or strategy. It can be used to make decisions on any time horizon, from immediate to long-term. It is the opposite of descriptive analytics, which examines decisions and outcomes after the fact.

How Prescriptive Analytics Works

Prescriptive analytics tries to answer the question "How do we get to this point?" It relies on artificial intelligence (AI) techniques, such as machine learning (the ability of a computer program without additional human input), to understand and advance from the data it acquires, adapting all the while.

Machine learning makes it possible to process a tremendous amount of data available today. As new or additional data becomes available, computer programs adjust automatically to make use of it, in a process that is much faster and more comprehensive than human capabilities could manage.

Prescriptive analytics works with another type of data analytics, predictive analytics, which involves the use of statistics and modeling to determine future performance, based on current and historical data. However, it goes further: Using the predictive analytics' estimation of what is likely to happen, it recommends what future course to take.

Advantages and Disadvantages of Prescriptive Analytics

Advantages:

Prescriptive analytics can cut through the clutter of immediate uncertainty and changing conditions. It can help prevent fraud, limit risk, increase efficiency, meet business goals, and create more loyal customers. When used effectively, it can help organizations make decisions based on highly analyzed facts rather than jump to under-informed conclusions based on instinct.

Prescriptive analytics can simulate the probability of various outcomes and show the probability of each, helping organizations to better understand the level of risk and uncertainty they face than they could be relying on averages. Organizations that use it can gain a better understanding of the likelihood of worst-case scenarios and plan accordingly.

Disadvantages:

But prescriptive analytics is not foolproof. It is only effective if organizations know what questions to ask and how to react to the answers. As such, it's only effective if its inputs are valid. If the input assumptions are invalid, the output results will not be accurate.

This form of data analytics is only suitable for short-term solutions. This means businesses shouldn't use prescriptive analytics to make any long-term ones. That's because it becomes more unreliable if more time is needed.

Not all prescriptive analytics providers are made the same. So it's important for businesses to carefully consider the technology and who provides it. Some may provide real, concrete results while others make the promise of big data and fail to deliver.

Pros:

- Prevents fraud, reduces risk, and increases efficiency among other things
- Simulates outcomes and shows probably of each

Cons:

- Only as effective as the inputs
- Not suitable for long-term predictions/solutions
- Some big data providers provide results while others don't

Examples of Prescriptive Analytics

Numerous data-intensive businesses and government agencies can benefit from using prescriptive analytics. This includes companies in the financial services and health care sectors, where the cost of human error is high. For instance, prescriptive analytics could be used to:

- Evaluate whether a local fire department should require residents to evacuate a particular area when a wildfire is burning nearby
- Predict whether an article on a particular topic will be popular with readers based on data about searches and social shares for related topics
- Adjust a worker training program in real-time based on how the worker is responding to each lesson
- The following are examples where prescriptive analytics can be used in various settings.

Prescriptive Analytics for Hospitals and Clinics:-

Prescriptive analytics can be used by hospitals and clinics to improve the outcomes for patients. It puts health care data in context to evaluate the cost-effectiveness of various procedures and treatments and to evaluate official clinical methods.

It can also be used to analyze which hospital patients have the highest risk of re-admission so that health care providers can do more, via patient education and doctor follow-up to stave off constant returns to the hospital or emergency room.

Prescriptive Analytics for Airlines:-

Suppose you are the chief executive officer (CEO) of an airline and you want to maximize your company's profits. Prescriptive analytics can help you do this by automatically adjusting ticket prices and availability based on numerous factors, including customer demand, weather, and gasoline prices.

Prescriptive Analytics in Banking:-

Banking is one of the industries that can benefit from prescriptive analytics the most. That's because companies in this sector are always trying to find ways to better serve their customers while ensuring they remain profitable. Applying prescriptive analytical tools can help the banking sector to:

- Create models for customer relationship management
- Improve ways to cross-sell and upsell products and services
- Recognize weaknesses that may result in losses, such as anti-money laundering (AML)
- Develop key security and regulatory initiatives like compliance reporting

Prescriptive Analytics in Marketing:-

Just like banking, data analytics is very critical in the marketing sector. Marketers can use prescriptive analytics to stay ahead of consumer trends. Using past trends and past performance can give internal and external marketing departments a competitive edge.

By employing prescriptive analytics, marketers can come up with effective campaigns that target specific customers at specific times like, say, advertising for a certain demographic during the Superbowl. Corporations can also identify how to engage different customers and how to effectively price and discount their products and services.

What Does Prescriptive Analytics Mean?

Prescriptive analytics is a form of data analytics that helps businesses make better and more informed decisions. Its goal is to help answer questions about what should be done to make something happen in the future. It analyzes raw data about past trends and performance through machine learning (so very little human input, if any at all) to determine possible courses of action or new strategies generally for the near term.

Why Is Prescriptive Analytics So Important for Businesses?

Prescriptive analytics is very important for businesses because it allows them to look at their past performance and ask themselves "What do we need to do to get to this point?" It is critical for businesses that are in need of a turnaround, especially those that are struggling with low performance metrics. Using this type of data analytics allows them to come up with strategies and a suitable course of action and, perhaps, how long it may take for them to achieve these goals.

6. Write five real-life questions that Power BI can solve.

1. Waiting On Figures

Having to hold off on major business decisions because you're unable to collect figures from a colleague or need to sift through numerous reports on a server to find what you need may have been considered normal routine back in the day, but business has progressed, and waiting for data reports is no longer acceptable. Power BI allows you to access your company's data analytics almost instantly. On top of that, it also makes the data easy to decipher with advanced visualizations which can be shared at the touch of a button.

2. Using Data From Old Reports

While being able to share documents (such as quarterly reports) with employees through the cloud was exciting when it first came out, it leaves too much room for human error. For example, it's not uncommon for documents shared in a cloud to be mislabeled, altered, and even deleted by accident. Even if stored in the correct location, finding reports this way can be incredibly time-consuming. All of these factors can lead to unnecessary mistakes and delays.

Using Power BI reduces the possibility of error by allowing reports to be run in seconds using only the most current data. This ensures that reports can't be altered or deleted and eliminates the time spent sifting through files to find the correct data.

3. Excessive Time Spent Preparing For Presentations

Whether it's for a meeting with potential investors, sharing the latest figures with your shareholders, or leading an internal meeting with your colleagues, presentation preparation can be tedious. On top of collecting all of the data you want to share, the information has to then be put into a visually appealing presentation. If you want to include charts, graphs, and images, presentations can take a significant amount of time to produce. In addition to that, by the time the presentation is complete, the data will already be outdated.

Power BI can quickly and easily create visual representations of your data and provide stunning and accurate presentations for your meetings. Using Power BI's automated reporting tools can save hours of preparation.

4. Being Unable To Find Specific Data Sets

Sifting through spreadsheets in search of specific data sets is time-consuming and inefficient. One of the most useful Power BI solutions is the ability to easily search for data and data-sets.

Power BI allows IT members to publish data catalogs for others to view. This makes it easier for you to find the data sets needed to perform an analysis. Additionally, using natural language technology and its Question & Answer feature provides a more natural experience to locate and better understand your BI.

5. Not Being Able To Determine Your Level Of Success

While business intelligence offers a lot of useful information, not everyone knows how to use it. Even with the numbers in plain view, it can be difficult to determine whether or not your business is successful and what areas need improvement. Using Power BI's Question & Answer feature, it's now possible to ask your software these questions using natural language. Ask what your profits were for that month or how customer subscription numbers compare to last year's.

The natural language technology makes it incredibly easy, and you don't have to worry about putting your questions in any specific format. The tool will also draw your attention to any problem areas that need to be addressed, ensuring you don't miss even the smallest opportunities to make a profit.