BUSINESS ANALYTICS
LECTURE NOTES
UNIT 1

INTRODUCTION TO BUSINESS ANALYTICS

Analytics and data science- Analytics life cycle-Types of Analytics-Business Problem definition- Data collection- Data preparation-Hypothesis generation-Modeling-Validation and Evaluation-Interpretation-Deployment and iteration.

Introduction:

Every organization across the world uses performance measures such as market share, profitability, sales growth, return on investments (ROI), customer satisfaction, and so on for quantifying, monitoring, and improving its performance.

Organisation should understand the KPI‘s (Key performance Indicators) and the factors that have impact on KPI‘s.

1. Analytics:

Analytics is a body of knowledge consisting of statistical, mathematical and operations research techniques, and Artificial intelligence techniques such as machine learning and deep learning algorithms, data collection and storage, data management processes such as data extraction, transformation and loading (ETL).

Many companies use analytics as a competitive strategy. A typical data-driven decision making process uses following steps:

1. Identify the problem or opportunity for value creation.
2. Identify the sources of data (primary & secondary)
3. Pre-process the data for issues such as missing and incorrect data.
4. Divide the data sets into subsets training and validation.
5. Build analytical models and identify the best model using model performance in validation data.
6. Implement solution/Decision/Develop product.

1.1 Data Science:

Data Science is nothing short of magic, and a Data Scientist is a magician who performs tricks with the data in his hat. Now, as magic is composed of different elements, similarly, Data Science is an interdisciplinary field. We can consider it to be an amalgamation of different fields such as **data manipulation, data visualization, statistical analysis**, and **Machine Learning**. Each of these sub-domains has equal importance.

Data Manipulation:

With the help of data manipulation techniques, you can find interesting insights from the raw data with minimal effort. Data manipulation is the process of organizing information to make it readable and understandable. Engineers perform data manipulation using data manipulation language (DML) capable of adding, deleting, or altering data. Data comes from various sources.

While working with disparate data, you need to organize, clean, and transform it to use it in your decision-making process. This is where data manipulation fits in. Data manipulation allows you to manage and integrate data helping drive actionable insights.

Data manipulation, also known as data preparation, enables users to turn static data into fuel for business intelligence and analytics. Many data scientists use data preparation software to organize data and generate reports, so non-analysts and other stakeholders can derive valuable information and make informed decisions.

Importance of Data manipulation

Data manipulation makes it easier for organizations to organize and analyse data as needed. It helps them perform vital business functions such as analyzing trends, buyer behaviour, and drawing insights from their financial data.

Data manipulation offers several advantages to businesses, including:

- **Consistency:** Data manipulation maintains consistency across data accumulated from different sources, giving businesses a unified view that helps them make better, more informed decisions.
- **Usability:** Data manipulation allows users to cleanse and organize data and use it more efficiently.
- **Forecasting:** Data manipulation enables businesses to understand historical data and helps them prepare future forecasts, especially in financial data analysis.
- **Cleansing:** Data manipulation helps clear unwanted data and keep information that matters. Enterprises can clean up records, isolate, and even reduce unnecessary variables, and focus on the data they need.

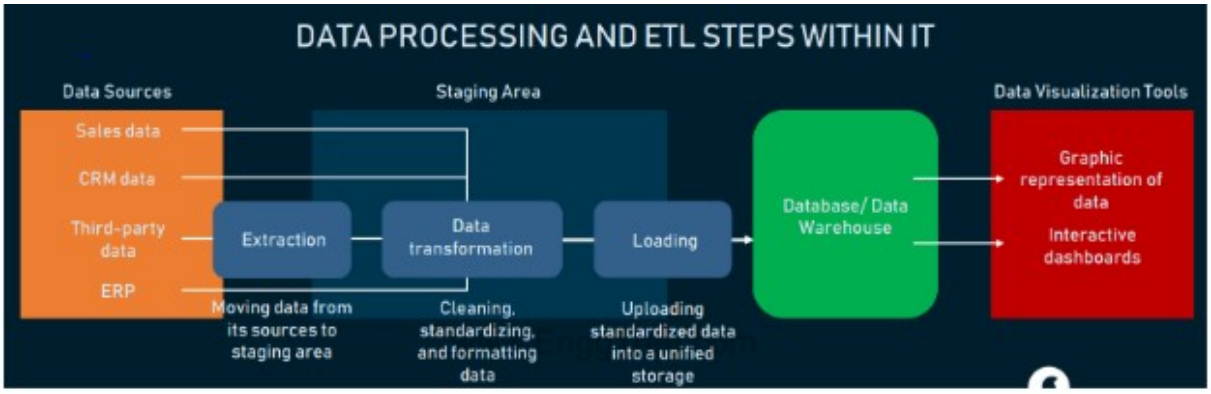
Data visualization:

It is the practice of converting raw information (text, numbers, or symbols) into a graphic format. The data is visualized with a clear purpose: to show logical correlations between units, and define inclinations, tendencies, and patterns. Depending on the type of logical connection and the data itself, visualization can be done in a suitable format. So, it‘s dead simple, any analytical report contains examples of data interpretations like pie charts, comparison bars, demographic maps, and much more.

As we‘ve mentioned, a data representation tool is just the user interface of the whole business intelligence system. Before it can be used for creating visuals, the data goes through

a long process. This is basically a description of how Business Analytics works, so we'll break it down into the stages shortly:

1. First things first, you should define data sources and data types that will be used. Then transformation methods and database qualities are determined.
2. Following that, the data is sourced from its initial storages, for example, Google Analytics, ERP, CRM, or SCM system.
3. Using API channels, the data is moved to a staging area where it is transformed. Transformation assumes data cleaning, mapping, and standardizing to a unified format.
4. Further, cleaned data can be moved into a storage: a usual database or data warehouse. To make it possible for the tools to read data, the original base language of datasets can also be rewritten.



Business Intelligence Data processing in a nutshell

Common types of data visualizations

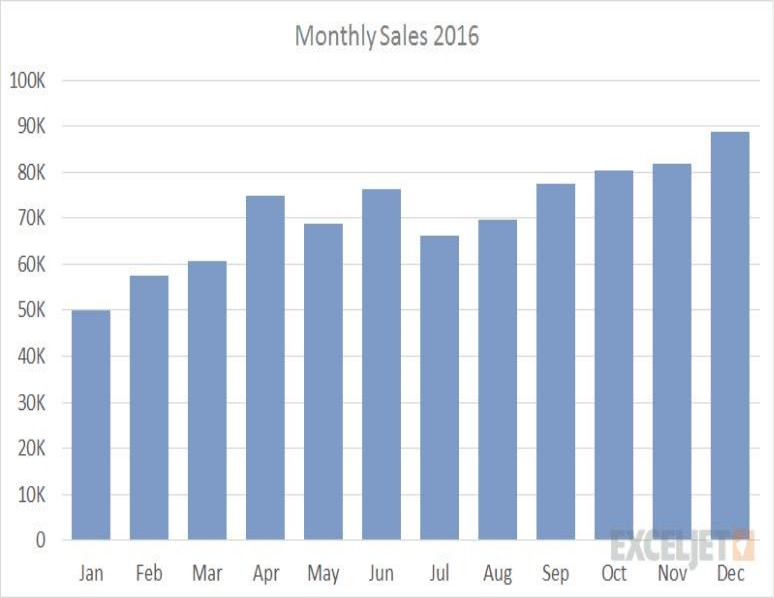
Each type of visual corresponds precisely to the idea of what data it can interpret, and what type of connection (relationship, comparison, composition, or distribution) it shows better. Let's look at the most common types of visualizations you encounter in Business Analytics in general.

Bar chart

A bar chart is one of the basic ways to compare data units to each other. Because of its simple graphic form, a bar chart is often used in Business Analytics as an interactive page element.

Bar charts are versatile enough to be modified and show more complex data models. The bars can be structured in clusters or be stacked, to depict distribution across market segments, or subcategories of items. The same goes for horizontal bar charts, fitting more for long data labels to be placed on the bars.

When to use: comparing objects, numeric information. Use horizontal charts to fit long data labels. Place stacks in bars to break each object into segments for a more detailed comparison.



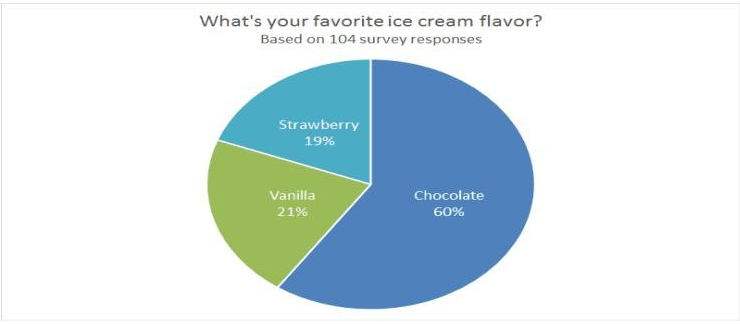
Monthly sales bar chart

Pie chart

One more common type of chart we see everywhere, is a pie chart.

This type of chart is used in any marketing or sales department, because it makes it easy to demonstrate the composition of objects or unit-to-unit comparison.

When to use: composition of an object, comparing parts to the whole object.



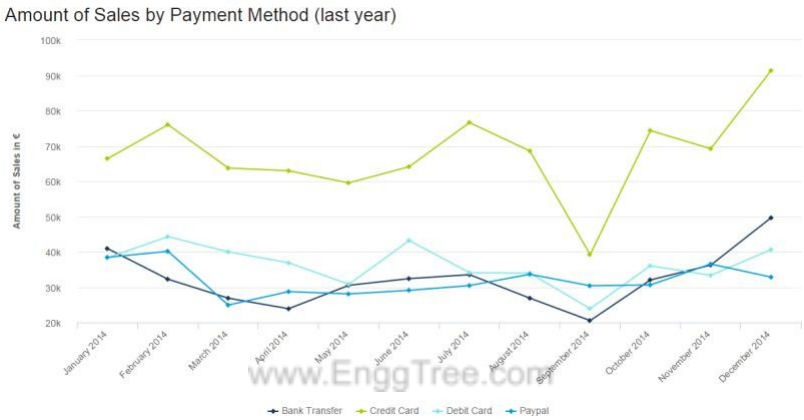
Pie chart showing percentage correlation of ice cream flavour preference

Line Graph

This type of visual utilizes a horizontal axis and a vertical axis to depict the value of a unit over time.

Line graphs can also be combined with bar charts to represent data from multiple dimensions.

When to use: object value on the timeline, depicting tendencies in behavior over time.

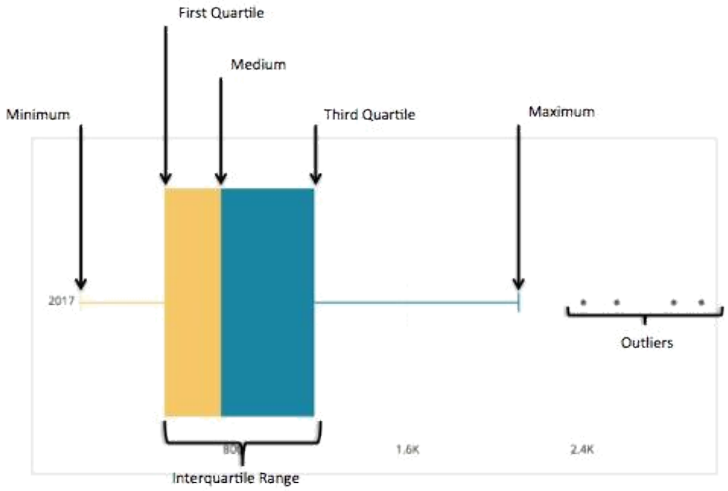


Sales analysis by payment methods

Box plot

At first glance, a box plot looks pretty complicated. But if we look closer at the example, it becomes evident that it depicts quarters in a horizontal fashion.

> Our main elements here are minimum, maximum, and the median placed in between the first and third quartile. What a box shows is the distribution of objects, and their deviation from the median.**When to use**: Distribution of the complex object, deviation from the median value.



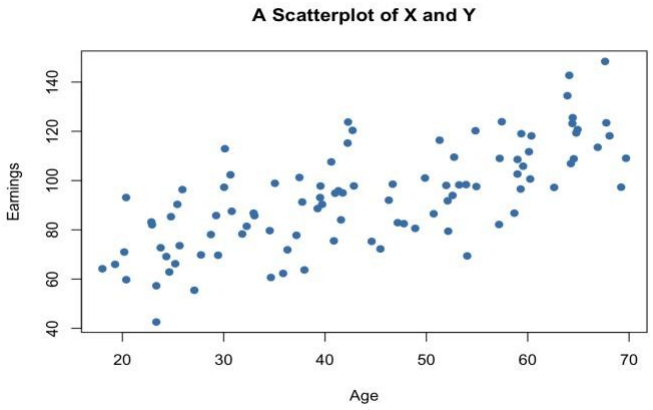
Box plot divided into 5 quartiles, while outliers are shown as object that fall out of distribution area

Scatter plot

This type of visualization is built on X and Y axes. Between them, there are dots placed around, defining objects. The position of a dot on the graph denotes which qualities it has.

As in the case of line graphs, dots placed between the axes are noticed in a split second. The only limitation of this type of visualization is the number of axes.

When to use: showing distribution of objects, defining the quality of each object on the



graph.

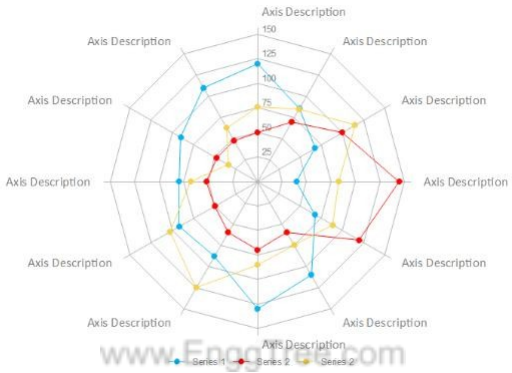
A sad scatterplot showing the inability of young people to earn money

Radar or spider chart

This type of chart is basically a line chart drawn in radial fashion. It has a spider web form that is created by multiple axes and variables.

Its purpose is the same as for a line chart. But because of the number of axes, you can compare units from various angles and show the inclinations graphically.

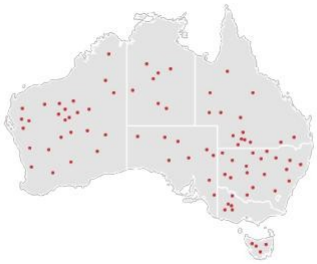
When to use: describing data qualities, comparing multiple objects to each other through different dimensions.



Spider chart structure

Dot map or density map

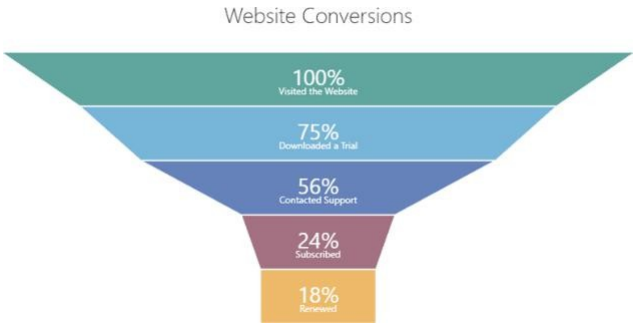
Superimposing a visualization over the map works for data‘s geographical domain. Density maps are built with the help of dots placed on the map, marking the location of each unit.



A simple representation of a dot map

Funnel charts

These are perfect for showing narrowing correlations between different groups of items. In most cases, funnels will utilize both geometric form and colour coding to differentiate items.



The example shows conversion results starting from total traffic number and the number of subscribers

This type of chart is also handy when there are multiple stages in the process. On the example above, we can see that after the ―Contacted Support‖ stage, the number of subscribers has been reduced.

When to use: depicting processual stages with the narrowing percentage of value/objects

In choosing the type of visualization, make sure you clearly understand the following points:

1. **Specifics of your data set**: domain of knowledge or department in your company
2. **Audience**: people you want to present the information to
3. **Connection logic**: comparison of objects, distribution, relationship, process description, etc.
4. **Output**: simply, the reason for showing this information to somebody

1.1.3 What is statistical analysis?

Statistical analysis is the process of collecting and analyzing samples of data to uncover patterns and trends and predict what could happen next to make better and more scientific decisions.

Once the data is collected, statistical analysis can be used for many things in your business. Some include:

- Summarizing and presenting the data in a graph or chart to present key findings
- Discovering crucial measures within the data, like the mean
- Calculating if the data is slightly clustered or spread out, which also determines similarities.
- Making future predictions based on past behavior

- Testing a hypothesis from an experiment

There are several ways that businesses can use statistical analysis to their advantage. Some of these ways include identifying who on your sales staff is performing poorly, finding trends in customer data, narrowing down the top operating product lines, conducting financial audits, and getting a better understanding of how sales performance can vary in different regions of the country.

Just like any other thing in business, there is a process involved in business analytics as well. Business analytics needs to be systematic, organized, and include step-by-step actions to have the most optimized result at the end with the least amount of discrepancies.

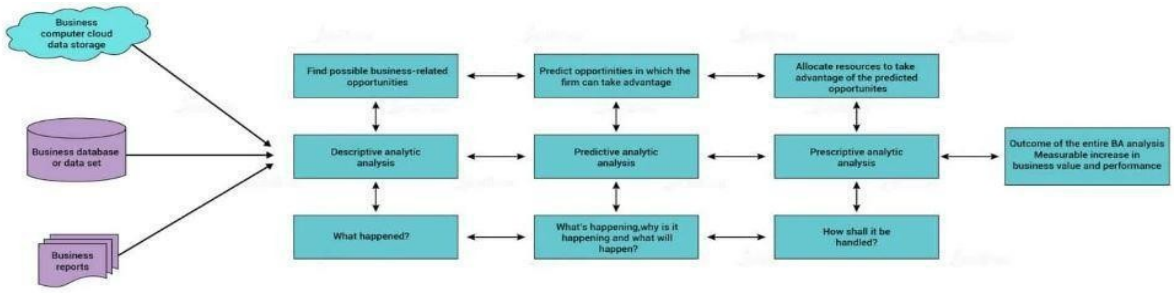
Now, let us dive into the steps involved in business analytics:

- **Business Problem Framing:** In this step, we basically find out what business problem we are trying to solve, e.g., when we are looking to find out why the supply chain isn‘t as effective as it should be or why we are losing sales. This discussion generally happens with stakeholders when they realize inefficiency in any part of the business.
- **Analytics Problem Framing:** Once we have the problem statement, what we need to think of next is how analytics can be done for that business analytics problem. Here, we look for metrics and specific points that we need to analyze.
- **Data:** The moment we identify the problem in terms of what needs to be analyzed, the next thing that we need is data, which needs to be analyzed. In this step, not only do we obtain data from various data sources but we also clean the data; if the raw data is corrupted or has false values, we remove those problems and convert the data into usable form.
- **Methodology selection and model building:** Once the data gets ready, the tricky part begins. At this stage, we need to determine what methods have to be used and what metrics are the crucial ones. If required, the team has to build custom models to find out the specific methods that are suited to respective operations. Many times, the kind of data we possess also dictates the methodology that can be used to do business analytics. Most organizations make multiple models and compare them based on the decided-upon crucial metrics.
- **Deployment:** Post the selection of the model and the statistical ways of analyzing data for the solution, the next thing we need to do is to test the solution in a real-time scenario. For that, we deploy the models on the data and look for different kinds of insights. Based on the metrics and data highlights, we need to decide the optimum strategy to solve our problem and implement a solution effectively. Even in this phase of business analytics, we will compare the expected output with the real-time output. Later, based on this, we will decide if there is a need to reiterate and modify the solution or if we can go on with the implementation of the same.

2. Business Analytics Process

The Business Analytics process involves asking questions, looking at data, and manipulating it to find the required answers. Now, every organization has different ways to execute this process as all of these organizations work in different sectors and value different metrics more than the others based on their specific business model.

Since the approach to business is different for different organizations, their solutions and their ways to reach the solutions are also different. Nonetheless, all of the actions that they do can be classified and generalized to understand their approach. The image given below demonstrates the steps in Business Analytics process of a firm:



2.1 Six Steps in the Business Analytics Lifecycle

Step 1: Identifying the Problem

The first step of the process is identifying the business problem. The problem could be an actual crisis; it could be something related to recognizing business needs or optimizing current processes. This is a crucial stage in Business Analytics as it is important to clearly understand what the expected outcome should be. When the desired outcome is determined, it is further broken down into smaller goals. Then, business stakeholders decide the relevant data required to solve the problem. Some important questions must be answered in this stage, such as: What kind of data is available? Is there sufficient data? And so on.

Step 2: Exploring Data

Once the problem statement is defined, the next step is to gather data (if required) and, more importantly, cleanse the data—most organizations would have plenty of data, but not all data points would be accurate or useful. Organizations collect huge amounts of data through different methods, but at times, junk data or empty data points would be present in the dataset. These faulty pieces of data can hamper the analysis. Hence, it is very important to clean the data that has to be analyzed.

To do this, you must do computations for the missing data, remove outliers, and find new variables as a combination of other variables. You may also need to plot time series graphs as they generally indicate patterns and outliers. It is very important to remove outliers as they

can have a heavy impact on the accuracy of the model that you create. Moreover, cleaning the data helps you get a better sense of the dataset.

Step 3: Analysis

Once the data is ready, the next thing to do is analyze it. Now to execute the same, there are various kinds of statistical methods (such as hypothesis testing, correlation, etc.) involved to find out the insights that you are looking for. You can use all of the methods for which you have the data.

The prime way of analyzing is pivoting around the target variable, so you need to take into account whatever factors that affect the target variable. In addition to that, a lot of assumptions are also considered to find out what the outcomes can be. Generally, at this step, the data is sliced, and the comparisons are made. Through these methods, you are looking to get actionable insights.

Step 4: Prediction and Optimization

Gone are the days when analytics was used to react. In today‘s era, Business Analytics is all about being proactive. In this step, you will use prediction techniques, such as neural networks or decision trees, to model the data. These prediction techniques will help you find out hidden insights and relationships between variables, which will further help you uncover patterns on the most important metrics. By principle, a lot of models are used simultaneously, and the models with the most accuracy are chosen. In this stage, a lot of conditions are also checked as parameters, and answers to a lot of _what if…?‘ questions are provided.

Step 5: Making a Decision and Evaluating the Outcome

From the insights that you receive from your model built on target variables, a viable plan of action will be established in this step to meet the organization‘s goals and expectations. The said plan of action is then put to work, and the waiting period begins. You will have to wait to see the actual outcomes of your predictions and find out how successful you were in your endeavors. Once you get the outcomes, you will have to measure and evaluate them.

Step 6: **Optimizing and Updating**

Post the implementation of the solution, the outcomes are measured as mentioned above. If you find some methods through which the plan of action can be optimized, then those can be implemented. If that is not the case, then you can move on with registering the outcomes of the entire process. This step is crucial for any analytics in the future because you will have an ever-improving database. Through this database, you can get closer and closer to maximum optimization. In this step, it is also important to evaluate the ROI (return on investment). Take a look at the diagram above of the life cycle of business analytics.

2.3 TYPES OF ANALYTICS :

For different stages of business analytics huge amount of data is processed at various steps. Depending on the stage of the workflow and the requirement of data analysis, there are four main kinds of analytics – descriptive, diagnostic, predictive and prescriptive. These four types together answer everything a company needs to know- from what‘s going on in the company to what solutions to be adopted for optimising the functions.
The four types of analytics are usually implemented in stages and no one type of analytics is said to be better than the other. They are interrelated and each of these offers a different insight. With data being important to so many diverse sectors- from manufacturing to energy grids, most of the companies rely on one or all of these types of analytics. With the right choice of analytical techniques, big data can deliver richer insights for the companies

Before diving deeper into each of these, let‘s define the four types of analytics:

1) **Descriptive Analytics**: Describing or summarising the existing data using existing business intelligence tools to better understand what is going on or what has happened.
2) **Diagnostic Analytics**: Focus on past performance to determine what happened and why. The result of the analysis is often an analytic dashboard.
3) **Predictive Analytics**: Emphasizes on predicting the possible outcome using statistical models and machine learning techniques.
4) **Prescriptive Analytics**: It is a type of predictive analytics that is used to recommend one or more course of action on analyzing the data.
Let‘s understand these in a bit more depth.

2.3.1. Descriptive Analytics

This can be termed as the simplest form of analytics. The mighty size of big data is beyond human comprehension and the first stage hence involves crunching the data into understandable chunks. The purpose of this analytics type is just to summarise the findings and understand what is going on.

Among some frequently used terms, what people call as advanced analytics or business intelligence is basically usage of descriptive statistics (arithmetic operations, mean, median, max, percentage, etc.) on existing data. It is said that 80% of business analytics mainly involves descriptions based on aggregations of past performance. It is an important step to make raw data understandable to investors, shareholders and managers. This way it gets easy to identify and address the areas of strengths and weaknesses such that it can help in strategizing.The two main techniques involved are data aggregation and data mining stating that this method is purely used for understanding the underlying behavior and not to make any estimations. By mining historical data, companies can analyze the consumer behaviors and engagements with their businesses that could be helpful in targeted marketing, service improvement, etc. The tools used in this phase are MS Excel, MATLAB, SPSS, STATA, etc

2.3.2 Diagnostic Analytics

Diagnostic analytics is used to determine why something happened in the past. It is characterized by techniques such as drill-down, data discovery, data mining and correlations. Diagnostic analytics takes a deeper look at data to understand the root causes of the events. It is helpful in determining what factors and events contributed to the outcome. It mostly uses probabilities, likelihoods, and the distribution of outcomes for the analysis.

In a time series data of sales, diagnostic analytics would help you understand why the sales have decrease or increase for a specific year or so. However, this type of analytics has a limited ability to give actionable insights. It just provides an understanding of causal relationships and sequences while looking backward.

A few techniques that uses diagnostic analytics include attribute importance, principle components analysis, sensitivity analysis, and conjoint analysis. Training algorithms for classification and regression also fall in this type of analytics.

2.3.3 Predictive Analytics

As mentioned above, predictive analytics is used to predict future outcomes. However, it is important to note that it cannot predict if an event will occur in the future; it merely forecasts what are the probabilities of the occurrence of the event. A predictive model builds on the preliminary descriptive analytics stage to derive the possibility of the outcomes.

The analytics is found in sentiment analysis where all the opinions posted on social media are collected and analyzed (existing text data) to predict the person‘s sentiment on a particular subject as being- positive, negative or neutral (future prediction).

Hence, predictive analytics includes building and validation of models that provide accurate predictions. Predictive analytics relies on machine learning algorithms like random forests, SVM, etc. and statistics for learning and testing the data. Usually, companies need trained data scientists and machine learning experts for building these models. The most popular tools for predictive analytics include Python, R, RapidMiner, etc.

The prediction of future data relies on the existing data as it cannot be obtained otherwise. If the model is properly tuned, it can be used to support complex forecasts in sales and marketing. It goes a step ahead of the standard BI in giving accurate predictions.

2.3.4 Prescriptive Analytics

The basis of this analytics is predictive analytics but it goes beyond the three mentioned above to suggest the future solutions. It can suggest all favorable outcomes according to a specified course of action and also suggest various course of actions to get to a particular outcome. Hence, it uses a strong feedback system that constantly learns and updates the relationship between the action and the outcome.

The computations include optimisation of some functions that are related to the desired outcome. For example, while calling for a cab online, the application uses GPS to connect you to the correct driver from among a number of drivers found nearby. Hence, it optimises the distance for faster arrival time. Recommendation engines also use prescriptive analytics.

The other approach includes simulation where all the key performance areas are combined to design the correct solutions. It makes sure whether the key performance metrics are included in the solution. The optimisation model will further work on the impact of the previously made forecasts. Because of its power to suggest favorable solutions, prescriptive analytics is the final frontier of advanced analytics or data science, in today‘s term.

The four techniques in analytics may make it seem as if they need to be implemented sequentially. However, in most scenarios, companies can jump directly to prescriptive analytics. As for most of the companies, they are aware of or are already implementing descriptive analytics but if one has identified the key area that needs to be optimised and worked upon, they must employ prescriptive analytics to reach the desired outcome.

According to research, prescriptive analytics is still at the budding stage and not many firms have completely used its power. However, the advancements in predictive analytics will surely pave the way for its development.

3. Business Problem Definition:

Problem-solving in business is defined as implementing processes that reduce or remove obstacles that are preventing you or others from accomplishing operational and strategic business goals.

In business, a problem is a situation that creates a gap between the desired and actual outcomes. In addition, a true problem typically does not have an immediately obvious resolution.

Business problem-solving works best when it is approached through a consistent system in which individuals:

- Identify and define the problem
- Prioritize the problem based on size, potential impact, and urgency
- Complete a root-cause analysis
- Develop a variety of possible solutions
- Evaluate possible solutions and decide which is most effective
- Plan and implement the solution

3.1 Why Problem Solving Is Important in Business

Understanding the importance of problem-solving skills in the workplace will help you develop as a leader. Problem-solving skills will help you resolve critical issues and conflicts that you come across. Problem-solving is a valued skill in the workplace because it allows you to:

- Apply a standard problem-solving system to all challenges
- Find the root causes of problems
- Quickly deal with short-term business interruptions
- Form plans to deal with long-term problems and improve the organization
- See challenges as opportunities
- Keep your cool during challenges

3.2 How to Solve Business Problems Effectively

There are many different problem-solving skills, but most can be broken into general steps. Here is a four-step method for business problem solving:

1) Identify the Details of the Problem: Gather enough information to accurately define the problem. This can include data on procedures being used, employee actions, relevant workplace rules, and so on. Write down the specific outcome that is needed, but don‘t assume what the solution should be.

2) Creatively Brainstorm Solutions: Alone or with a team, state every solution you can think of. You‘ll often need to write them down. To get more solutions, brainstorm with the employees who have the greatest knowledge of the issue.

3) Evaluate Solutions and Make a Decision: Compare and contrast alternative solutions based on the feasibility of each one, including the resources needed to implement it and the return on investment of each one. Finally, make a firm decision on one solution that clearly addresses the root cause of the problem.

4) Take Action: Write up a detailed plan for implementing the solution, get the necessary approvals, and put it into action.

4 . WHAT IS DATA COLLECTION?

Data collection is the methodological process of gathering information about a specific subject. It‘s crucial to ensure your data is complete during the collection phase and that it‘s collected legally and ethically. If not, your analysis won‘t be accurate and could have far-reaching consequences.

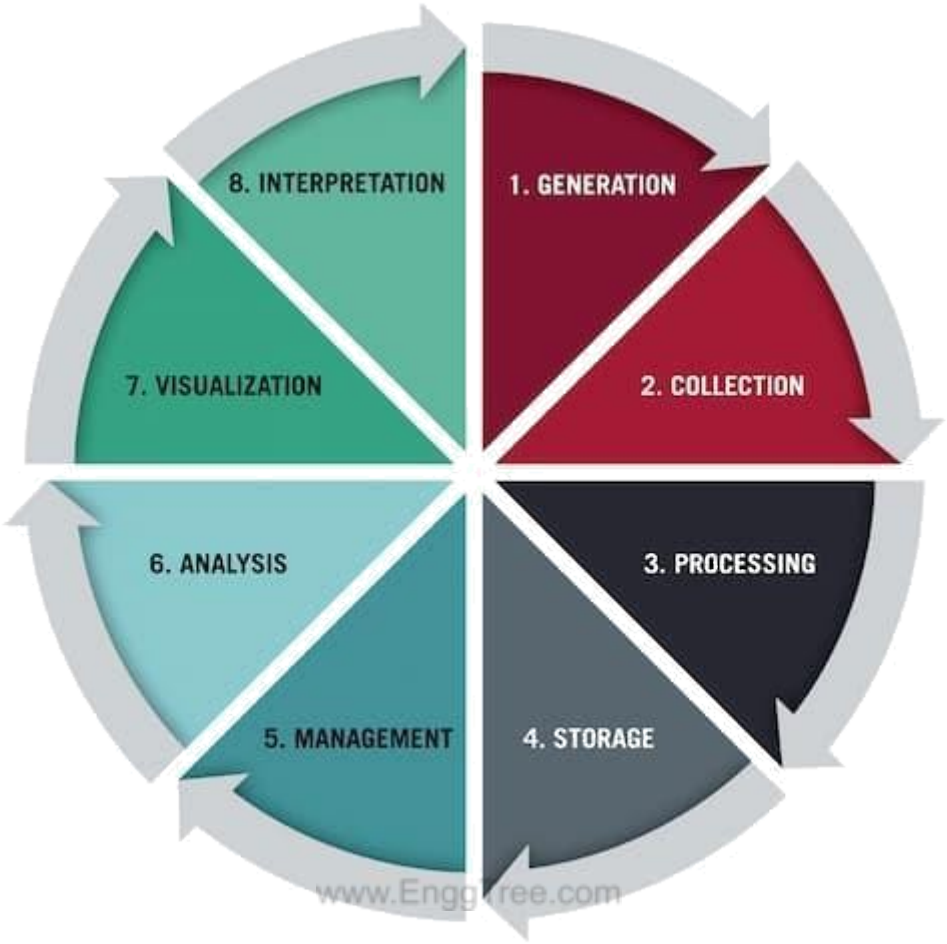
In general, there are three types of consumer data:

- First-party data, which is collected directly from users by your organization
- Second-party data, which is data shared by another organization about its customers (or its first-party data)
- Third-party data, which is data that‘s been aggregated and rented or sold by organizations that don‘t have a connection to your company or users

Although there are use cases for second- and third-party data, first-party data (data you‘ve collected yourself) is more valuable because you receive information about how your audience behaves, thinks, and feels—all from a trusted source.

Data can be qualitative (meaning contextual in nature) or quantitative (meaning numeric in nature). Many data collection methods apply to either type, but some are better suited to one over the other.

In the data life cycle, data collection is the second step. After data is generated, it must be collected to be of use to your team. After that, it can be processed, stored, managed, analyzed, and visualized to aid in your organization‘s decision-making.



Before collecting data, there are several factors you need to define:

- The question you aim to answer
- The data subject(s) you need to collect data from
- The collection timeframe
- The data collection method(s) best suited to your needs

The data collection method you select should be based on the question you want to answer, the type of data you need, your timeframe, and your company‘s budget. Explore the options in the next section to see which data collection method is the best fit.

4.1 SEVEN DATA COLLECTION METHODS USED IN BUSINESS ANALYTICS

1. Surveys

Surveys are physical or digital questionnaires that gather both qualitative and quantitative data from subjects. One situation in which you might conduct a survey is gathering attendee feedback after an event. This can provide a sense of what attendees enjoyed, what they wish

was different, and areas you can improve or save money on during your next event for a similar audience.

Because they can be sent out physically or digitally, surveys present the opportunity for distribution at scale. They can also be inexpensive; running a survey can cost nothing if you use a free tool. If you wish to target a specific group of people, partnering with a market research firm to get the survey in the hands of that demographic may be worth the money.

Something to watch out for when crafting and running surveys is the effect of bias, including:

- **Collection bias**: It can be easy to accidentally write survey questions with a biased lean. Watch out for this when creating questions to ensure your subjects answer honestly and aren‘t swayed by your wording.
- **Subject bias**: Because your subjects know their responses will be read by you, their answers may be biased toward what seems socially acceptable. For this reason, consider pairing survey data with behavioral data from other collection methods to get the full picture.

2. Transactional Tracking

Each time your customers make a purchase, tracking that data can allow you to make decisions about targeted marketing efforts and understand your customer base better.

Often, e-commerce and point-of-sale platforms allow you to store data as soon as it‘s generated, making this a seamless data collection method that can pay off in the form of customer insights.

3. Interviews and Focus Groups

Interviews and focus groups consist of talking to subjects face-to-face about a specific topic or issue. Interviews tend to be one-on-one, and focus groups are typically made up of several people. You can use both to gather qualitative and quantitative data.

Through interviews and focus groups, you can gather feedback from people in your target audience about new product features. Seeing them interact with your product in real-time and recording their reactions and responses to questions can provide valuable data about which product features to pursue.

As is the case with surveys, these collection methods allow you to ask subjects anything you want about their opinions, motivations, and feelings regarding your product or brand. It also introduces the potential for bias. Aim to craft questions that don‘t lead them in one particular direction.

One downside of interviewing and conducting focus groups is they can be time-consuming and expensive. If you plan to conduct them yourself, it can be a lengthy process. To avoid this, you can hire a market research facilitator to organize and conduct interviews on your behalf.

4. Observation

Observing people interacting with your website or product can be useful for data collection because of the candour it offers. If your user experience is confusing or difficult, you can witness it in real-time.

Yet, setting up observation sessions can be difficult. You can use a third-party tool to record users‘ journeys through your site or observe a user‘s interaction with a beta version of your site or product.

While less accessible than other data collection methods, observations enable you to see first hand how users interact with your product or site. You can leverage the qualitative and quantitative data gleaned from this to make improvements and double down on points of success.

5. Online Tracking

To gather behavioural data, you can implement pixels and cookies. These are both tools that track users‘ online behaviour across websites and provide insight into what content they‘re interested in and typically engage with.

You can also track users‘ behavior on your company‘s website, including which parts are of the highest interest, whether users are confused when using it, and how long they spend on product pages. This can enable you to improve the website‘s design and help users navigate to their destination.

Inserting a pixel is often free and relatively easy to set up. Implementing cookies may come with a fee but could be worth it for the quality of data you‘ll receive. Once pixels and cookies are set, they gather data on their own and don‘t need much maintenance, if any.

It‘s important to note: Tracking online behavior can have legal and ethical privacy implications. Before tracking users‘ online behavior, ensure you‘re in compliance with local and industry data privacy standards.

6. Forms

Online forms are beneficial for gathering qualitative data about users, specifically demographic data or contact information. They're relatively inexpensive and simple to set up, and you can use them to gate content or registrations, such as webinars and email newsletters.

You can then use this data to contact people who may be interested in your product, build out demographic profiles of existing customers, and in remarketing efforts, such as email workflows and content recommendations

7. Social Media Monitoring

Monitoring your company's social media channels for follower engagement is an accessible way to track data about your audience's interests and motivations. Many social media platforms have analytics built in, but there are also third-party social platforms that give more detailed, organized insights pulled from multiple channels.

You can use data collected from social media to determine which issues are most important to your followers. For instance, you may notice that the number of engagements dramatically increases when your company posts about its sustainability efforts.

5. What Is Data Preparation?

Data preparation, also sometimes called ―pre-processing,‖ is the act of cleaning and consolidating raw data prior to using it for business analysis. It might not be the most celebrated of tasks, but careful data preparation is a key component of successful data analysis.

Doing the work to properly validate, clean, and augment raw data is essential to draw accurate, meaningful insights from it. The validity and power of any business analysis produced is only as good as the data preparation done in the early stages.

5.1 Why Is Data Preparation Important?

The decisions that business leaders make are only as good as the data that supports them. Careful and comprehensive data preparation ensures analysts trust, understand, and ask better questions of their data, making their analyses more accurate and meaningful. From more meaningful data analysis comes better insights and, of course, better outcomes.

To drive the deepest level of analysis and insight, successful teams and organizations must implement a data preparation strategy that prioritizes:

- **Accessibility:** Anyone — regardless of skillset — should be able to access data securely from a single source of truth
- **Transparency:** Anyone should be able to see, audit, and refine any step in the end-to-end data preparation process that took place
- **Repeatability:** Data preparation is notorious for being time-consuming and repetitive, which is why successful data preparation strategies invest in solutions built for repeatability.

With the right solution in hand, analysts and teams can streamline the data preparation process, and instead, spend more time getting to valuable business insights and outcomes, faster.

5.2 What Steps Are Involved in Data Preparation Processes?

The data preparation process can vary depending on industry or need, but typically consists of the following steps:

- **Acquiring data:** Determining what data is needed, gathering it, and establishing consistent access to build powerful, trusted analysis
- **Exploring data:** Determining the data‘s quality, examining its distribution, and analyzing the relationship between each variable to better understand how to compose an analysis
- **Cleansing data:** Improving data quality and overall productivity to craft error-proof insights
- **Transforming data:** Formatting, orienting, aggregating, and enriching the datasets used in an analysis to produce more meaningful insights

While data preparation processes build upon each other in a serialized fashion, it‘s not always linear. The order of these steps might shift depending on the data and questions being asked. It‘s common to revisit a previous step as new insights are uncovered or new data sources are integrated into the process.

The entire data preparation process can be notoriously time-intensive, iterative, and repetitive. That‘s why it‘s important to ensure the individual steps taken can be easily understood, repeated, revisited, and revised so analysts can spend less time prepping and more time analyzing.

Below is a deeper look at each part of the process.

5.2.1 Acquire Data

The first step in any data preparation process is acquiring the data that an analyst will use for their analysis. It‘s likely that analysts rely on others (like IT) to obtain data for their analysis, likely from an enterprise software system or data management system. IT will usually deliver this data in an accessible format like an Excel document or CSV.

Modern analytic software can remove the dependency on a data-wrangling middleman to tap right into trusted sources like SQL, Oracle, SPSS, AWS, Snowflake, Salesforce, and Marketo. This means analysts can acquire the critical data for their regularly-scheduled reports as well as novel analytic projects on their own.

5.2.2 Explore Data

Examining and profiling data helps analysts understand how their analysis will begin to take shape. Analysts can utilize visual analytics and summary statistics like range, mean, and standard deviation to get an initial picture of their data. If data is too large to work with easily, segmenting it can help.

During this phase, analysts should also evaluate the quality of their dataset. Is the data complete? Are the patterns what was expected? If not, why? Analysts should discuss what they‘re seeing with the owners of the data, dig into any surprises or anomalies, and consider if it‘s even possible to improve the quality. While it can feel disappointing to disqualify a dataset based on poor quality, it is a wise move in the long run. Poor quality is only amplified as one moves through the data analytics processes

5.2.3 Cleanse Data

During the exploration phase, analysts may notice that their data is poorly structured and in need of tidying up to improve its quality. This is where data cleansing comes into play. Cleansing data includes:

- Correcting entry errors
- Removing duplicates or outliers
- Eliminating missing data
- Masking sensitive or confidential information like names or addresses

5.2.4 Transform Data

Data comes in many shapes, sizes, and structures. Some is analysis-ready, while other datasets may look like a foreign language.

Transforming data to ensure that it‘s in a format or structure that can answer the questions being asked of it is an essential step to creating meaningful outcomes. This will vary based on the software or language that an analysts uses for their data analysis.

A couple of common examples of data transformations are:

- Pivoting or changing the orientation of data
- Converting date formats
- Aggregating sales and performance data across time

6.HYPOTHESIS GENERATION OR TESTING:

Hypothesis testing is the act of testing a hypothesis or a supposition in relation to a statistical parameter. Analysts implement hypothesis testing in order to test if a hypothesis is plausible or not.In data science and statistics, hypothesis testing is an important step as it involves the verification of an assumption that could help develop a statistical parameter. For instance, a researcher establishes a hypothesis assuming that the average of all odd numbers is an even number.

In order to find the plausibility of this hypothesis, the researcher will have to test the hypothesis using hypothesis testing methods. Unlike a hypothesis that is ‗supposed‘ to stand true on the basis of little or no evidence, hypothesis testing is required to have plausible evidence in order to establish that a statistical hypothesis is true.

6.1 Types of Hypotheses

In data sampling, different types of hypothesis are involved in finding whether the tested samples test positive for a hypothesis or not. In this segment, we shall discover the different types of hypotheses and understand the role they play in hypothesis testing.

6.1.1 Alternative Hypothesis

Alternative Hypothesis (H1) or the research hypothesis states that there is a relationship between two variables (where one variable affects the other). The alternative hypothesis is the main driving force for hypothesis testing.

It implies that the two variables are related to each other and the relationship that exists between them is not due to chance or coincidence.

When the process of hypothesis testing is carried out, the alternative hypothesis is the main subject of the testing process. The analyst intends to test the alternative hypothesis and verifies its plausibility.

6.1.2 Null Hypothesis

The Null Hypothesis (H0) aims to nullify the alternative hypothesis by implying that there exists no relation between two variables in statistics. It states that the effect of one variable on the other is solely due to chance and no empirical cause lies behind it.

The null hypothesis is established alongside the alternative hypothesis and is recognized as important as the latter. In hypothesis testing, the null hypothesis has a major role to play as it influences the testing against the alternative hypothesis.

6.1.3 Non-Directional Hypothesis

The Non-directional hypothesis states that the relation between two variables has no direction. Simply put, it asserts that there exists a relation between two variables, but does not recognize the direction of effect, whether variable A affects variable B or vice versa.

6.1.4 Directional Hypothesis

The Directional hypothesis, on the other hand, asserts the direction of effect of the relationship that exists between two variables.

Herein, the hypothesis clearly states that variable A affects variable B, or vice versa.

6.1.5 Statistical Hypothesis

A statistical hypothesis is a hypothesis that can be verified to be plausible on the basis of statistics. By using data sampling and statistical knowledge, one can determine the plausibility of a statistical hypothesis and find out if it stands true or not.

6.2 Performing Hypothesis Testing

Now that we have understood the types of hypotheses and the role they play in hypothesis testing, let us now move on to understand the process in a better manner.

In hypothesis testing, a researcher is first required to establish two hypotheses - alternative hypothesis and null hypothesis in order to begin with the procedure.

To establish these two hypotheses, one is required to study data samples, find a plausible pattern among the samples, and pen down a statistical hypothesis that they wish to test.

A random population of samples can be drawn, to begin with hypothesis testing. Among the two hypotheses, alternative and null, only one can be verified to be true. Perhaps the presence of both hypotheses is required to make the process successful.

At the end of the hypothesis testing procedure, either of the hypotheses will be rejected and the other one will be supported. Even though one of the two hypotheses turns out to be true, no hypothesis can ever be verified 100%.

6.2.1 Seven steps of hypothesis testing

Let us perform hypothesis testing through the following 7 steps of the procedure:

Step 1 : Specify the null hypothesis and the alternative hypothesis

Step 2 : What level of significance?

Step 3 : Which test and test statistic to be performed?

Step 4 : State the decision rule

Step 5 : Use the sample data to calculate the test statistic

Step 6 : Use the test statistic result to make a decision

Step 7 : Interpret the decision in the context of the original question

To guide us through the steps, let us use the following example.

Assume a food laboratory analyzed a certified reference freeze-dried food material with a stated sodium (Na) content of 250 mg/kg. It carried out 7 repeated analyses and obtained a mean value of 274 mg/kg of sodium with a sample standard deviation of 21 mg/kg. Now we want to know if the mean value of 274 mg/kg is significantly larger than the stated amount of 250 mg/kg. If so, we will conclude that the reported results of this batch of analysis were of bias and had consistently given higher values than expected.

Step 1 : Specify the null hypothesis and the alternative hypothesis

The **null hypothesis** *Ho* is the statement that we are interested in testing. In this case, the null condition is that the mean value is 250 mg/kg of sodium.

The **alternative hypothesis** *H1* is the statement that we accept if our sample outcome leads us to reject the null hypothesis. In our case, the alternative hypothesis is that the mean value is not equal to 250 mg/kg of sodium. In other words, it can be significantly larger or smaller than the value of 250 mg/kg.

So, our formal statement of the hypotheses for this example is as follows:

Ho : mg/kg (i.e., the certified value)

H1 : ≠ 250 mg/kg (i.e., indicating that the laboratory has a bias result.

Step 2 : What level of significance

The level of significance is the probability of rejecting the null hypothesis by chance alone. This could happen from sub-sampling error, methodology, analyst‘s technical competence, instrument drift, etc. So, we have to decide on the level of significance to reject the null hypothesis if the sample result was unlikely given the null hypothesis was true.

Traditionally, we define the *unlikely* (given by symbol □) as 0.05 (5%) or less. However, there is nothing to stop you from using □ = 0.1 (10%) or □ = 0.01 (1%) with your own justification or reasoning.

In fact, the significance level sometimes is referred to as the probability of a **Type I** error. A Type I error occurs when you falsely reject the null hypothesis on the basis of the above-mentioned errors. A **Type II** error occurs when you fail to reject the null hypothesis when it is false.

Step 3 : Which test and test statistic?

The test statistic is the value calculated from the sample to determine whether to reject the null hypothesis. In this case, we use Student‘s t-test statistic in the following manner:

= ±(=0.05, = −1) √

or (=0.05, = −1)=| |√

By calculation, we get a t-value of 3.024 at the significance level of □ = 0.05 and ν = (7-1) or 6 degrees of freedom for n = 7 replicates.

Step 4 : State the decision rule

The decision rule is always of the following form:

Reject *Ho* if …..

We reject the null hypothesis if the test statistic is larger than a critical value corresponding to the significance level in step 2.

There is now a question in *H1* on either one-tailed (> or <) or two-tailed (≠ not equal) tests to be addressed. If we are talking about either ―greater than‖ or ―smaller than‖, we take the s significance level at □ = 0.05 whilst for the unequal (that mean the result can be either larger or smaller than the certified value), the significance level at □ = 0.025 on either side of the normal curve is to be studied.

As our *H1* is for the mean value to be larger or smaller than the certified value, we use the 2-tailed t-test for □ = 0.05 with 6 degrees of freedom. In this case, the tcritical value at □ = . and 6 degrees of freedom is .447 from the Student‘s t-table or from using the Excel function ― T.INV. T(. ,6)‖ or ― TINV(. ,6) in older Excel version.

That means the decision rule would be stated as below:

Reject *Ho* if t > 2.447

Step 5 : Use the sample data to calculate the test statistic

Upon calculation on the sample data, we have got a t-value of 3.024 at the significance level of □ = 0.05 and v = (7-1) or 6 degrees of freedom for n = 7 replicates.

Step 6 : Use the test statistic to make a decision

When we compare the result of step 5 to the decision rule in step 4, it is obvious that 3.024 is greater than the t-critical value of 2.447, and so we reject the null hypothesis. In other words, the mean value of 274 mg/kg is significantly different from the certified value of 250 mg/kg. Is it really so? We must go to step 7.

Step 7 : Interpret the decision in the context of the original question

Since hypothesis testing involves some kind of probability under the disguise of significance level, we must interpret the final decision with caution. To say that a result is ―statistically significant‖ sounds remarkable, but all it really means is that it is more than by chance alone.

To do justice, it would be useful to look at the actual data to see if there are one or more high outliers pulling up the mean value. Perhaps increasing the number of replicates might show up any undesirable data. Furthermore, we might have to take a closer look at the test procedure and the technical competence of the analyst to see if there were any lapses in the analytical process. A repeated series of experiment should be able to confirm these findings.

7.MODELING

A model is an abstraction or representation of a real system, idea, or object. Models capture the most important features of a problem and present them in a form that is easy to interpret. A model can be as simple as a written or verbal description of some phenomenon, a visual representation such as a graph or a flowchart, or a mathematical or spreadsheet representation.

7.1 Decision Models

A decision model is a logical or mathematical representation of a problem or business situation that can be used to understand, analyze, or facilitate making a decision. Most decision models have three types of input:

1. Data, which are assumed to be constant for purposes of the model. Some examples would be costs, machine capacities, and intercity distances.

2. Uncontrollable variables, which are quantities that can change but cannot be directly controlled by the decision maker. Some examples would be customer demand, inflation rates, and investment returns. Often, these variables are uncertain.

3. Decision variables, which are controllable and can be selected at the discretion of the decision maker. Some examples would be production quantities, staffing levels, and investment allocations. Decision models characterize the relationships among the data, uncontrollable variables, and decision variables, and the outputs of interest to the decision maker.

Decision models can be represented in various ways, most typically with mathematical functions and spreadsheets. Spreadsheets are ideal vehicles for implementing decision models because of their versatility in managing data, evaluating different scenarios, and presenting results in a meaningful fashion. Using these relationships, we may develop a mathematical representation by defining symbols for each of these quantities:

TC = total cost

V = unit variable cost

F = fixed cost

Q = quantity produced

This results in the model TC = F + VQ

7.1.2 Model Assumptions:

All models are based on assumptions that reflect the modeler‘s view of the ―real world.‖ Some assumptions are made to simplify the model and make it more tractable; that is, able to be easily analyzed or solved. Other assumptions might be made to better characterize historical data or past observations. The task of the modeler is to select or build an appropriate model that best represents the behavior of the real situation. For example, economic theory tells us that demand for a product is negatively related to its price. Thus, as prices increase, demand falls, and vice versa (a phenomenon that you may recognize as price elasticity—the ratio of the percentage change in demand to the percentage change in price). Different mathematical models can describe this phenomenon.

7.2 Prescriptive Decision Models

A prescriptive decision model helps decision makers to identify the best solution to a decision problem. **Optimization** is the process of finding a set of values for decision variables that minimize or maximize some quantity of interest—profit, revenue, cost, time, and so on— called the **objective function**. Any set of decision variables that optimizes the objective function is called an **optimal solution**. In a highly competitive world where one percentage point can mean a difference of hundreds of thousands of dollars or more, knowing the best solution can mean the difference between success and failure.

Prescriptive decision models can be either **deterministic or stochastic**. A **deterministic model** is one in which all model input information is either known or assumed to be known with certainty. A **stochastic model** is one in which some of the model input information is uncertain. For instance, suppose that customer demand is an important element of some model. We can make the assumption that the demand is known with certainty; say, 5,000 units per month. In this case we would be dealing with a deterministic model. On the other hand, suppose we have evidence to indicate that demand is uncertain, with an average value of 5,000 units per month, but which typically varies between 3,200 and 6,800 units. If we make this assumption, we would be dealing with a stochastic model.

7.3 Uncertainty and Risks:

As we all know, the future is always uncertain. Thus, many predictive models incorporate uncertainty and help decision makers analyze the risks associated with their decisions. Uncertainty is imperfect knowledge of what will happen; risk is associated with the consequences and likelihood of what might happen.

For example, the change in the stock price of Apple on the next day of trading is uncertain. However, if you own Apple stock, then you face the risk of losing money if the stock price falls. If you don‘t own any stock, the price is still uncertain although you would not have any risk. Risk is evaluated by the magnitude of the consequences and the likelihood that they would occur. For example, a 10% drop in the stock price would incur a higher risk if you own $1 million than if you only owned $1,000. Similarly, if the chances of a 10% drop were 1 in 5, the risk would be higher than if the chances were only 1 in 100. The importance of risk in business has long been recognized.

8.Model Validation

Model validation is defined within regulatory guidance as ―the set of processes and activities intended to verify that models are performing as expected, in line with their design objectives, and business uses.‖ It also identifies ―potential limitations and assumptions, and assesses their possible impact.‖

Generally, validation activities are performed by individuals independent of model development or use. Models, therefore, should not be validated by their owners as they can be highly technical, and some institutions may find it difficult to assemble a model risk team that has sufficient functional and technical expertise to carry out independent validation. When faced with this obstacle, institutions often outsource the validation task to third parties.

In statistics, **model validation** is the task of confirming that the outputs of a statistical model are acceptable with respect to the real data-generating process. In other words, model validation is the task of confirming that the outputs of a statistical model have enough fidelity

to the outputs of the data-generating process that the objectives of the investigation can be achieved.

8.1 The Four Elements

Model validation consists of four crucial elements which should be considered:

1. Conceptual Design

The foundation of any model validation is its conceptual design, which needs documented coverage assessment that supports the model‘s ability to meet business and regulatory needs and the unique risks facing a bank.

The design and capabilities of a model can have a profound effect on the overall effectiveness of a bank‘s ability to identify and respond to risks. For example, a poorly designed risk assessment model may result in a bank establishing relationships with clients that present a risk that is greater than its risk appetite, thus exposing the bank to regulatory scrutiny and reputation damage.

A validation should independently challenge the underlying conceptual design and ensure that documentation is appropriate to support the model‘s logic and the model‘s ability to achieve desired regulatory and business outcomes for which it is designed.

2. System Validation

All technology and automated systems implemented to support models have limitations. An effective validation includes: firstly, evaluating the processes used to integrate the model‘s conceptual design and functionality into the organisation‘s business setting; and, secondly, examining the processes implemented to execute the model‘s overall design. Where gaps or limitations are observed, controls should be evaluated to enable the model to function effectively.

3. Data Validation and Quality Assessment

Data errors or irregularities impair results and might lead to an organisation‘s failure to identify and respond to risks. Best practise indicates that institutions should apply a risk-based data validation, which enables the reviewer to consider risks unique to the organisation and the model.

To establish a robust framework for data validation, guidance indicates that the accuracy of source data be assessed. This is a vital step because data can be derived from a variety of sources, some of which might lack controls on data integrity, so the data might be incomplete or inaccurate.

4. Process Validation

To verify that a model is operating effectively, it is important to prove that the established processes for the model‘s ongoing administration, including governance policies and procedures, support the model‘s sustainability. A review of the processes also determines whether the models are producing output that is accurate, managed effectively, and subject to the appropriate controls.

If done effectively, model validation will enable your bank to have every confidence in its various models‘ accuracy, as well as aligning them with the bank‘s business and regulatory expectations. By failing to validate models, banks increase the risk of regulatory criticism, fines, and penalties.

The complex and resource-intensive nature of validation makes it necessary to dedicate sufficient resources to it. An independent validation team well versed in data management, technology, and relevant financial products or services — for example, credit, capital management, insurance, or financial crime compliance — is vital for success. Where shortfalls in the validation process are identified, timely remedial actions should be taken to close the gaps.

Data Validation in Excel

The following example is an introduction to data validation in Excel. The data validation button under the data tab provides the user with different types of data validation checks based on the data type in the cell. It also allows the user to define custom validation checks using Excel formulas. The data validation can be found in the Data Tools section of the Data tab in the ribbon of Excel:

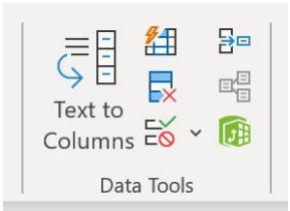


Fig 1: Data validation tool in Excel

Data Entry Task

The example below illustrates a case of data entry, where the province must be entered for every store location. Since stores are only located in certain provinces, any incorrect entry should be caught.

It is accomplished in Excel using a two-fold data validation. First, the relevant provinces are incorporated into a drop-down menu that allows the user to select from a list of valid provinces.

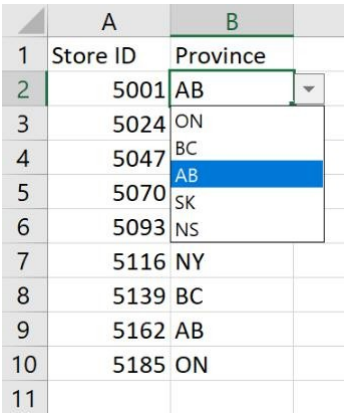


Fig. 2: First level of data validation

Second, if the user inputs a wrong province by mistake, such as ―NY‖ instead of ―NS,‖ the system warns the user of the incorrect input.

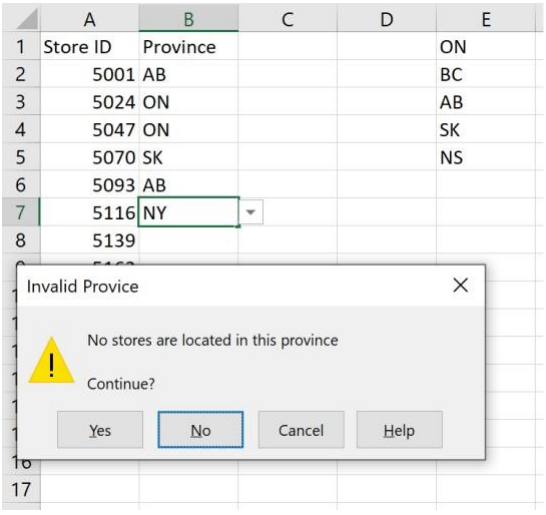
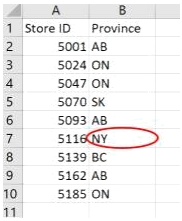


Fig. 3: Second level of data validation

Further, if the user ignores the warning, an analysis can be conducted using the data validation feature in Excel that identifies incorrect inputs.



	A	B
1	Store ID	Province
2	5001	AB
3	5024	ON
4	5047	ON
5	5070	SK
6	5093	AB
7	5116	NY
8	5139	BC
9	5162	AB
10	5185	ON
11		

Fig. 4: Final level of data validation

8.2 Model Evaluation

Model Evaluation is an integral part of the model development process. It helps to find the best model that represents our data and how well the chosen model will work in the future. Evaluating model performance with the data used for training is not acceptable in data science because it can easily generate overoptimistic and overfitted models. There are two methods of evaluating models in data science, Hold-Out and Cross-Validation. To avoid overfitting, both methods use a test set (not seen by the model) to evaluate model performance.

- **Hold-Out:** In this method, the mostly large dataset is *randomly* divided to three subsets:

1. **Training set** is a subset of the dataset used to build predictive models.

2. **Validation set** is a subset of the dataset used to assess the performance of model built in the training phase. It provides a test platform for fine tuning model‘s parameters and selecting the best-performing model. Not all modelling algorithms need a validation set.

3. **Test set** or unseen examples is a subset of the dataset to assess the likely future performance of a model. If a model fit to the training set much better than it fits the test set, overfitting is probably the cause.

- **Cross-Validation:** When only a limited amount of data is available, to achieve an unbiased estimate of the model performance we use *k*-fold cross-validation. In *k*-fold cross-validation, we divide the data into *k* subsets of equal size. We build models *k*times, each time leaving out one of the subsets from training and use it as the test set. If *k* equals the sample size, this is called ―leave-one-out‖.

Model evaluation can be divided to **two sections:**

- **Classification Evaluation**

- **Regression Evaluation**

9.Interpretation:

Data interpretation is the process of reviewing data and drawing meaningful conclusions using a variety of analytical approaches. Data interpretation aids researchers in categorizing, manipulating, and summarising data in order to make sound business decisions. The end goal for a data interpretation project is to develop a good marketing strategy or to expand its client user base.

There are certain steps followed to conduct data interpretation:

- Putting together the data you'll need(neglecting irrelevant data)
- Developing the initial research or identifying the most important inputs;
- Sorting and filtering of data.
- Forming conclusions on the data.
- Developing recommendations or practical solutions.

9.1 Types of data interpretation

The purpose of data interpretation is to assist individuals in understanding numerical data that has been gathered, evaluated, and presented.

9.1.1 Qualitative data Interpretation

To evaluate qualitative data, also known as categorical data, the qualitative data interpretation approach is utilized. Words, instead of numbers or patterns, are used to describe data in this technique. Unlike quantitative data, which can be studied immediately after collecting and sorting it, qualitative data must first be converted into numbers before being analyzed. This is due to the fact that analyzing texts in their original condition is frequently time-consuming and results in a high number of mistakes. The analyst's coding should also be defined so that it may be reused and evaluated by others.

Observations: a description of the behavioral patterns seen in a group of people. The length of time spent on an activity, the sort of activity, and the form of communication used might all be examples of these patterns.

Groups of people: To develop a collaborative discussion about a study issue, group people and ask them pertinent questions.

Research: Similar to how patterns of behavior may be noticed, different forms of documentation resources can be classified and split into categories based on the type of information they include.

Interviews are one of the most effective ways to get narrative data. Themes, topics, and categories can be used to group inquiry replies. The interview method enables extremely targeted data segmentation.

The following methods are commonly used to produce qualitative data:

- Transcripts of interviews
- Questionnaires with open-ended answers
- Transcripts from call centers
- Documents and texts
- Audio and video recordings are available.
- Notes from the field

Now the second step is to interpret the data that is produced. This is done by the following methods:

Content Analysis

This is a popular method for analyzing qualitative data. Other approaches to analysis may fall under the general category of content analysis. An aspect of the content analysis is thematic analysis. By classifying material into words, concepts, and themes, content analysis is used to uncover patterns that arise from the text.

Narrative Analysis

The focus of narrative analysis is on people‘s experiences and the language they use to make sense of them. It‘s especially effective for acquiring a thorough insight into customers‘ viewpoints on a certain topic. We might be able to describe the results of a targeted case study using narrative analysis.

Discourse Analysis

Discourse analysis is a technique for gaining a comprehensive knowledge of the political, cultural, and power dynamics that exist in a given scenario. The emphasis here is on how people express themselves in various social settings. Brand strategists frequently utilize

discourse analysis to figure out why a group of individuals reacts the way they do to a brand or product.

It‘s critical to be very clear on the type and scope of the study topic in order to get the most out of the analytical process. This will assist you in determining which research collection routes are most likely to assist you in answering your query.

Your approach to qualitative data analysis will differ depending on whether you are a corporation attempting to understand consumer sentiment or an academic surveying a school.

9.1.2 Quantitative data Interpretation

Quantitative data, often known as numerical data, is analyzed using the quantitative data interpretation approach. Because this data type contains numbers, it is examined using numbers rather than words. Quantitative analysis is a collection of procedures for analyzing numerical data. It frequently requires the application of statistical modeling techniques such as standard deviation, mean, and median. Let‘s try and understand these;

Median: The median is the middle value in a list of numbers that have been sorted ascending or descending, and it might be more descriptive of the data set than the average.

Mean: The basic mathematical average of two or more values is called a mean. The arithmetic mean approach, which utilizes the sum of the values in the series, and the geometric mean method, which is the average number of products, are two ways to determine the mean for a given collection of numbers.

Standard deviation: The positive square root of the variance is the standard deviation. One of the most fundamental approaches to statistical analysis is the standard deviation. A low standard deviation indicates that the values are near to the mean, whereas a large standard deviation indicates that the values are significantly different from the mean.

There are three common uses for quantitative analysis.

- For starters, it‘s used to compare and contrast groupings. For instance, consider the popularity of certain car brands with different colors.
- It‘s also used to evaluate relationships between variables.
- Third, it‘s used to put scientifically sound theories to the test. Consider a hypothesis concerning the effect of a certain vaccination.

Regression analysis

A collection of statistical procedures for estimating connections between a dependent variable and one or maybe more independent variables is known as regression analysis. It may be used to determine the strength of a relationship across variables and to predict how they will interact in the future.

Cohort Analysis

Cohort analysis is a technique for determining how engaged users are over time. It‘s useful to determine whether user engagement is improving over time or just looking to improve due to growth. Cohort analysis is useful because it helps to distinguish between growth and engagement measures. Cohort analysis is watching how individuals‘ behavior develops over time in groups of people.

Predictive Analysis

By examining historical and present data, the predictive analytic approach seeks to forecast future trends. Predictive analytics approaches, which are powered by machine learning and deep learning, allow firms to notice patterns or possible challenges ahead of time and prepare educated initiatives. Predictive analytics is being used by businesses to address issues and identify new possibilities.

Prescriptive Analysis

The prescriptive analysis approach employs tools like as graph analysis,

Prescriptive analytics is a sort of data analytics in which technology is used to assist organisations in making better decisions by analyzing raw data. Prescriptive analytics, in particular, takes into account information about potential situations or scenarios, available resources, previous performance, and present performance to recommend a course of action or strategy. It may be used to make judgments throughout a wide range of time frames, from the immediate to the long term.

Conjoint Analysis

Conjoint analysis is the best market research method for determining how much customers appreciate a product‘s or service‘s qualities. This widely utilized method mixes real-life scenarios and statistical tools with market decision models

Cluster analysis

Any organization that wants to identify distinct groupings of consumers, sales transactions, or other sorts of behaviors and items may use cluster analysis as a valuable data-mining technique.

The goal of cluster analysis is to uncover groupings of subjects that are similar, where ―similarity‖ between each pair of subjects refers to a global assessment of the entire collection of features. Cluster analysis, similar to factor analysis, deals with data matrices in which the variables haven‘t been partitioned into criteria and predictor subsets previously.

10. Deployment and Iteration:

The iterative process is the practice of building, refining, and improving a project, product, or initiative. Teams that use the iterative development process create, test, and revise until they‘re satisfied with the end result. You can think of an iterative process as a trial-and-error methodology that brings your project closer to its end goal.

Iterative processes are a fundamental part of lean methodologies and Agile project management—but these processes can be implemented by any team, not just Agile ones. During the iterative process, you will continually improve your design, product, or project until you and your team are satisfied with the final project deliverable.

10.1 The benefits and challenges of the iterative process

The iterative model isn‘t right for every team—or every project. Here are the main pros and cons of the iterative process for your team.

Pros:

- Increased efficiency. Because the iterative process embraces trial and error, it can often help you achieve your desired result faster than a non-iterative process.
- Increased collaboration. Instead of working from predetermined plans and specs (which also takes a lot of time to create), your team is actively working together.
- Increased adaptability. As you learn new things during the implementation and testing phases, you can tweak your iteration to best hit your goals—even if that means doing something you didn‘t expect to be doing at the start of the iterative process.
- More cost effective. If you need to change the scope of the project, you‘ll only have invested the minimum time and effort into the process.
- Ability to work in parallel. Unlike other, non-iterative methodologies like the waterfall method, iterations aren‘t necessarily dependent on the work that comes before them. Team members can work on several elements of the project in parallel, which can shorten your overall timeline.
- Reduced project-level risk. In the iterative process, risks are identified and addressed during each iteration. Instead of solving for large risks at the beginning and end of the project, you‘re consistently working to resolve low-level risks.
- More reliable user feedback. When you have an iteration that users can interact with or see, they‘re able to give you incremental feedback about what works or doesn‘t work for them.

Cons:

- Increased risk of scope creep. Because of the trial-and-error nature of the iterative process, your project could develop in ways you didn‘t expect and exceed your original project scope.
- Inflexible planning and requirements. The first step of the iterative process is to define your project requirements. Changing these requirements during the iterative process can break the flow of your work, and cause you to create iterations that don‘t serve your project‘s purpose.
- Vague timelines. Because team members will create, test, and revise iterations until they get to a satisfying solution, the iterative timeline isn‘t clearly defined. Additionally, testing for different increments can vary in length, which also impacts the overall iterative process timeline.

UNIT II BUSINESS INTELLIGENCE

Data Warehouses and Data Mart – Knowledge Management – Types of Decisions – Decision Making Process – Decision Support systems – Business Intelligence- OLAP- Analytic Functions

1.Data Warehouses and Data Mart:

A Data Warehouse (DW) is an organised collection of integrated, subject-oriented databases designed to aid decision support functions. DW is organized at the right level of granularity to provide clean enterprise-wide data in a standardized format for reports, queries and analysis. DW is physically and functionally separate from an operational and transactional database. Creating a DW for analysis and queries represents investment in time and effort. It has to be constantly kept up-to-date for it to be useful.

A Data Warehousing (DW) is process for collecting and managing data from varied sources to provide meaningful business insights. A Data warehouse is typically used to connect and analyze business data from heterogeneous sources. The data warehouse is the core of the BI system which is built for data analysis and reporting. It is a blend of technologies and components which aids the strategic use of data. It is electronic storage of a large amount of information by a business which is designed for query and analysis instead of transaction processing. It is a process of transforming data into information and making it available to users in a timely manner to make a difference.

Data warehouse system is also known by the following name:

- Decision Support System (DSS)
- Executive Information System
- Management Information System
- Business Intelligence Solution
- Analytic Application
- Data Warehouse

1.1 How Data warehouse works?

A Data Warehouse works as a central repository where information arrives from one or more data sources. Data flows into a data warehouse from the transactional system and other relational databases.

Data may be:

1. Structured
2. Semi-structured
3. Unstructured data

The data is processed, transformed, and ingested so that users can access the processed data in the Data Warehouse through Business Intelligence tools, SQL clients, and spreadsheets. A data warehouse merges information coming from different sources into one comprehensive database.

By merging all of this information in one place, an organization can analyze its customers more holistically. This helps to ensure that it has considered all the information available. Data warehousing makes data mining possible. Data mining is looking for patterns in the data that may lead to higher sales and profits.

1.2 Types of Data Warehouse

Three main types of Data Warehouses are:

1. Enterprise Data Warehouse:

Enterprise Data Warehouse is a centralized warehouse. It provides decision support service across the enterprise. It offers a unified approach for organizing and representing

data. It also provide the ability to classify data according to the subject and give access according to those divisions.

2. Operational Data Store:

Operational Data Store, which is also called ODS, are nothing but data store required 1.2 when neither Data warehouse nor OLTP systems support organizations reporting needs. In ODS, Data warehouse is refreshed in real time. Hence, it is widely preferred for routine activities like storing records of the Employees.

3. Data Mart:

A data mart is a subset of the data warehouse. It specially designed for a particular line of business, such as sales, finance, sales or finance. In an independent data mart, data can collect directly from sources.

1.3 Components of Data warehouse

Four components of Data Warehouses are:

Load manager: Load manager is also called the front component. It performs with all the operations associated with the extraction and load of data into the warehouse. These operations include transformations to prepare the data for entering into the Data warehouse.

Warehouse Manager: Warehouse manager performs operations associated with the management of the data in the warehouse. It performs operations like analysis of data to ensure consistency, creation of indexes and views, generation of denormalization and aggregations, transformation and merging of source data and archiving and baking-up data.

Query Manager: Query manager is also known as backend component. It performs all the operation operations related to the management of user queries. The operations of this Data warehouse components are direct queries to the appropriate tables for scheduling the execution of queries.

End-user access tools:

This is categorized into five different groups like 1. Data Reporting 2. Query Tools 3. Application development tools 4. EIS tools, 5. OLAP tools and data mining tools.

1.4 Who needs Data warehouse?

Data warehouse is needed for all types of users like:

- Decision makers who rely on mass amount of data
- Users who use customized, complex processes to obtain information from multiple data sources.
- It is also used by the people who want simple technology to access the data
- It also essential for those people who want a systematic approach for making decisions.
- If the user wants fast performance on a huge amount of data which is a necessity for reports, grids or charts, then Data warehouse proves useful.
- Data warehouse is a first step If you want to discover 'hidden patterns' of data-flows and groupings.

1.5 What Is a Data Warehouse Used For?

Here, are most common sectors where Data warehouse is used:

Airline:

In the Airline system, it is used for operation purpose like crew assignment, analyses of route profitability, frequent flyer program promotions, etc.

Banking:

It is widely used in the banking sector to manage the resources available on desk effectively. Few banks also used for the market research, performance analysis of the product and operations.

Healthcare:

Healthcare sector also used Data warehouse to strategize and predict outcomes, generate patient's treatment reports, share data with tie-in insurance companies, medical aid services, etc.

Public sector:

In the public sector, data warehouse is used for intelligence gathering. It helps government agencies to maintain and analyze tax records, health policy records, for every individual.

Investment and Insurance sector:

In this sector, the warehouses are primarily used to analyze data patterns, customer trends, and to track market movements.

Retail chain:

In retail chains, Data warehouse is widely used for distribution and marketing. It also helps to track items, customer buying pattern, promotions and also used for determining pricing policy.

Telecommunication:

A data warehouse is used in this sector for product promotions, sales decisions and to make distribution decisions.

Hospitality Industry:

This Industry utilizes warehouse services to design as well as estimate their advertising and promotion campaigns where they want to target clients based on their feedback and travel patterns.

Steps to Implement Data Warehouse

The best way to address the business risk associated with a Data warehouse implementation is to employ a three-prong strategy as below

1. **Enterprise strategy**: Here we identify technical including current architecture and tools. We also identify facts, dimensions, and attributes. Data mapping and transformation is also passed.
2. **Phased delivery**: Datawarehouse implementation should be phased based on subject areas. Related business entities like booking and billing should be first implemented and then integrated with each other.
3. **Iterative Prototyping**: Rather than a big bang approach to implementation, the Datawarehouse should be developed and tested iteratively.

Here, are key steps in Datawarehouse implementation along with its deliverables.

Step	Tasks	Deliverables
1	Need to define project scope	Scope Definition
2	Need to determine business needs	Logical Data Model
3	Define Operational Datastore requirements	Operational Data Store Model

4	Acquire or develop Extraction tools	Extract tools and Software
5	Define Data Warehouse Data requirements	Transition Data Model
6	Document missing data	To Do Project List
7	Maps Operational Data Store to Data Warehouse	D/W Data Integration Map
8	Develop Data Warehouse Database design	D/W Database Design
9	Extract Data from Operational Data Store	Integrated D/W Data Extracts
10	Load Data Warehouse	Initial Data Load
11	Maintain Data Warehouse	On-going Data Access and Subsequent Lo

1,6 Best practices to implement a Data Warehouse

- Decide a plan to test the consistency, accuracy, and integrity of the data.
- The data warehouse must be well integrated, well defined and time stamped.
- While designing Datawarehouse make sure you use right tool, stick to life cycle, take care about data conflicts and ready to learn you're your mistakes.
- Never replace operational systems and reports
- Don't spend too much time on extracting, cleaning and loading data.
- Ensure to involve all stakeholders including business personnel in Datawarehouse implementation process. Establish that Data warehousing is a joint/ team project. You don't want to create Data warehouse that is not useful to the end users.
- Prepare a training plan for the end users.

1.7 Advantages of Data Warehouse:

- Data warehouse allows business users to quickly access critical data from some sources all in one place.
- Data warehouse provides consistent information on various cross-functional activities. It is also supporting ad-hoc reporting and query.
- Data Warehouse helps to integrate many sources of data to reduce stress on the production system.

- Data warehouse helps to reduce total turnaround time for analysis and reporting.
- Restructuring and Integration make it easier for the user to use for reporting and analysis.
- Data warehouse allows users to access critical data from the number of sources in a single place. Therefore, it saves user's time of retrieving data from multiple sources.
- Data warehouse stores a large amount of historical data. This helps users to analyze different time periods and trends to make future predictions.

1.8 Disadvantages of Data Warehouse:

- Not an ideal option for unstructured data.
- Creation and Implementation of Data Warehouse is surely time confusing affair.
- Data Warehouse can be outdated relatively quickly
- Difficult to make changes in data types and ranges, data source schema, indexes, and queries.
- The data warehouse may seem easy, but actually, it is too complex for the average users.
- Despite best efforts at project management, data warehousing project scope will always increase.
- Sometime warehouse users will develop different business rules.
- Organisations need to spend lots of their resources for training and Implementation purpose.

1.9 The Future of Data Warehousing

- Change in **Regulatory constrains** may limit the ability to combine source of disparate data. These disparate sources may include unstructured data which is difficult to store.
- As the **size** of the databases grows, the estimates of what constitutes a very large database continue to grow. It is complex to build and run data warehouse systems which are always increasing in size. The hardware and software resources are available today do not allow to keep a large amount of data online.
- **Multimedia data** cannot be easily manipulated as text data, whereas textual information can be retrieved by the relational software available today. This could be a research subject.
- retrieved by the relational software available today. This could be a research subject.

Data Warehouse Tools

There are many Data Warehousing tools are available in the market. Here, are some most prominent one:

1. MarkLogic:

MarkLogic is useful data warehousing solution that makes data integration easier and faster using an array of enterprise features. This tool helps to perform very complex search operations. It can query different types of data like documents, relationships, and metadata.

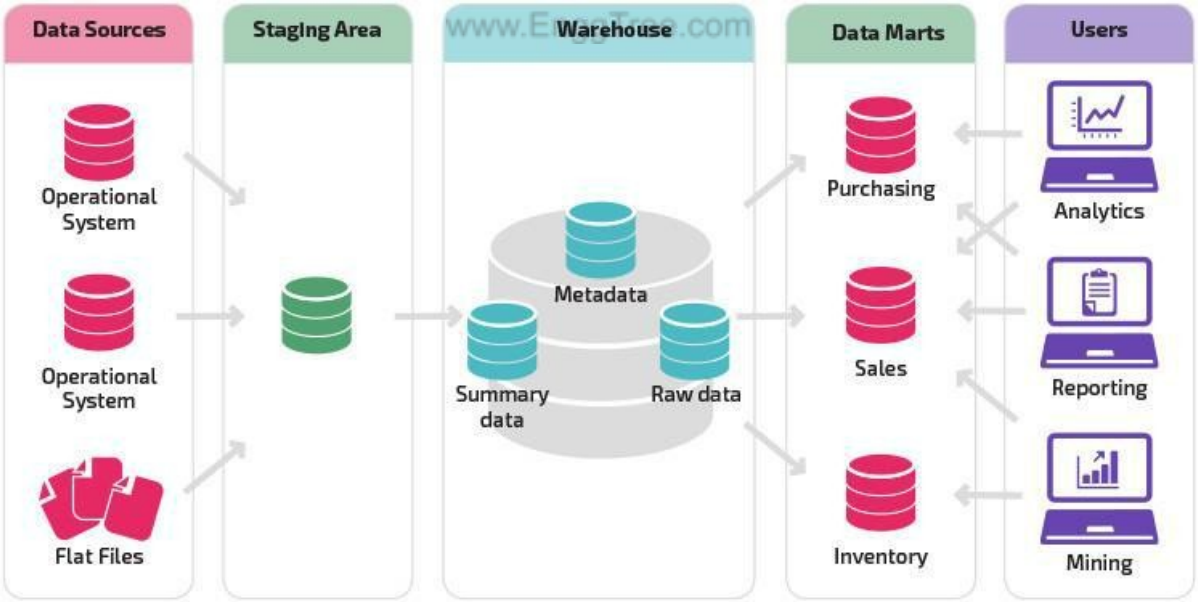
2. Oracle:

Oracle is the industry-leading database. It offers a wide range of choice of data warehouse solutions for both on-premises and in the cloud. It helps to optimize customer experiences by increasing operational efficiency.

3. Amazon RedShift:

Amazon Redshift is Data warehouse tool. It is a simple and cost-effective tool to analyze all types of data using standard SQL and existing BI tools. It also allows running complex queries against petabytes of structured data, using the technique of query optimization.

1.9.1 Differences between Data Warehouse and Data Mart



1.

Parameter	Data Warehouse	Data Mart
Definition	A Data Warehouse is a large repository of data collected from different organizations or departments within a corporation.	A data mart is an only subtype of a Data Warehouse. It is designed to meet the need of a certain user group.
Usage	It helps to take a strategic decision.	It helps to take tactical decisions for the business.
Objective	The main objective of Data Warehouse is to provide an integrated environment and coherent picture of the business at a point in time.	A data mart mostly used in a business division at the department level.
Designing	The designing process of Data Warehouse is quite difficult.	The designing process of Data Mart is easy.
	May or may not use in a dimensional model. However, it can feed dimensional models.	It is built focused on a dimensional model using a start schema.
Data Handling	Data warehousing includes large area of the corporation which is why it takes a long time to process it.	Data marts are easy to use, design and implement as it can only handle small amounts of data.
Focus	Data warehousing is broadly focused all the departments. It is possible that it can even represent the entire company.	Data Mart is subject-oriented, and it is used at a department level.
Data type	The data stored inside the Data Warehouse are always detailed when compared with data mart.	Data Marts are built for particular user groups. Therefore, data short and limited.
Subject-area	The main objective of Data Warehouse is to provide an integrated environment and coherent picture of the business at a point in time.	Mostly hold only one subject area- for example, Sales figure.
Data storing	Designed to store enterprise -wide decision data, not just marketing data.	Dimensional modeling and star schema design employed for optimizing the performance of access layer.
Data type	Time variance and non-volatile design are strictly enforced.	Mostly includes consolidation data structures to meet subject area's query and reporting needs.
Data value	Read-Only from the end-users standpoint.	Transaction data regardless of grain fed directly from the Data Warehouse.
Scope	Data warehousing is more helpful as it can bring information from any department.	Data mart contains data, of a specific department of a company. There are maybe separate data marts for sales, finance, marketing, etc. Has limited usage

Source	In Data Warehouse Data comes from many sources.	In Data Mart data comes from very few sources.
Size	The size of the Data Warehouse may range from 100 GB to 1 TB+.	The Size of Data Mart is less than 100 GB.
Implementation time	The implementation process of Data Warehouse can be extended from months to years.	The implementation process of Data Mart is restricted to few months.

2. Knowledge Management (KM): Concept, Features and Process

Concept of KM:

KM may be defined as follows:

Knowledge management is a process of acquiring, generating, accumulating and using knowledge for the benefit of the organisation to enable it to gain a competitive edge for survival, growth and prosperity in a globalized competitive economy.

According to some management experts, notably Peter F. Drucker, KM is a bad term; in as much as knowledge cannot be managed.

Rather, KM requires conditions for the emergence of a learning organisation; which is necessary for generation, sharing and use of knowledge residing in the minds of people.

2.1 Features of Knowledge Management

Some salient features of KM are described below:

(i) KM is a systematic process; consisting of standardized procedures to collect, store, distribute and use knowledge. The essence of KM is to get right knowledge to right people, at the right time.

(ii) Knowledge is of two types – explicit and implicit. Explicit knowledge is visible information available in literature, reports, patents, technical specifications, communication with customers, suppliers, competitors etc. It can be embedded in rules, systems, policies and procedures etc. of the organisation.

Tacit or implicit knowledge is personal knowledge residing in the minds of people as a result of their personal beliefs, values, perspectives and experience. There is a need for a learning organisation for enhancement, sharing and utilisation of tacit knowledge.

(iii) KM is a continuous process; as the world economy is dynamic and full of challenges. It requires constant creation of new skills and capabilities and improvement of existing ones.

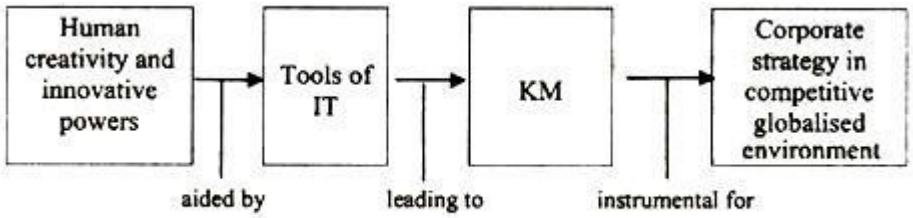
(iv) KM requires whole-hearted support of top management, to provide cultural and technical foundation for the origination and implementation of KM practices.

(v) The objective of KM is improvement in organisational performance; to enable the organisation acquire, sharpen and utilize its competitive edge for survival and growth in the global economy of today.

2.2 Knowledge Management and Information Technology:

KM is not an outgrowth of IT. Rather, KM requires human skills, creativity and innovative capabilities of people; which are the base of KM. In fact I there are tools of IT like Intranets, Lotus Notes, MS-Exchange etc.; which provide an infrastructure for the free play of human creativity and innovative powers for the formulation of corporation strategy, in a competitive globalized environment.

The above ideas are illustrated with the help of the following diagram:



KM, IT and Corporate Strategy

Knowledge Management IT and Corporate Strategy

An Overview of the Process of KM:

KM broadly consists of the following major steps:

(i) Identification of Knowledge Needs:

The first step in KM is an identification of what type of knowledge is required for the successful designing and implementation of corporate strategy.

(ii) Determination of Knowledge Assets:

The management must identify what are the knowledge assets of the organisation; which basically are competitors, suppliers, governmental agencies, products and processes, technology etc. Management must plan to get maximum returns out of knowledge assets.

(iii) Generation of Knowledge:

Generation of knowledge requires two sources:

(a) Acquisition of knowledge through knowledge assets e.g. knowledge about new products (from competitors), new technologies, social, economical, political changes. It

also requires transformation of raw information into knowledge, useful to solve business problems.

(b) Generation of knowledge, by creating conditions for the emergence of a learning organisation. This is the most important internal source of knowledge generation which makes tacit knowledge of individuals available for organisational purposes.

(iv) Knowledge Storage:

It includes preserving existing and acquired knowledge in knowledge repositories. (A knowledge repository is an on line computer based storehouse of organised information about a particular domain of knowledge).

(v) Knowledge Distribution:

It is a process which allows members of the organisation to have an access to the collective knowledge of the organisation.

(vi) Knowledge Utilization:

It requires embedding knowledge in products, processes, procedures etc. of the organisation. Best utilisation of knowledge takes place when managers utilize knowledge in organisational decision making. A learning organisation creates conditions for sharing and utilizing knowledge in organisational contexts.

(vii) Feedback on Knowledge Management

Feedback on KM implies evaluating the significance of knowledge assets. It also includes impact of KM on organisational performance; and devising techniques for betterment of KM in future.

An overview of the process of KM- at a glance

2.3 Significance of Knowledge Management

Significance of KM could be highlighted with reference the following advantages which KM provides to the organisation:

(i) **Building and Sharpening Competitive Edge:**

KM enables a corporation to build and sharpen its competitive edge, for survival and growth in the competitive globalized economy. In fact, KM aided by IT tools enables a corporation to design and implement most appropriate corporate strategies.

(ii) Betterment of Human Relations:

KM is basically built on the knowledge generated, shared and utilized through a learning organisation. There is no doubt that learning organisation provides the foundation on which the building of KM could be built. A learning organisation through facilitating interaction among people of the organisation, leads to betterment of human relations; which is a very big permanent asset an organisation can boast of to possess.

(iii) Improvement in Organisational Efficiency:

KM provides knowledge which can be embedded in organisational processes. It makes knowledge available for decision-making purposes. Thus it helps to improve organisational efficiency, resulting in reduced costs and increased profits, for the organisation.

(iv) Enhancement of Human Capital Capabilities

KM-its concept and practices – motivate people to enhance their intellectual capabilities, resulting in new skills, improvement of existing skills etc. Thus not only does KM enhance the intellectual elements of people; but also indirectly prevents depreciation of human capital.

(v) Enhancement of Enterprise Goodwill:

Initiation and practices of KM help an enterprise enhance its goodwill in the global market; enabling it to acquire more success and prosperity.

3.**Types of Decisions in Business Intelligence**

The characteristics of decisions faced by managers at different levels are quite different. Decisions can be classified as structured, semi structured, and unstructured. Unstructured decisions are those in which the decision maker must provide judgment, evaluation, and insights into the problem definition. Each of these decisions is novel, important, and nonroutine, and there is no well-understood or agreed-on procedure for making them.

Structured decisions, by contrast, are repetitive and routine, and decision makers can follow a definite procedure for handling them to be efficient. Many decisions have elements of both and are considered semi structured decisions, in which only part of the problem has a clear-cut answer provided by an accepted procedure. In general, structured decisions are made more prevalently at lower organizational levels, whereas unstructured decision making is more common at higher levels of the firm.

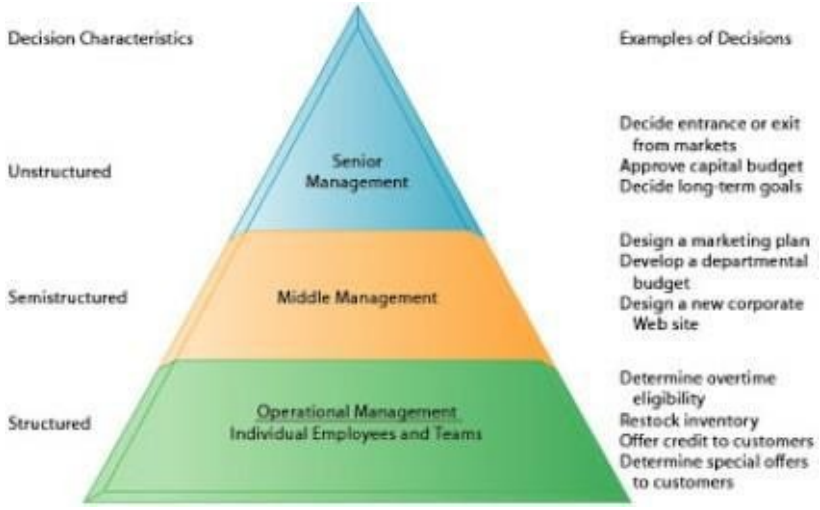
Senior executives tend to be exposed to many unstructured decision situations that are open ended and evaluative and that require insight based on many sources of information and personal experience. For example, a CEO in today's music industry might ask, "Whom should we choose as a distribution partner for our online music catalog—Apple, Microsoft, or Sony?" Answering this question would require access to news,

government reports, and industry views as well as high-level summaries of firm performance. However, the answer would also require senior managers to use their own best judgment and poll other managers for their opinions.

Middle management and operational management tend to face more structured decision scenarios, but their decisions may include unstructured components. A typical middlelevel management decision might be “Why is the order fulfillment report showing a decline over the last six months at a distribution center in Minneapolis?” This middle manager could obtain a report from the firm’s enterprise system or distribution management system on order activity and operational efficiency at the Minneapolis distribution center. This is the structured part of the decision. But before arriving at an answer, this middle manager will have to interview employees and gather more unstructured information from external sources about local economic conditions or sales trends.

Rank-and-file employees tend to make more structured decisions. For example, a sales account representative often has to make decisions about extending credit to customers by consulting the firm’s customer database that contains credit information. In this case the decision is highly structured, it is a routine decision made thousands of times each day in most firms, and the answer has been preprogrammed into a corporate risk management or credit reporting system.

The types of decisions faced by project teams cannot be classified neatly by organizational level. Teams are small groups of middle and operational managers and perhaps employees assigned specific tasks that may last a few months to a few years. Their tasks may involve unstructured or semistructured decisions such as designing new products, devising new ways to enter the marketplace, or reorganizing sales territories and compensation systems.



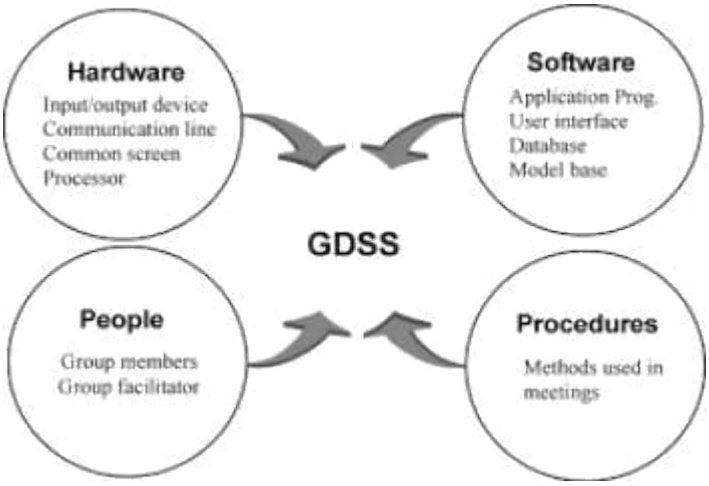
SYSTEMS FOR DECISION SUPPORT

There are four kinds of systems used to support the different levels . We introduced some of these systems in *Management information systems (MIS)* provide routine reports and summaries of transaction- level data to middle and operational-level managers to provide answers to structured and semistructured decision problems.

1.Decision-support systems (DSS) are targeted systems that combine analytical models with operational data and supportive interactive queries and analysis for middle managers who face semistructured decision situations.

2.Executive support systems (ESS) are specialized systems that provide senior management making primarily unstructured decisions with a broad array of both external information (news, stock analyses, industry trends) and high-level summaries of firm performance. The purpose of ESS to help the C- level managers to focus on the information that really affect the overall profitability and success of the firm. The leading methodology for understanding the really important information needed by the firm's executive is called the Balanced Score Card Method, a frame work for operationalizing the firm's strategic plan by focusing on measurable outcomes on four dimensions of firm performance.Financial,business process ,customer, learning and growth. Performance on each dimension is measured using KPI's.

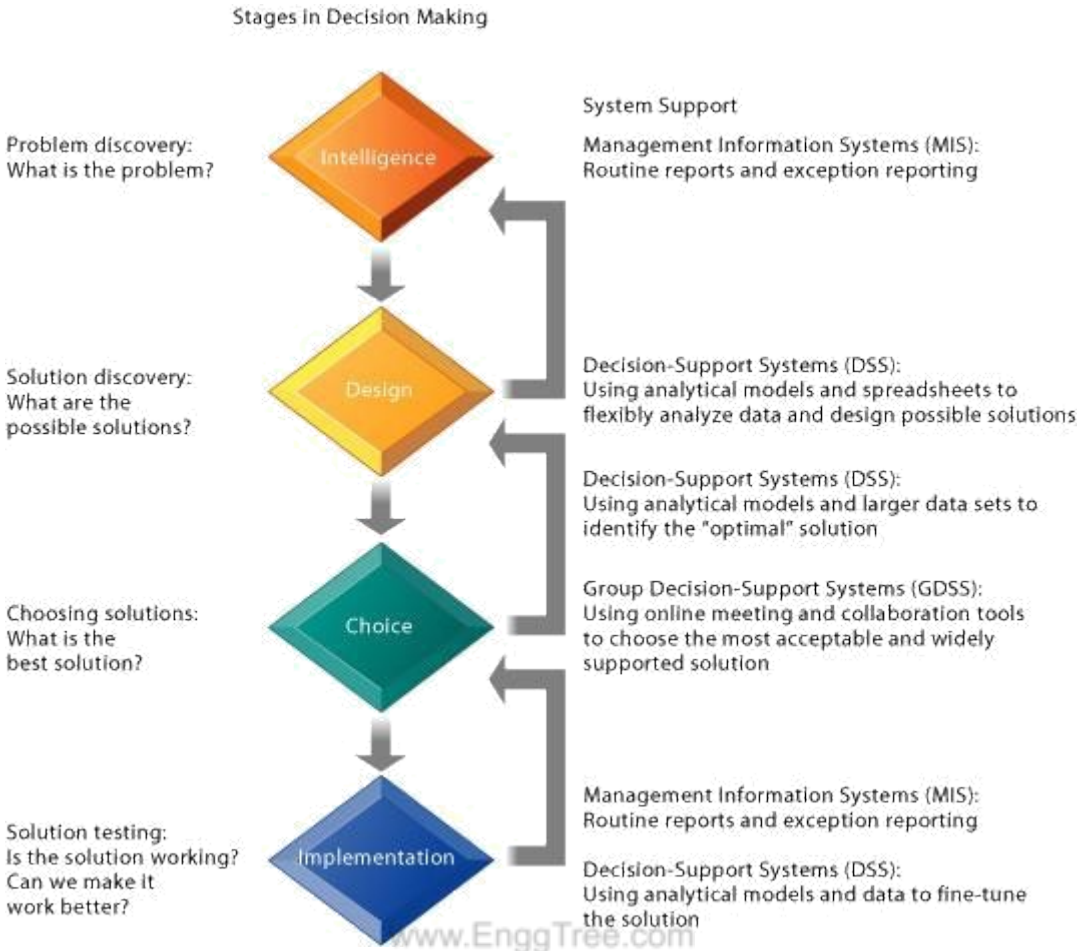
3.Group decision-support systems (GDSS) are specialized systems that provide a group electronic environment in which managers and teams can collectively make decisions and design solutions for unstructured and semistructured problems.GDSS guided meetings takes place in a conference rooms with special software and hardware tools to facilitate group decision making.It makes possible to increase the meeting size and increase in productivity.Because individuals contribute simultaneously at the same time rather than one at a time.



Organizational Level	Decision Type	Type of Decision-Support System	Examples
Senior management	Unstructured	Executive support systems (ESS)	Decide entrance or exit from markets Approve capital budget Decide long-term corporate objectives
Middle management/ project teams	Semistructured	Management information systems (MIS) Decision-support systems (DSS) Group decision-support systems(GDSS)	Allocate resources to managers and departments Design a new corporate Web site Develop a marketing plan Design a departmental budget
Operational management/ project teams Employees	Semistructured Structured	Decision-support systems (DSS) Management information systems (MIS) Group decision-support systems (GDSS)	Evaluate employee performance Restock inventory Routine credit decisions Determine special offers to customers

3.1.STAGES IN THE DECISION-MAKING PROCESS

Making decisions consists of several different activities. Simon (1960) describes four different stages in decision making: intelligence, design, choice, and implementation



The decision-making process can be described in four steps that follow one another in a logical order. In reality, decision makers frequently circle back to reconsider the previous stages and through a process of iteration eventually arrive at a solution that is workable.

Intelligence consists of discovering, identifying, and understanding the problems occurring in the organization—why is there a problem, where, and what effects is it having on the firm. Traditional MIS that deliver a wide variety of detailed information can help identify problems, especially if the systems report exceptions.

Design involves identifying and exploring various solutions to the problem. Decisionsupport systems (DSS) are ideal in this stage for exploring alternatives because they possess analytical tools for modeling data, enabling users to explore various options quickly.

Choice consists of choosing among solution alternatives. Here, DSS with access extensive firm data can help managers choose the optimal solution. Also group decisionsupport systems can be used to bring groups of managers together in an electronic online environment to discuss different solutions and make a choice.

Implementation involves making the chosen alternative work and continuing

to monitor how well the solution is working. Here, traditional MIS come back into play by providing managers with routine reports on the progress of a specific solution. Support systems can range from full-blown MIS to much smaller systems, as well as project-planning software operating on personal computers.

In the real world, the stages of decision making described here do not necessarily follow a linear path. You can be in the process of implementing a decision, only to discover that your solution is not working. In such cases, you will be forced to repeat the design, choice, or perhaps even the intelligence stage.

For instance, in the face of declining sales, a sales management team may strongly support a new sales incentive system to spur the sales force on to greater effort. If paying the sales force a higher commission for making more sales does not produce sales increases, managers would need to investigate whether the problem stems from poor product design, inadequate customer support, or a host of other causes, none of which would be "solved" by a new incentive system.

3.2 Trends in Decision Support and Business Intelligence

Systems supporting management decision making originated in the early 1960s as early MIS that created fixed, inflexible paper-based reports and distributed them to managers on a routine schedule. In the 1970s, the first DSS emerged as standalone applications with limited data and a few analytic models. ESS emerged during the 1980s to give senior managers an overview of corporate operations. Early ESS were expensive, based on custom technology, and suffered from limited data and flexibility.

The rise of client/server computing, the Internet, and Web technologies has made a major impact on systems that support decision making. Many decision-support applications are now delivered over corporate intranets. We see six major trends:

- ***Detailed enterprise-wide data.*** Enterprise systems create an explosion in firmwide, current, and relatively accurate information, supplying end users at their desktops with powerful analytic tools for analyzing and visualizing data.
- ***Broadening decision rights and responsibilities.*** As information becomes more widespread throughout the corporation, it is possible to reduce levels of hierarchy and grant more decision-making authority to lower-level employees.
- ***Intranets and portals.*** Intranet technologies create global, company-wide networks that ease the flow of information across divisions and regions and delivery of near real-time data to management and employee desktops.
- ***Personalization and customization of information.*** Web portal technologies provide great flexibility in determining what data each employee and manager sees on his or her desktop. Personalization of decision

information can speed up decision making by enabling users to filter out irrelevant information.

- ***Extranets and collaborative commerce.*** Internet and Web technologies permit suppliers and logistics partners to access firm enterprise data and decision-support tools and work collaboratively with the firm.
- ***Team support tools.*** Web-based collaboration and meeting tools enable project teams, task forces, and small groups to meet online using corporate intranets or extranets. These new collaboration tools borrow from earlier GDSS and are used for both brainstorming and decision sessions.

4.Business Intelligence

Business intelligence combines business analytics, data mining, data visualization, data tools and infrastructure, and best practices to help organizations make more data-driven decisions. In practice, you know you've got modern business intelligence when you have a comprehensive view of your organization's data and use that data to drive change, eliminate inefficiencies, and quickly adapt to market or supply changes. Modern BI solutions prioritize flexible self-service analysis, governed data on trusted platforms, empowered business users, and speed to insight

Business Intelligence is a set of processes, architectures, and technologies that convert raw data into meaningful information that drives profitable business actions. It is a suite of software and services to transform data into actionable intelligence and knowledge.

BI has a direct impact on organization's strategic, tactical and operational business decisions. BI supports fact-based decision making using historical data rather than assumptions and gut feeling.

BI tools perform data analysis and create reports, summaries, dashboards, maps, graphs, and charts to provide users with detailed intelligence about the nature of the business.

4.1 Why is BI important?

- Measurement: 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)

4.2 How Business Intelligence systems are implemented?

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.

4.3 Examples of Business Intelligence System used in Practice

Example 1:

. 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 beexecuted 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
- Increase radio budget

Correspondigly, 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
- change in customer salary level

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

Example 2:

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.

Example 3:

A bank gives branch managers access to BI applications. It helps branch manager to determine who are the most profitable customers 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.

4.4 Four types of BI users

Following given are the four key players who are used Business Intelligence System:

1. The Professional Data Analyst:

The data analyst is a statistician who always needs to drill deep down into data. BI system helps them to get fresh insights to develop unique business strategies.

2. The IT users:

The IT user also plays a dominant role in maintaining the BI infrastructure.

3. The head of the company:

CEO or CXO can increase the profit of their business by improving operational efficiency in their business.

4. The Business Users"

Business intelligence users can be found from across the organization. There are mainly two types of business users

1. Casual business intelligence user
2. The power user.

The difference between both of them is that a power user has the capability of working with complex data sets, while the casual user need will make him use dashboards to evaluate predefined sets of data.

4.5 Advantages of Business Intelligence

Here are some of the advantages of using Business Intelligence System:

1. Boost productivity

With a BI program, It is possible for businesses to create reports with a single click thus saves lots of time and resources. It also allows employees to be more productive on their tasks.

2. To improve visibility

BI also helps to improve the visibility of these processes and make it possible to identify any areas which need attention.

3. Fix Accountability

BI system assigns accountability in the organization as there must be someone who should own accountability and ownership for the organization's performance against its set goals.

4. It gives a bird's eye view:

BI system also helps organizations as decision makers get an overall bird's eye view through typical BI features like dashboards and scorecards.

5. It streamlines business processes:

BI takes out all complexity associated with business processes. It also automates analytics by offering predictive analysis, computer modeling, benchmarking and other methodologies.

6. It allows for easy analytics.

BI software has democratized its usage, allowing even nontechnical or non-analysts users to collect and process data quickly. This also allows putting the power of analytics from the hand's many people.

4.6 BI System Disadvantages

1. Cost:

Business intelligence can prove costly for small as well as for medium-sized enterprises. The use of such type of system may be expensive for routine business transactions.

2. Complexity:

Another drawback of BI is its complexity in implementation of datawarehouse. It can be so complex that it can make business techniques rigid to deal with.

3. Limited use

Like all improved technologies, BI was first established keeping in consideration the buying competence of rich firms. Therefore, BI system is yet not affordable for many small and medium size companies.

4. Time Consuming Implementation

It takes almost one and half year for data warehousing system to be completely implemented. Therefore, it is a time-consuming process.

5.What is OLAP?

A core component of data warehousing implementations, OLAP enables fast, flexible multidimensional data analysis for business intelligence (BI) and decision support applications.

OLAP (for *online analytical processing*) is software for performing multidimensional analysis at high speeds on large volumes of data from a data warehouse, data mart, or some other unified, centralized data store.

Most business data have multiple dimensions—multiple categories into which the data are broken down for presentation, tracking, or analysis. For example, sales figures might have several dimensions related to location (region, country, state/province, store), time (year, month, week, day), product (clothing, men/women/children, brand, type), and more.

But in a data warehouse, data sets are stored in tables, each of which can organize data into just two of these dimensions at a time. OLAP extracts data from multiple relational data sets and reorganizes it into a multidimensional format that enables very fast processing and very insightful analysis.

5.1What is an OLAP cube?

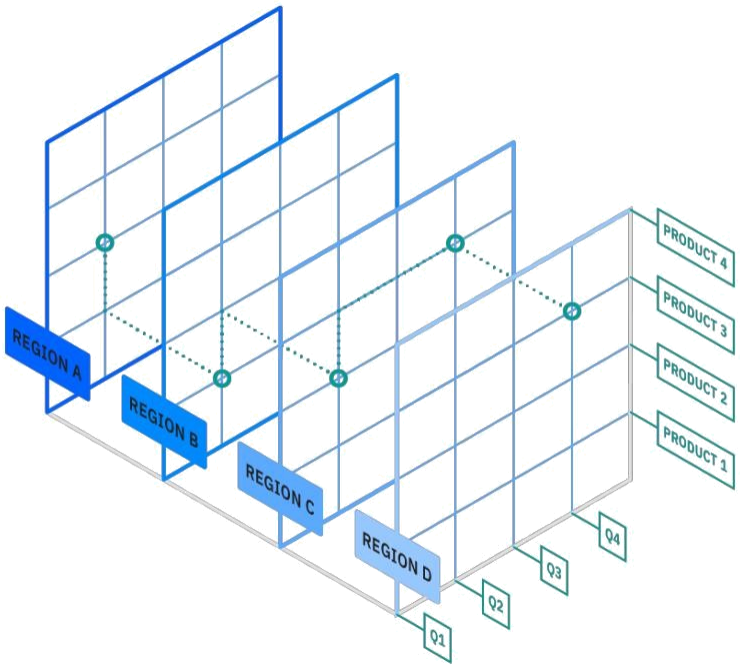
The core of most OLAP systems, the OLAP cube is an array-based multidimensional database that makes it possible to process and analyze multiple data dimensions much more quickly and efficiently than a traditional relational database.

A relational database table is structured like a spreadsheet, storing individual records in a two-dimensional, row-by-column format. Each data “fact” in the database sits at the intersection of two dimensions–a row and a column—such as *region* and *total sales.*

SQL and relational database reporting tools can certainly query, report on, and analyze multidimensional data stored in tables, but performance slows down as the data volumes increase. And it requires a lot of work to reorganize the results to focus on different dimensions.

This is where the OLAP cube comes in. The OLAP cube extends the single table with additional layers, each adding additional dimensions—usually the next level in the “concept hierarchy” of the dimension. For example, the top layer of the cube might organize sales by region; additional layers could be country, state/province, city and even specific store.

In theory, a cube can contain an infinite number of layers. (An OLAP cube representing more than three dimensions is sometimes called a hypercube.) And smaller cubes can exist within layers—for example, each store layer could contain cubes arranging sales by salesperson and product. In practice, data analysts will create OLAP cubes containing just the layers they need, for optimal analysis and performance.



OLAP cubes enable four basic types of multidimensional data analysis:

Drill-down

The drill-down operation converts less-detailed data into more-detailed data through one of two methods—moving down in the concept hierarchy or adding a new dimension to the cube. For example, if you view sales data for an organization's calendar or fiscal quarter, you can drill-down to see sales for each month, moving down in the concept hierarchy of the "time" dimension.

Roll up

Roll up is the opposite of the drill-down function—it aggregates data on an OLAP cube by moving up in the concept hierarchy or by reducing the number of dimensions. For example, you could move up in the concept hierarchy of the "location" dimension by viewing each country's data, rather than each city.

Slice and dice

The slice operation creates a sub-cube by selecting a single dimension from the main OLAP cube. For example, you can perform a slice by highlighting all data for the organization's first fiscal or calendar quarter (time dimension).

The dice operation isolates a sub-cube by selecting several dimensions within the main OLAP cube. For example, you could perform a dice operation by highlighting all data by an organization's calendar or fiscal quarters (time dimension) and within the U.S. and Canada (location dimension).

Pivot

The pivot function rotates the current cube view to display a new representation of the data—enabling dynamic multidimensional views of data. The OLAP pivot function is comparable to the pivot table feature in spreadsheet software, such as Microsoft Excel, but while pivot tables in Excel can be challenging, OLAP pivots are relatively easier to use (less expertise is required) and have a faster response time and query performance.

MOLAP vs. ROLAP vs. HOLAP

OLAP that works directly with a multidimensional OLAP cube is known as *multidimensional OLAP,* or *MOLAP*. Again, for most uses, MOLAP is the fastest and most practical type of multidimensional data analysis.

However, there are two other types of OLAP which may be preferable in certain cases:

ROLAP

ROLAP, or *relational OLAP,* is multidimensional data analysis that operates directly on data on relational tables, without first reorganizing the data into a cube.

As noted previously, SQL is a perfectly capable tool for multidimensional queries, reporting, and analysis. But the SQL queries required are complex, performance can drag, and the resulting view of the data is static—it can't be pivoted to represent a different view of the data. ROLAP is best when the ability to work directly with large amounts of data is more important than performance and flexibility.

HOLAP

HOLAP, or *hybrid OLAP*, attempts to create the optimal division of labor between relational and multidimensional databases within a single OLAP architecture. The relational tables contain larger quantities of data, and OLAP cubes are used for aggregations and speculative processing. HOLAP requires an OLAP server that supports both MOLAP and ROLAP.

A HOLAP tool can "drill through" the data cube to the relational tables, which paves the way for quick data processing and flexible access. This hybrid system can offer better scalability but can't escape the inevitable slow-down when accessing relational data sources. Also, its complex architecture typically requires more frequent updates and

maintenance, as it must store and process all the data from relational databases and multidimensional databases. For this reason, HOLAP can end up being more expensive.

OLAP vs. OLTP

Online transaction processing, or *OLTP*, refers to data-processing methods and software focused on transaction-oriented data and applications.

The main difference between OLAP and OLTP is in the name: OLAP is analytical in nature, and OLTP is transactional.

OLAP tools are designed for multidimensional analysis of data in a data warehouse, which contains both transactional and historical data. In fact, an OLAP server is typically the middle, analytical tier of a data warehousing solution. Common uses of OLAP include data mining and other business intelligence applications, complex analytical calculations, and predictive scenarios, as well as business reporting functions like financial analysis, budgeting, and forecast planning.

OLTP is designed to support transaction-oriented applications by processing recent transactions as quickly and accurately as possible. Common uses of OLTP include ATMs, e-commerce software, credit card payment processing, online bookings, reservation systems, and record-keeping tools.

UNIT III BUSINESS FORECASTING

Introduction to Business Forecasting and Predictive Analytics - Logic and Data Driven Models - Data Mining and Predictive Analysis Modeling - Machine Learning for Predictive Analytics.

1. Introduction to Business Forecasting

Business analysts may choose from a wide range of forecasting techniques to support decision making. Selecting the appropriate method depends on the characteristics of the forecasting problem, such as the time horizon of the variable being forecast, as well as available information on which the forecast will be based.

Three major categories of forecasting approaches are *qualitative and judgmental techniques*, *statistical time-series models*, and *explanatory/causal methods*. In this chapter, we introduce forecasting techniques in each of these categories and use basic Excel tools, *XLMiner*, and linear regression to implement them in a spreadsheet environment.

1.1 Qualitative and Judgmental Forecasting

Qualitative and judgmental techniques rely on experience and intuition; they are necessary when historical data are not available or when the decision maker needs to forecast far into the future. For example, a forecast of when the next generation of a microprocessor will be available and what capabilities it might have will depend greatly on the opinions and expertise of individuals who understand the technology. Another use of judgmental methods is to incorporate nonquantitative information, such as the impact of government regulations or competitor behavior, in a quantitative forecast. Judgmental techniques range from such simple methods as a manager's opinion or a group-based jury of executive opinion to more structured approaches such as historical analogy and the Delphi method.

1.1.1 The Delphi Method

A popular judgmental forecasting approach, called the **Delphi method**, uses a panel of experts, whose identities are typically kept confidential from one another, to respond to a sequence of questionnaires. After each round of responses, individual opinions, edited to ensure anonymity, are shared, allowing each to see what the other experts think. Seeing other experts' opinions helps to reinforce those in agreement and to influence those who did not agree to possibly consider other factors. In the next round, the experts revise their estimates, and the process is repeated, usually for no more than two or three rounds. The Delphi method promotes unbiased exchanges of ideas and discussion and usually results in some convergence of opinion. It is one of the better approaches to forecasting long range trends and impacts.

Indicators and Indexes

Indicators and indexes generally play an important role in developing judgmental forecasts.

Indicators are measures that are believed to influence the behaviour of a variable we wish to forecast. By monitoring changes in indicators, we expect to gain insight about the future behaviour of the variable to help forecast the future.

Example 1 Leading Economic Indicators

The Department of Commerce initiated an Index of Leading Indicators to help predict future economic performance.
Components of the index include the following:

- average weekly hours, manufacturing
- average weekly initial claims, unemployment insurance
- new orders, consumer goods, and materials
- vendor performance—slower deliveries
- new orders, nondefense capital goods
- building permits, private housing
- stock prices, 500 common stocks (Standard & Poor)
- money supply
- interest rate spread
- index of consumer expectations (University of Michigan)

Business Conditions Digest included more than 100 time series in seven economic areas. This publication was discontinued in March 1990, but information related to the Index of Leading Indicators was continued in *Survey of Current Business.* In December 1995, the U.S. Department of Commerce sold this data source to The Conference Board, which now markets the information under the title *Business Cycle Indicators*; information can be obtained at its Web site (www.conference-board.org). The site includes excellent current information about the calculation of the index as well as its current components.

1.2 Statistical Forecasting Models

Statistical time-series models find greater applicability for short-range forecasting problems.

Time Series

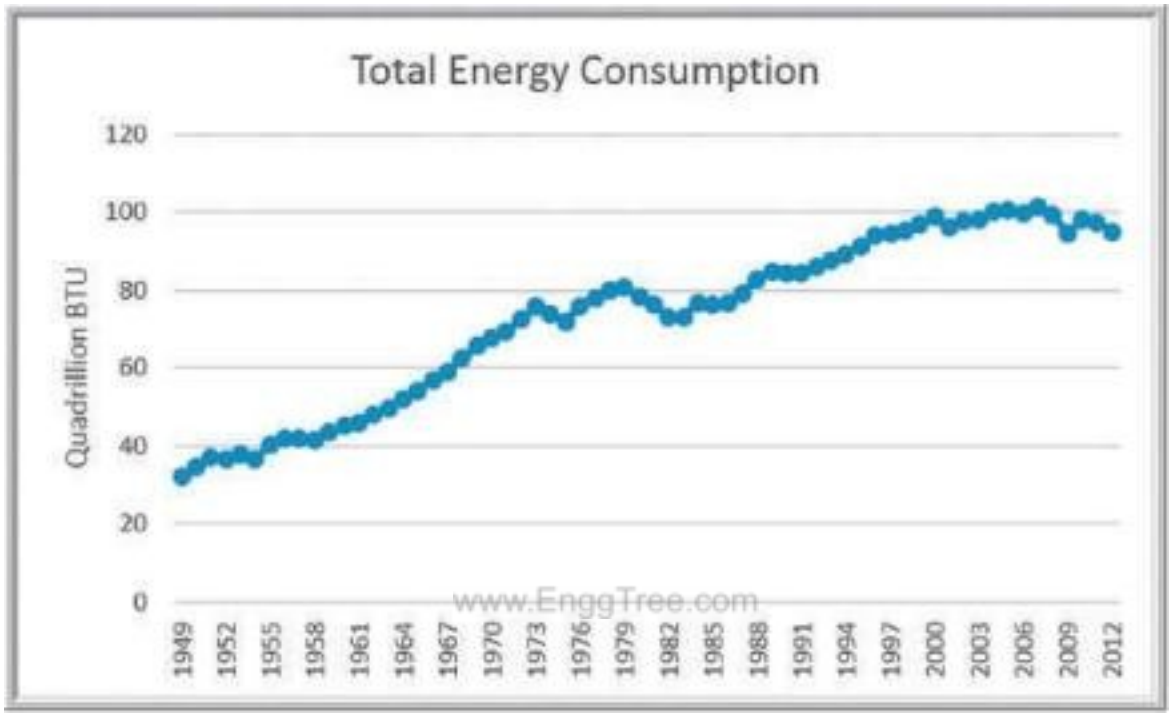
A **time series** is a stream of historical data, such as weekly sales. We characterize the values of a time series over T periods as A_t , t = 1, 2, c, T. Time-series models assume that whatever forces have influenced sales in the recent past will continue into the near future; thus, forecasts are developed by extrapolating these data into the future. Time series generally have one or more of the following components: random behavior, trends, seasonal effects, or cyclical effects.

Stationary Time Series

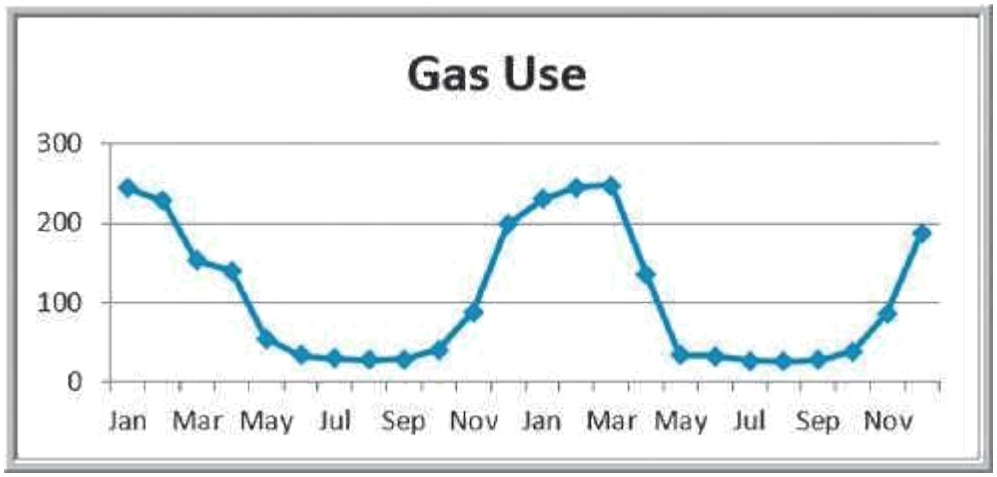
Time series that do not have trend, seasonal, or cyclical effects but are relatively constant and exhibit only random behavior are called **stationary time series**.
Many forecasts are based on analysis of historical time-series data and are predicated on the assumption that the future is an extrapolation of the past
Statistical time-series models find greater applicability for short-range forecasting problems.
A **trend** is a gradual upward or downward movement of a time series over time.

Time series may also exhibit short-term seasonal effects (over a year, month, week, or even a day) as well as longer-term cyclical effects, or nonlinear trends. A seasonal effect is one that repeats at fixed intervals of time, typically a year, month, week, or day.

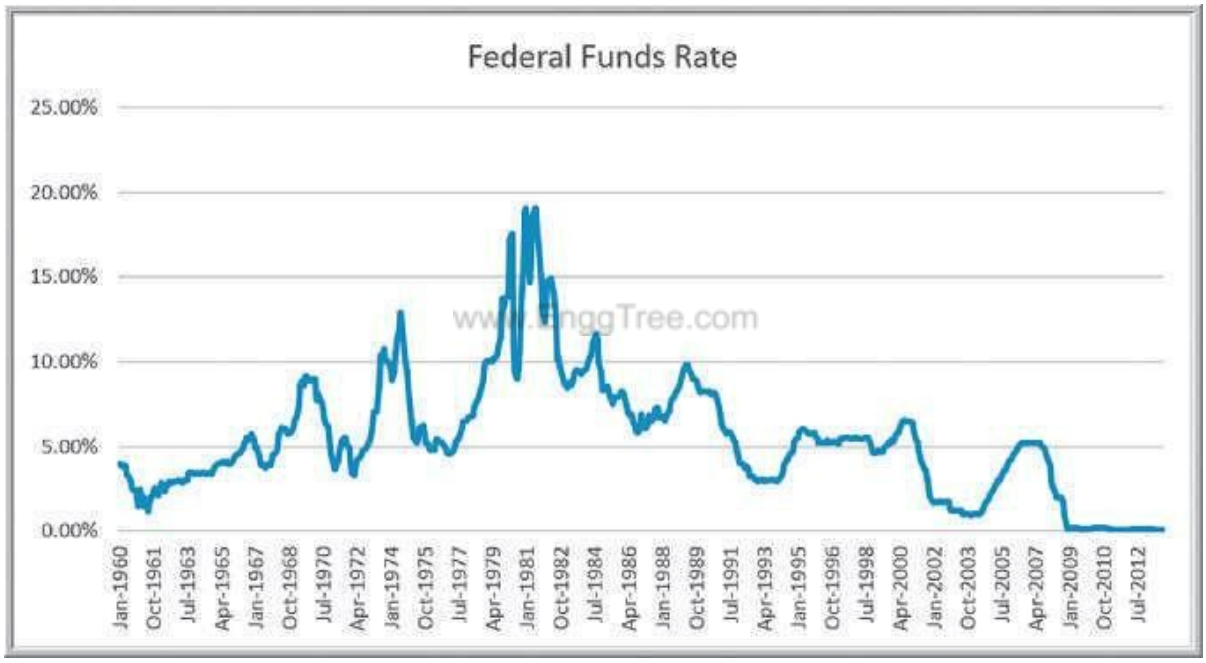
At a neighborhood grocery store, for instance, short-term seasonal patterns may occur over a week, with the heaviest volume of customers on weekends; seasonal patterns may also be evident during the course of a day, with higher volumes in the mornings and late afternoons. Figure shows seasonal changes in natural gas usage for a homeowner over the course of a year (Excel file Gas & Electric). Cyclical effects describe ups and downs over a much longer time frame, such as several years. shows a chart of the data in the Excel file Federal Funds Rates.



Total Energy Consumption Time Series



Seasonal Effects in Natural Gas Usage



Cyclical Effects in Federal Fund Rates

1.3 Moving Average Models

simple moving average method is a smoothing method based on the idea of averaging random fluctuations in the time series to identify the underlying direction in which the time series is changing.

Error Metrics and Forecast Accuracy

The quality of a forecast depends on how accurate it is in predicting future values of a time series. In the simple moving average model, different values for *k* will produce different
forecasts.

To analyze the effectiveness of different forecasting models, we can define *error metrics*, which compare quantitatively the forecast with the actual observations. Three metrics that are commonly used are the *mean absolute deviation*, *mean square error*, and *mean absolute percentage error*.

1.Mean Absolute Deviation (MAD):

The **mean absolute deviation (MAD)** is the absolute difference between the actual value and the forecast, averaged over a range of forecasted values:

$$\text{MAD} = \frac{\sum_{t=1}^{n} |A_t - F_t|}{n}$$

where *At* is the actual value of the time series at time *t*, *Ft* is the forecast value for time *t*, and *n* is the number of forecast values (*not* the number of data points since we do not have a forecast value associated with the first *k* data points). MAD provides a robust measure of error and is less affected by extreme observations.

2. Mean square error (MSE):

Mean square error (MSE) is probably the most commonly used error metric. It penalizes larger errors because squaring larger numbers has a greater impact than squaring smaller numbers. The formula for MSE is

$$\text{MSE} = \frac{\sum_{t=1}^{n} (A_t - F_t)^2}{n}$$

n represents the number of forecast values used in computing the average.

3. Root mean square error (RMSE):

Sometimes the square root of MSE, called the **root mean square error (RMSE)**, is used. Note that unlike MSE, RMSE is expressed in the same units as the data (similar to the difference between a standard deviation and a variance), allowing for more practical comparisons.

$$\text{RMSE} = \sqrt{\frac{\sum_{t=1}^{n} (A_t - F_t)^2}{n}}$$

4. **Mean absolute percentage error (MAPE)**:

MAPE is the average of absolute errors divided by actual observation values.

$$\text{MAPE} = \frac{\sum_{t=1}^{n} \left| \frac{A_t - F_t}{A_t} \right|}{n} \times 100$$

The values of MAD and MSE depend on the measurement scale of the time-series data. For example, forecasting profit in the range of millions of dollars would result in very large MAD and MSE values, even for very accurate forecasting models. On the other hand, market share is measured in proportions; therefore, even bad forecasting models will have small values of MAD and MSE. Thus, these measures have no meaning except in comparison with other models used to forecast the same data. Generally, MAD is less affected by extreme observations and is preferable to MSE if such extreme observations
are considered rare events with no special meaning. MAPE is different in that the measurement scale is eliminated by dividing the absolute error by the time-series data value. This allows a better relative comparison. Although these comments provide some guidelines, there is no universal agreement on which measure is best.

1.4 Exponential Smoothing Models

Simple Exponential smoothing Model

A versatile, yet highly effective, approach for short-range forecasting is **simple exponential smoothing**. The basic simple exponential smoothing model is

$$\begin{aligned} F_{t+1} &= (1 - \alpha)F_t + \alpha A_t \\ &= F_t + \alpha(A_t - F_t) \end{aligned}$$

where F_{t+1} is the forecast for time period $t + 1$, F_t is the forecast for period t, A_t is the observed value in period t, and a is a constant between 0 and 1 called the **smoothing constant**.

To begin, set $F1$ and $F2$ equal to the actual observation in period 1, $A1$. Using the two forms of the forecast equation just given, we can interpret the simple exponential smoothing model in two ways. In the first model, the forecast for the next period, F_{t+1}, is a weighted average of the forecast made for period t, Ft, and the actual observation in period t, At. The second form of the model, obtained by simply rearranging terms, states that the forecast for the next period, F_{t+1}, equals the forecast for the last period, Ft, plus a fraction a of the forecast error made in period t, At - Ft. Thus, to make a forecast once we have selected the smoothing constant, we need to know only the previous forecast and the actual value. By repeated substitution for Ft in the equation, it is easy to demonstrate that F_{t+1} is a decreasingly weighted average of all past time-series data. Thus,the forecast actually reflects *all* the data, provided that a is strictly between 0 and 1.

Double Exponential Smoothing

In double exponential smoothing, the estimates of a_t and b_t are obtained from the following
equations:

$$\begin{aligned} a_t &= \alpha F_t + (1 - \alpha)(a_{t-1} + b_{t-1}) \\ b_t &= \beta(a_t - a_{t-1}) + (1 - \beta)b_{t-1} \end{aligned}$$

In essence, we are smoothing both parameters of the linear trend model. From the first equation, the estimate of the level in period *t* is a weighted average of the observed value at time *t* and the predicted value at time *t*, $a_{t+1} + b_{t+1}$,based on simple exponential smoothing. For large values of a, more weight is placed on the observed value. Lower values of a put more weight on the smoothed predicted value. Similarly, from the second equation, the estimate of the trend in period *t* is a weighted average of the differences in the estimated levels in periods *t* and *t* - 1 and the estimate of the level in period *t* - 1.

Forecasting Time Series with Seasonality:

When time series exhibit seasonality, different techniques provide better forecasts,

- **Regression-Based Seasonal Forecasting Models**

One approach is to use linear regression. Multiple linear regression models with categorical variables can be used for time series with seasonality.

- **Holt-Winters Forecasting for Seasonal Time Series**

Holt-Winters models are similar to exponential smoothing models in that smoothing constants are used to smooth out variations in the level and seasonal patterns over time. For time series with seasonality but no trend, *XLMiner* supports a Holt-Winters method but does not have the ability to optimize the parameters

- **Holt-Winters Models for Forecasting Time Series with seasonality and Trend**

Many time series exhibit both trend and seasonality. Such might be the case for growing sales of a seasonal product. These models combine elements of both the trend and seasonal models. Two types of Holt-Winters smoothing models are often used.

The **Holt-Winters additive model** is based on the equation

$$F_{t+1} = a_t + b_t + S_{t-s+1}$$

and the **Holt-Winters multiplicative model** is

$$F_{t+1} = (a_t + b_t)S_{t-s+1}$$

The additive model applies to time series with relatively stable seasonality, whereas the multiplicative model applies to time series whose amplitude increases or decreases over time. Therefore, a chart of the time series should be viewed first to identify the appropriate type of model to use. Three parameters, $\propto$,β,γ, are used to smooth the level, trend,and seasonal factors in the time series. *XLMiner* supports both models.

Selecting Appropriate Time-Series-Based Forecasting Models

The table summarizes the choice of forecasting approaches that can be implemented by *XLMiner* based on characteristics of the time series.

	No Seasonality	Seasonality
No trend	Simple moving average or simple exponential smoothing	Holt-Winters no-trend smoothing model or multiple regression
Trend	Double exponential smoothing	Holt-Winters additive or Holt-Winters multiplicative model

Regression Forecasting with Causal Variables

In many forecasting applications, other independent variables besides time, such as economic indexes or demographic factors, may influence the time series. For example, a manufacturer of hospital equipment might include such variables as hospital capital spending and changes in the proportion of people over the age of 65 in building models to forecast future sales. Explanatory/causal models, often called **econometric models**, seek to identify factors that explain statistically the patterns observed in the variable being forecast, usually with regression analysis.

The Practice of Forecasting

Surveys of forecasting practices have shown that both judgmental and quantitative methods are used for forecasting sales of product lines or product families as well as for broad company and industry forecasts. Simple time-series models are used for short- and medium-range forecasts, whereas regression analysis is the most popular method for long range forecasting. However, many companies rely on judgmental methods far more than quantitative methods, and almost half judgmentally adjust quantitative forecasts.

In practice, managers use a variety of judgmental and quantitative forecasting techniques.

Statistical methods alone cannot account for such factors as sales promotions, unusual environmental disturbances, new product introductions, large one-time orders, and so on. Many managers begin with a statistical forecast and adjust it to account for intangible factors. Others may develop independent judgmental and statistical forecasts and then combine them, either objectively by averaging or in a subjective manner.

It is important to compare quantitatively generated forecasts to judgmental forecasts to see if the forecasting method is adding value in terms of an improved forecast. It is impossible to provide universal guidance as to which approaches are best, because they depend on a variety of factors, including the presence or absence of trends and seasonality, the number of data points available, length of the forecast time horizon, and the experience and knowledge of the forecaster. Often, quantitative approaches will miss significant changes in the data, such as reversal of trends, whereas qualitative forecasts may catch them, particularly when using indicators.

2.Logic and Data Driven Models

Predictive modeling means the developing models that can be used to forecast or predict future events. Models can be developed either through logic or data.

Logic driven models remain based on experience, knowledge and logical relationships of variables and constants connected to the desired business performance outcome situation.

Data-driven Models refers to the models in which data is collected from many sources to qualitatively establish model relationships. Logic driven models is often used as a first step to establish relationships through data-driven models. Data driven models include sampling and estimation, regression analysis, correlation analysis, forecasting models and stimulation.

3. Mining and Predictive Analysis Modelling:

Data mining is a rapidly growing field of business analytics that is focused on better understanding characteristics and patterns among variables in large databases using a

variety of statistical and analytical tools. Many of the tools that we have studied in previous chapters, such as data visualization, data summarization, PivotTables, correlation and regression analysis, and other techniques, are used extensively in data mining. However, as the amount of data has grown exponentially, many other statistical and analytical methods have been developed to identify relationships among variables in large data sets and understand hidden patterns that they may contain

Some common approaches in data mining include the following

- ***Data Exploration and Reduction***.
  This often involves identifying groups in which the elements of the groups are in some way similar. This approach is often used to understand differences among customers and segment them into homogenous groups.
  For example, Macy's department stores identified four lifestyles of its customers: "Katherine," a traditional, classic dresser who doesn't take a lot of risks and likes quality; "Julie," neotraditional and slightly more edgy but still classic; "Erin," a contemporary customer who loves newness and shops by brand; and "Alex," the fashion customer who wants only the latest and greatest (they have male versions also).4 Such segmentation is useful in design and marketing activities to better target product offerings. These techniques have also been used to identify characteristics of successful employees and improve recruiting and hiring practices.
- ***Classification***. Classification is the process of analyzing data to predict how to classify a new data element. An example of classification is spam filtering in an e-mail client. By examining textual characteristics of a message (subject header, key words, and so on), the message is classified as junk or not. Classification methods can help predict whether a credit-card transaction may be fraudulent, whether a loan applicant is high risk, or whether a consumer will respond to an advertisement.
- ***Association***. Association is the process of analyzing databases to identify natural associations among variables and create rules for target marketing or buying recommendations.
  For example, Netflix uses association to understand what types of movies a customer likes and provides recommendations based on the data.
  Amazon.com also makes recommendations based on past purchases.
  Supermarket loyalty cards collect data on customers' purchasing habits and print coupons at the point of purchase based on what was currently bought.
  - ***Cause-and-effect modeling***. Cause-and-effect modeling is the process of developing analytic models to describe the relationship between metrics that drive business performance—for instance, profitability, customer satisfaction, or employee satisfaction. Understanding the drivers of performance can lead to better decisions to improve performance. For example, the controls group of Johnson Controls, Inc., examined the relationship between satisfaction and contract-renewal rates. They found that 91% of contract renewals came from customers who were either satisfied or very satisfied, and customers who were not satisfied had a much higher defection rate. Their model predicted that a one-percentage-point increase in the overall satisfaction score was worth $13 million in service contract renewals annually. As a result, they identified decisions

that would improve customer satisfaction.Regression and correlation analysis are key tools for cause-and-effect modelling.

3.1 Predictive Modeling

Predictive modeling is a commonly used statistical technique to predict future behavior. Predictive modeling solutions are a form of data-mining technology that works by analyzing historical and current data and generating a model to help predict future outcomes.

In predictive modeling, data is collected, a statistical model is formulated, predictions are made, and the model is validated (or revised) as additional data becomes available.

For example, risk models can be created to combine member information in complex ways with demographic and lifestyle information from external sources to improve underwriting accuracy. Predictive models analyze past performance to assess how likely a customer is to exhibit a specific behavior in the future. This category also encompasses models that seek out subtle data patterns to answer questions about customer performance, such as fraud detection models. Predictive models often perform calculations during live transactions—for example, to evaluate the risk or opportunity of a given customer or transaction to guide a decision. If health insurers could accurately predict secular trends (for example, utilization), premiums would be set appropriately, profit targets would be met with more consistency, and health insurers would be more competitive in the marketplace.

Predictive modeling is a method of predicting future outcomes by using data modeling. It's one of the premier ways a business can see its path forward and make plans accordingly. While not fool proof, this method tends to have high accuracy rates, which is why it is so commonly used. Predictive modelling uses statistics to predict outcomes. Most often the event one wants to predict is in the future, but predictive modelling can be applied to any type of unknown event, regardless of when it occurred. For example, predictive models are often used to detect crimes and identify suspects, after the crime has taken place.

In many cases the model is chosen on the basis of detection theory to try to guess the probability of an outcome given a set amount of input data, for example given an email determining how likely that it is spam. Models can use one or more classifiers in trying to determine the probability of a set of data belonging to another set.

For example, a model might be used to determine whether an email is spam or "ham" (non-spam). Depending on definitional boundaries, predictive modelling is synonymous with, or largely overlapping with, the field of machine learning, as it is more commonly referred to in academic or research and development contexts. When deployed commercially, predictive modelling is often referred to as predictive analytics. Predictive modelling is often contrasted with causal modelling/analysis. In the former, one may be entirely satisfied to make use of indicators of, or proxies for, the outcome of interest. In the latter, one seeks to determine true cause-and-effect relationships. This distinction has given rise to a burgeoning literature in the fields of research methods and statistics and to the common statement that "correlation does not imply causation".

3.2 What Is Predictive Modeling?

In short, predictive modeling is a statistical technique using machine learning and data mining to predict and forecast likely future outcomes with the aid of historical and existing data. It works by analyzing current and historical data and projecting what it learns on a model generated to forecast likely outcomes.

Predictive modeling can be used to predict just about anything, from TV ratings and a customer's next purchase to credit risks and corporate earnings. A predictive model is not fixed; it is validated or revised regularly to incorporate changes in the underlying data. In other words, it's not a one-and-done prediction. Predictive models make assumptions based on what has happened in the past and what is happening now.

If incoming, new data shows changes in what is happening now, the impact on the likely future outcome must be recalculated, too. For example, a software company could model historical sales data against marketing expenditures across multiple regions to create a model for future revenue based on the impact of the marketing spend. Most predictive models work fast and often complete their calculations in real time. That's why banks and retailers can, for example, calculate the risk of an online mortgage or credit card application and accept or decline the request almost instantly based on that prediction.

Some predictive models are more complex, such as those used in computational biology and quantum computing; the resulting outputs take longer to compute than a credit card application but are done much more quickly than was possible in the past thanks to advances in technological capabilities, including computing power.

3.3 Top 5 Types of Predictive Models

Fortunately, predictive models don't have to be created from scratch for every application. Predictive analytics tools use a variety of vetted models and algorithms that can be applied to a wide spread of use cases.

Predictive modeling techniques have been perfected over time. As we add more data, more muscular computing, AI and machine learning and see overall advancements in analytics, we're able to do more with these models.

The top five predictive analytics models are:

1. **Classification model**:
   Considered the simplest model, it categorizes data for simple and direct query response. An example use case would be to answer the question "Is this a fraudulent transaction?"
2. **Clustering mode**l:
   This model nests data together by common attributes. It works by grouping things or people with shared characteristics or behaviors and plans strategies for each group at a larger scale. An example is in determining credit risk for a loan applicant based on what other people in the same or a similar situation did in the past.
3. **Forecast model**:
   This is a very popular model, and it works on anything with a numerical value based on learning from historical data. For example, in answering how much lettuce a restaurant should order next week or how many calls a customer support agent should be able to handle per day or week, the system looks back to historical data.
4. **Outliers model**:
   This model works by analyzing abnormal or outlying data points. For example, a bank might use an outlier model to identify fraud by asking whether a transaction is outside of the customer's normal buying habits or whether an expense in a given category is normal or not. For example, a $1,000 credit card charge for a washer and dryer in the cardholder's preferred big box store would not be alarming, but $1,000 spent on designer clothing in a location where the customer has never charged other items might be indicative of a breached account.
5. **Time series model:**

This model evaluates a sequence of data points based on time. For example, the number of stroke patients admitted to the hospital in the last four months is used to predict how many patients the hospital might expect to admit next week, next month or the rest of the year. A single metric measured and compared over time is thus more meaningful than a simple average.

3.4 Predictive Algorithms:

Some of the more common predictive algorithms are:

1. **Random Forest**: This algorithm is derived from a combination of decision trees, none of which are related, and can use both classification and regression to classify vast amounts of data.
2. **Generalized Linear Model (GLM) for Two Values**: This algorithm narrows down the list of variables to find "best fit." It can work out tipping points and change data capture and other influences, such as categorical predictors, to determine the "best fit" outcome, thereby overcoming drawbacks in other models, such as a regular linear regression.
3. **Gradient Boosted Model:** This algorithm also uses several combined decision trees, but unlike Random Forest, the trees are related. It builds out one tree at a time, thus enabling the next tree to correct flaws in the previous tree. It's often used in rankings, such as on search engine outputs.
4. **K-Means**: A popular and fast algorithm, K-Means groups data points by similarities and so is often used for the clustering model. It can quickly render things like personalized retail offers to individuals within a huge group, such as a million or more customers with a similar liking of lined red wool coats.
5. **Prophet**: This algorithm is used in time-series or forecast models for capacity planning, such as for inventory needs, sales quotas and resource allocations. It is highly flexible and can easily accommodate heuristics and an array of useful assumptions.

Predictive modeling is often performed using curve and surface fitting, time series regression, or machine learning approaches. Regardless of the approach used, the process of creating a predictive model is the same across methods.

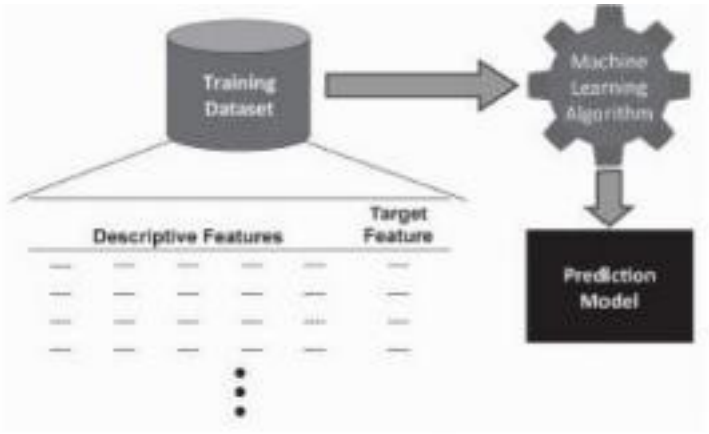
3.5 Steps for Predictive Modeling:

The steps are:

1. Clean the data by removing outliers and treating missing data.
2. Identify a parametric or nonparametric predictive modeling approach to use.
3. Preprocess the data into a form suitable for the chosen modeling algorithm.
4. Specify a subset of the data to be used for training the model.
5. Train, or estimate, model parameters from the training data set.
6. Conduct model performance or goodness-of-fit tests to check model adequacy.
7. Validate predictive modeling accuracy on data not used for calibrating the model.
8. Use the model for prediction if satisfied with its performance .

4.Machine Learning for Predictive Analytics

Machine learning is defined as an automated process that extracts patterns from data. To build the models used in predictive data analytics applications, we use supervised machine learning. Supervised machine learning techniques automatically learn a model of the relationship between a set of descriptive features and a target feature based on a set of historical examples, or instances. We can then use this model to make predictions for new instances. These two separate steps are shown in figure,



(a) Learning a model from a set of historical instances

(b) Using a model to make predictions

The two steps in supervised machine learning. Table1.1 lists a set of historical instances, or dataset, of mortgages that a bank has granted in the past. This dataset includes descriptive features that describe the mortgage, and a target feature that indicates whether the mortgage applicant ultimately defaulted on the loan or paid it back in full. The descriptive features tell us three pieces of information about the mortgage: the OCCUPATION (which can be professional or industrial) and AGE of the applicant and the ratio between the applicant's salary and the amount borrowed (LOANSALARY RATIO). The target feature, OUTCOME, is set to either default or repay. In machine learning terms, each row in the dataset is referred to as a training instance, and the overall dataset is referred to as a training data sets.

Table 1.1

A credit scoring dataset.

ID	OCCUPATION	AGE	LOAN-SALARY RATIO	OUTCOME
1	industrial	34	2.96	repay
2	professional	41	4.64	default
3	professional	36	3.22	default
4	professional	41	3.11	default
5	industrial	48	3.80	default
6	industrial	61	2.52	repay
7	professional	37	1.50	repay
8	professional	40	1.93	repay
9	industrial	33	5.25	default
10	industrial	32	4.15	default

An example of a very simple prediction model for this domain would be

if LOAN-SALARY RATIO > 3 then

OUTCOME = default

else

OUTCOME = repay

We can say that this model is consistent with the dataset as there are no instances in the dataset for which the model does not make a correct prediction. When new mortgage applications are made, we can use this model to predict whether the applicant will repay the mortgage or default on it and make lending decisions based on this prediction.

Machine learning algorithms automate the process of learning a model that captures the relationship between the descriptive features and the target feature in a dataset.

For simple datasets like the one in Table , we may be able to manually create a prediction model, and in an example of this scale, machine learning has little to offer us.

Consider, however, the dataset in Table, which shows a more complete representation of the same problem. This dataset lists more instances, and there are extra descriptive features describing the AMOUNT that a mortgage holder borrows, the mortgage holder's SALARY, the type of PROPERTY that the mortgage relates to (which can be farm,house, or apartment) and the TYPE of mortgage (which can be ftp for first-time buyers or stb for second-time buyers).

The simple prediction model using only the loan-salary ratio feature is no longer consistent with the dataset. It turns out, however, that there is at least one prediction model that is consistent with the dataset; it is just a little harder to find than the previous one:

if LOAN-SALARY RATIO < 1.5 then

OUTCOME = repay

else if LOAN-SALARY RATIO > 4 then

OUTCOME = default

else if AGE < 40 and OCCUPATION =industrial then

OUTCOME = default

else

OUTCOME = repay

To manually learn this model by examining the data is almost impossible. For a machine learning algorithm, however, this is simple. When we want to build prediction models from large datasets with multiple features, machine learning is the solution.

4.1 How does Machine Learning Work?

Machine learning algorithms work by searching through a set of possible prediction models for the model that best captures the relationship between the descriptive features and target feature in a dataset. An obvious criteria for driving this search is to look for models that are consistent with the data.

There are, however, at least two reasons why just searching for consistent models is not sufficient in order to learn useful prediction models.

First, when we are dealing with large datasets, it is likely that there will be noise in the data, and prediction models that are consistent with noisy data will make incorrect predictions.

Second, in the vast majority of machine learning projects, the training set represents only a small sample of the possible set of instances in the domain. As a result, machine learning is an ill-posed problem. An ill-posed problem is a problem for which a unique solution cannot be determined using only the information that is available.

Table 1.2

A more complex credit scoring dataset.

ID	AMOUNT	SALARY	LOAN-SALARY RATIO	AGE	OCCUPATION	PROPERTY	TYPE	OUTCOME
1	245,100	66,400	3.69	44	industrial	farm	stb	repay
2	90,600	75,300	1.20	41	industrial	farm	stb	repay
3	195,600	52,100	3.75	37	industrial	farm	ftb	default
4	157,800	67,600	2.33	44	industrial	apartment	ftb	repay
5	150,800	35,800	4.21	39	professional	apartment	stb	default
6	133,000	45,300	2.94	29	industrial	farm	ftb	default
7	193,100	73,200	2.64	38	professional	house	ftb	repay
8	215,000	77,600	2.77	17	professional	farm	ftb	repay
9	83,000	62,500	1.33	30	professional	house	ftb	repay
10	186,100	49,200	3.78	30	industrial	house	ftb	default
11	161,500	53,300	3.03	28	professional	apartment	stb	repay
12	157,400	63,900	2.46	30	professional	farm	stb	repay
13	210,000	54,200	3.87	43	professional	apartment	ftb	repay
14	209,700	53,000	3.96	39	industrial	farm	ftb	default
15	143,200	65,300	2.19	32	industrial	apartment	ftb	default
16	203,000	64,400	3.15	44	industrial	farm	ftb	repay
17	247,800	63,800	3.88	46	industrial	house	stb	repay
18	162,700	77,400	2.10	37	professional	house	ftb	repay
19	213,300	61,100	3.49	21	industrial	apartment	ftb	default
20	284,100	32,300	8.80	51	industrial	farm	ftb	default
21	154,000	48,900	3.15	49	professional	house	stb	repay
22	112,800	79,700	1.42	41	professional	house	ftb	repay
23	252,000	59,700	4.22	27	professional	house	stb	default
24	175,200	39,900	4.39	37	professional	apartment	stb	default
25	149,700	58,600	2.55	35	industrial	farm	stb	default

Table 1.3

A simple retail dataset

ID	BBY	ALC	ORG	GRP
1	no	no	no	couple
2	yes	no	yes	family
3	yes	yes	no	family
4	no	no	yes	couple
5	no	yes	yes	single

We can illustrate how machine learning is an ill-posed problem using an example in which the analytics team at a supermarket chain wants to be able to classify customer households into the demographic groups single, couple, or family, based solely on their shopping habits.

The dataset in Table 1.3 contains descriptive features describing the shopping habits of 5 customers. The descriptive features measure whether a customer buys baby food, BBY, alcohol, ALC, or organic vegetable products, ORG. Each feature can take one of the two values: yes or no. Alongside these descriptive features is a target feature, GRP, that describes the demographic group for each customer (single, couple, or family). The dataset in Table 1.3 is referred to as a labeled dataset because it includes values for the target feature.

Imagine we attempt to learn a prediction model for this retail scenario by searching for a model that is consistent with the dataset. The first thing we need to do is figure out many different possible models actually exist for the scenario. This defines the set of prediction models the machine learning algorithm will search. From the perspective of searching for a consistent model, the most important property of a prediction model is that it defines a mapping from every possible combination of descriptive feature values to a prediction for the target feature. For the retail scenario, there are only three binary descriptive features, so there are 2_3 = 8 possible combinations of descriptive feature values. However, for each of these 8 possible descriptive feature value combinations, there are 3 possible target feature values, so this means that there are 3_8= 6,561 possible prediction models that could be used. Table illustrates the relationship between descriptive feature value combinations and prediction models for the retail scenario. The descriptive feature combinations are listed on the left hand side of the table and the set of potential models for this domain are shown as 1 to 6,561 on the right hand side of the table. Using the training dataset from Table1.3 , a machine learning algorithm will reduce the full set of 6,561 possible prediction models for this scenario down to just those that

are consistent with the training instances. Table 1.4(b) illustrates this; the blanked out columns in the table indicate the models that are not consistent with the training data.

Table 1.4

Potential prediction models (a) before and (b) after training data becomes available.

BBY	ALC	ORG	GRP	M_1	M_2	M_3	M_4	M_5	...	M_{6561}
no	no	no	?	couple	couple	single	couple	couple	...	couple
no	no	yes	?	single	couple	single	couple	couple	...	single
no	yes	no	?	family	family	single	single	single	...	family
no	yes	yes	?	single	single	single	single	single	...	couple
yes	no	no	?	couple	couple	family	family	family	...	family
yes	no	yes	?	couple	family	family	family	family	...	couple
yes	yes	no	?	single	family	family	family	family	...	single
yes	yes	yes	?	single	single	family	family	couple	...	family

(b)

BBY	ALC	ORG	GRP	M_2	M_4	M_5	...
no	no	no	couple	couple	couple	couple	...
no	no	yes	couple	couple	couple	couple	...
no	yes	no	?	family	single	single	...
no	yes	yes	single	single	single	single	...
yes	no	no	?	couple	family	family	...
yes	no	yes	family	family	family	family	...
yes	yes	no	family	family	family	family	...
yes	yes	yes	?	single	family	couple	...

Table1.4(b) also illustrates the fact that the training dataset does not contain an instance for every possible descriptive feature value combination and that there are still a large number of potential prediction models that remain consistent with the training dataset after the inconsistent models have been excluded. Specifically, there are three remaining descriptive feature value combinations for which the correct target feature value is not known, and therefore there are $3_3 = 27$ potential models that remain consistent with the training data. Three of these- M_2,M_4,M_5- shown in Table1.4(b). Because a single consistent model cannot be found based on the sample training dataset alone, we say that machine learning is fundamentally an ill-posed problem.

We might be tempted to think that having multiple models that are consistent with the data is a good thing. The problem is, however, that although these models agree on what predictions should be made for the instances in the training dataset, they disagree with regard to what predictions should be returned for instances that are not in the training dataset. For example, if a new customer starts shopping at the supermarket and buys baby food, alcohol, and organic vegetables, our set of consistent models will contradict each other with respect to what prediction should be returned for this customer, for example, M_2 will return GRP = single, M_4 will return GRP = family, and M_5 will return GRP = couple.

The criterion of consistency with the training data doesn't provide any guidance with regard to which of the consistent models to prefer when dealing with queries that are outside the training dataset. As a result, we cannot use the set of consistent models to make predictions for these queries. In fact, searching for predictive models that are consistent with the dataset is equivalent to just memorizing the dataset. As a result, no learning is taking place because the set of consistent models tells us nothing about the underlying relationship between the descriptive and target features beyond what a simple look-up of the training dataset would provide.

If a predictive model is to be useful, it must be able to make predictions for queries that are not present in the data. A prediction model that makes the correct predictions for these queries captures the underlying relationship between the descriptive and target features and is said to generalize well. Indeed, the goal of machine learning is to find the predictive model that generalizes best. In order to find this single best model, a machine learning algorithm must use some criteria for choosing among the candidate models it considers during its search.

Given that consistency with the dataset is not an adequate criterion to select the best prediction model, what criteria should we use? There are a lot of potential answers to this question, and that is why there are a lot of different machine learning algorithms. Each machine learning algorithm uses different model selection criteria to drive its search for the best predictive model. So, when we choose to use one machine learning algorithm instead of another, we are, in effect, choosing to use one model selection criterion instead of another.

All the different model selection criteria consist of a set of assumptions about the characteristics of the model that we would like the algorithm to induce. The set of assumptions that defines the model selection criteria of a machine learning algorithm is known as the inductive bias 6 of the machine learning algorithm.

There are two types of inductive bias that a machine learning algorithm can use, a restriction bias and a preference bias. A restriction bias constrains the set of models that the algorithm will consider during the learning process. A preference bias guides the learning algorithm to prefer certain models over others.

For example, we introduce a machine learning algorithm called multivariable linear regression with gradient descent, which implements the restriction bias of only considering prediction models that produce predictions based on a linear combination of the descriptive feature values and applies a preference bias over the order of the linear models it considers in terms of a gradient descent approach through a weight space. As a second example, we introduce the Iterative Dichotomizer 3 (ID3) machine learning algorithm, which uses a restriction bias of only considering tree prediction models where each branch encodes a sequence of checks on individual descriptive features but also utilizes a preference bias by considering shallower (less complex) trees over larger trees. It is important to recognize that using an inductive bias is a necessary prerequisite for

learning to occur; without inductive bias, a machine learning algorithm cannot learn anything beyond what is in the data.

In summary, machine learning works by searching through a set of potential models to find the prediction model that best generalizes beyond the dataset. Machine learning algorithms use two sources of information to guide this search, the training dataset and the inductive bias assumed by the algorithm.

UNIT IV HR & SUPPLY CHAIN ANALYTICS

Human Resources – Planning and Recruitment – Training and Development - Supply chain network - Planning Demand, Inventory and Supply – Logistics – Analytics applications in HR & Supply Chain

HUMAN RESOURCES

WHAT IS HRM?

Human resource management (HRM) is the process of employing people, training them, compensating them, developing policies relating to them, and developing strategies to retain them. As a field, HRM has undergone many changes over the last twenty years, giving it an even more important role in today's organizations. In the past, HRM meant processing payroll, sending birthday gifts to employees, arranging company outings, and making sure forms were filled out correctly—in other words, more of an administrative role rather than a strategic role crucial to the success of the organization. Jack Welch, former CEO of General Electric and management guru, sums up the new role of HRM: "Get out of the parties and birthdays and enrollment forms.… Remember, HR is important in good times, HR is defined in hard times"

It's necessary to point out here, at the very beginning of this text, that every manager has some role relating to human resource management. Just because we do not have the title of HR manager doesn't mean we won't perform all or at least some of the HRM tasks. For example, most managers deal with compensation, motivation, and retention of employees—making these aspects not only part of HRM but also part of management. As a result, this book is equally important to someone who wants to be an HR manager and to someone who will manage a business.

Human Resource Recall

Have you ever had to work with a human resource department at your job? What was the interaction like? What was the department's role in that specific organization?

The Role of HRM

Keep in mind that many functions of HRM are also tasks other department managers perform, which is what makes this information important, despite the career path taken. Most experts agree on seven main roles that HRM plays in organizations. These are described in the following sections.

Staffing

You need people to perform tasks and get work done in the organization. Even with the most sophisticated machines, humans are still needed. Because of this, one of the major tasks in HRM

is staffing. Staffing involves the entire hiring process from posting a job to negotiating a salary package. Within the staffing function, there are four main steps:

1. **Development of a staffing plan.** This plan allows HRM to see how many people they should hire based on revenue expectations.
2. **Development of policies to encourage multiculturalism at work.** Multiculturalism in the workplace is becoming more and more important, as we have many more people from a variety of backgrounds in the workforce.
3. **Recruitment.** This involves finding people to fill the open positions.
4. **Selection.** In this stage, people will be interviewed and selected, and a proper compensation package will be negotiated. This step is followed by training, retention, and motivation.

Development of Workplace Policies

Every organization has policies to ensure fairness and continuity within the organization. One of the jobs of HRM is to develop the verbiage surrounding these policies. In the development of policies, HRM, management, and executives are involved in the process. For example, the HRM professional will likely recognize the need for a policy or a change of policy, seek opinions on the policy, write the policy, and then communicate that policy to employees. It is key to note here that HR departments do not and cannot work alone. Everything they do needs to involve all other departments in the organization. Some examples of workplace policies might be the following:

- Discipline process policy
- Vacation time policy
- Dress code
- Ethics policy
- Internet usage policy

Compensation and Benefits Administration

HRM professionals need to determine that compensation is fair, meets industry standards, and is high enough to entice people to work for the organization. Compensation includes anything the employee receives for his or her work. In addition, HRM professionals need to make sure the pay is comparable to what other people performing similar jobs are being paid. This involves setting up pay systems that take into consideration the number of years with the organization, years of experience, education, and similar aspects. Examples of employee compensation include the following:

- Pay
- Health benefits

- 401(k) (retirement plans)
- Stock purchase plans
- Vacation time
- Sick leave
- Bonuses
- Tuition reimbursement

Retention

Retention involves keeping and motivating employees to stay with the organization. Compensation is a major factor in employee retention, but there are other factors as well. Ninety percent of employees leave a company for the following reasons:

1. Issues around the job they are performing
2. Challenges with their manager
3. Poor fit with organizational culture
4. Poor workplace environment

Despite this, 90 percent of managers think employees leave as a result of pay.As a result, managers often try to change their compensation packages to keep people from leaving, when compensation isn't the reason they are leaving at all.

Training and Development

Once we have spent the time to hire new employees, we want to make sure they not only are trained to do the job but also continue to grow and develop new skills in their job. This results in higher productivity for the organization. Training is also a key component in employee motivation. Employees who feel they are developing their skills tend to be happier in their jobs, which results in increased employee retention. Examples of training programs might include the following:

- Job skills training, such as how to run a particular computer program
- Training on communication
- Team-building activities
- Policy and legal training, such as sexual harassment training and ethics training

Dealing with Laws Affecting Employment

Human resource people must be aware of all the laws that affect the workplace. An HRM professional might work with some of these laws:

- Discrimination laws
- Health-care requirements
- Compensation requirements such as the minimum wage
- Worker safety laws
- Labor laws

The legal environment of HRM is always changing, so HRM must always be aware of changes taking place and then communicate those changes to the entire management organization.

Worker Protection

Safety is a major consideration in all organizations. Oftentimes new laws are created with the goal of setting federal or state standards to ensure worker safety. Unions and union contracts can also impact the requirements for worker safety in a workplace. It is up to the human resource manager to be aware of worker protection requirements and ensure the workplace is meeting both federal and union standards. Worker protection issues might include the following:

- Chemical hazards
- Heating and ventilation requirements
- Use of “no fragrance” zones
- Protection of private employee information

Communication

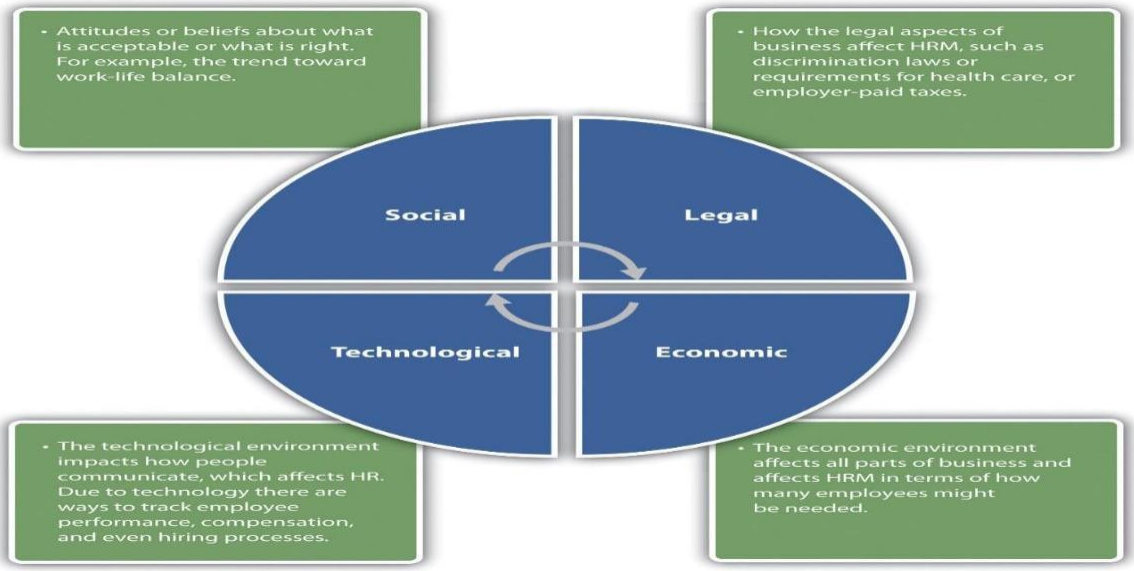
Besides these major roles, good communication skills and excellent management skills are key to successful human resource management as well as general management.

Awareness of External Factors

In addition to managing internal factors, the HR manager needs to consider the outside forces at play that may affect the organization. Outside forces, or external factors, are those things the company has no direct control over; however, they may be things that could positively or negatively impact human resources. External factors might include the following:

1. Globalization and offshoring
2. Changes to employment law
3. Health-care costs
4. Employee expectations
5. Diversity of the workforce
6. Changing demographics of the workforce
7. A more highly educated workforce
8. Layoffs and downsizing
9. Technology used, such as HR databases
10. Increased use of social networking to distribute information to employees

For example, the recent trend in flexible work schedules (allowing employees to set their own schedules) and telecommuting (allowing employees to work from home or a remote location for a specified period of time, such as one day per week) are external factors that have affected HR. HRM has to be aware of these outside issues, so they can develop policies that meet not only the needs of the company but also the needs of the individuals. Another example is the Patient Protection and Affordable Care Act, signed into law in 2010. Compliance with this bill has huge implications for HR. For example, a company with more than fifty employees must provide health-care coverage or pay a penalty. Currently, it is estimated that 60 percent of employers offer health-care insurance to their employees. Because health-care insurance will be mandatory, cost concerns as well as using health benefits as a recruitment strategy are big external challenges. Any manager operating without considering outside forces will likely alienate employees, resulting in unmotivated, unhappy workers. Not understanding the external factors can also mean breaking the law, which has a concerning set of implications as well.



An understanding of key external factors is important to the successful HR professional. This allows him or her to be able to make strategic decisions based on changes in the external environment. To develop this understanding, reading various publications is necessary.

One way managers can be aware of the outside forces is to attend conferences and read various articles on the web. For example, the website of the Society for Human Resource Management, SHRM Online[1], not only has job postings in the field but discusses many contemporary human resource issues that may help the manager make better decisions when it comes to people management.

Most professionals agree that there are seven main tasks HRM professionals perform. All these need to be considered in relation to external and outside forces.

SKILLS NEEDED FOR HRM

One of the major factors of a successful manager or human resource (HR) manager is an array of skills to deal with a variety of situations. It simply isn't enough to have knowledge of HR, such as knowing which forms need to be filled out. It takes multiple skills to create and manage people, as well as a cutting-edge human resource department.

The first skill needed is organization. The need for this skill makes sense, given that you are managing people's pay, benefits, and careers. Having organized files on your computer and good time-management skills are crucial for success in any job, but especially if you take on a role in human resources.

Like most jobs, being able to **multitask**—that is, work on more than one task at a time—is important in managing human resources. A typical person managing human resources may have to deal with an employee issue one minute, then switch and deal with recruiting. Unlike many management positions, which only focus on one task or one part of the business, human resources focuses on all areas of the business, where multitasking is a must.

As trite as it may sound, people skills are necessary in any type of management and perhaps might be the most important skills for achieving success at any job. Being able to manage a variety of personalities, deal with conflict, and coach others are all in the realm of people management. The ability to communicate goes along with people skills. The ability to communicate good news (hiring a new employee), bad news (layoffs), and everything in between, such as changes to policy, makes for an excellent manager and human resource management (HRM) professional.

Keys to a successful career in HRM or management include understanding specific job areas, such as managing the employee database, understanding employment laws, and knowing how to write and develop a strategic plan that aligns with the business. All these skills will be discussed in this book.

A strategic mind-set as an HR professional is a key skill as well. A person with a strategic mind-set can plan far in advance and look at trends that could affect the environment in which the business is operating. Too often, managers focus on their own area and not enough on the business as a whole. The strategic HR professional is able to not only work within his or her area but also understand how HR fits into the bigger picture of the business.

Ethics and a sense of fairness are also necessary in human resources. Ethics is a concept that examines the moral rights and wrongs of a certain situation. Consider the fact that many HR managers negotiate salary and union contracts and manage conflict. In addition, HR managers have the task of ensuring compliance with ethics standards within the organization. Many HR managers are required to work with highly confidential information, such as salary information, so a sense of ethics when managing this information is essential.

Ethics is perhaps one of the most important aspects to being a great HR professional. This humorous video shows how unethical behavior can undermine motivation at work.

Having said that, for those of you wanting a career in HRM, there are three exams you can take to show your mastery of HRM material:

1. **Professional in Human Resources (PHR).** To take this exam, an HR professional must have at least two years' experience. The exam is four hours long and consists of 225 multiple-choice questions in a variety of areas. Twelve percent of the test focuses on strategic management, 26 percent on workforce planning, 17 percent on human resource development, 16 percent on rewards, 22 percent on employee and labor relations, and 7 percent on risk management. The application process for taking the exam is given on the Human Resource Certification Institute website at http://www.hrci.org.
2. **Senior Professional in Human Resources (SPHR).** This exam is designed for HR professionals who focus on designing and planning, rather than actual implementation. It is recommended that

the person taking this exam has six to eight years of experience and oversees and manages an HR department. In this test, the greater focus is on the strategic aspect of HRM.

3. **Global Professional in Human Resources (GPHR).** This exam is for HR professionals who perform many of their tasks on a global level and whose companies often work across borders. This exam is three hours long, with 165 multiple-choice questions. A person with two years of professional experience can take the certification test. However, because the test has the international aspect, someone who designs HR-related programs and processes to achieve business goals would be best suited to earn this certification.

The benefits of achieving certifications are great. In addition to demonstrating the abilities of the HR professional, certification allows the professional to be more marketable in a very competitive field.

Most companies need a human resource department or a manager with HR skills. The industries and job titles are so varied that it is possible only to list general job titles in human resources:

1. Recruiter
2. Compensation analyst
3. Human resources assistant
4. Employee relations manager
5. Benefits manager
6. Work-life coordinator
7. Training and development manager
8. Human resources manager
9. Vice president for human resources

This is not an exhaustive list, but it can be a starting point for research on this career path.

TODAY'S HRM CHALLENGES

- One of the most important aspects to productive HRM is to ensure the department adds value to the rest of the organization, based on the organization's strategic plan.
- One of the major challenges of HRM is containment of costs. This can be done in several ways, for example, in the way health care and benefits are offered. Many companies are developing *cafeteria plans* that satisfy the employee and help contain costs.
- HRM can also contain costs by developing and managing training programs and ensuring employees are well trained to be productive in the job.

- Hiring is a very expensive part of human resources, and therefore HRM should take steps to ensure they are hiring the right people for the job the first time. *Turnover* is a term used to describe the departure of an employee.
- Poor communication results in wasting time and resources. We can communicate better by understanding communication channels, personalities, and styles.
- Technology is also a challenge to be met by human resources. For example, employees may request alternative work schedules because they can use technology at home to get their work done.
- Because technology is part of our work life, *cyberloafing*, or employees spending too much time on the Internet, creates new challenges for managers. Technology can also create challenges such as workplace stress and lack of work-life balance.
- The economy is a major factor in human resource management. HR managers, no matter what the state of the economy, must plan effectively to make sure they have the right number of workers at the right time. When we deal with a down economy, the legal and union implications of layoffs must be considered, and in an up economy, hiring of workers to meet the internal demand is necessary.
- The retirement of *baby boomers* is creating a gap in the workplace, related to not only the number of people available but also the skills people have. *Multigenerational* companies, or companies with workers of a variety of ages, must find ways to motivate employees, even though those employees may have different needs. HR must be aware of this and continually plan for the challenge of a changing workforce. Diversity in the workplace is an important challenge in human resource management.
- Ethics and monitoring of ethical behavior are also challenges in HRM. Setting ethical standards and monitoring ethical behavior, including developing a *code of conduct*, is a must for any successful business.

If you were to ask most business owners what their biggest challenges are, they will likely tell you that cost management is a major factor to the success or failure of their business. In most businesses today, the people part of the business is the most likely place for cuts when the economy isn't doing well.

Consider the expenses that involve the people part of any business:

1. Health-care benefits
2. Training costs
3. Hiring process costs
4. And many more…

These costs cut into the bottom line of any business. The trick is to figure out how much, how many, or how often benefits should be offered, without sacrificing employee motivation. A company can cut costs by not offering benefits or 401(k) plans, but if its goal is to hire the best

people, a hiring package without these items will most certainly not get the best people. Containment of costs, therefore, is a balancing act. An HR manager must offer as much as he or she can to attract and retain employees, but not offer too much, as this can put pressure on the company's bottom line. We will discuss ways to alleviate this concern throughout this book.

For example, there are three ways to cut costs associated with health care:

1. Shift more of the cost of health care to employees
2. Reduce the benefits offered to cut costs
3. Change or better negotiate the plan to reduce health-care cost

PLANNING AND RECRUITMENT

PLANNING

The strategic plan may include long-term goals, while the HR plan may include short-term objectives that are tied to the overall strategic plan. More recently, however, the personnel department has divided into human resource management and human resource development, as these functions have evolved over the century. HRM is not only crucial to an organization's success, but it should be part of the overall company's strategic plan, because so many businesses today depend on people to earn profits. Strategic planning plays an important role in how productive the organization is.

Table 2.1 Examples of Differences between Personnel Management and HRM

Personnel Management Focus	HRM Focus
Administering of policies	Helping to achieve strategic goals through people
Stand-alone programs, such as training	HRM training programs that are integrated with company's mission and values

Personnel Management Focus	HRM Focus
Personnel department responsible for managing people	Line managers share joint responsibility in all areas of people hiring and management
Creates a cost within an organization	Contributes to the profit objectives of the organization

Most people agree that the following duties normally fall under HRM. Each of these aspects has its own part within the overall strategic plan of the organization:

1. **Staffing.** Staffing includes the development of a strategic plan to determine how many people you might need to hire. Based on the strategic plan, HRM then performs the hiring process to recruit and select the right people for the right jobs.
2. **Basic workplace policies.** Development of policies to help reach the strategic plan's goals is the job of HRM. After the policies have been developed, communication of these policies on safety, security, scheduling, vacation times, and flextime schedules should be developed by the HR department. Of course, the HR managers work closely with supervisors in organizations to develop these policies. Workplace policies will be addressed throughout the book.
3. **Compensation and benefits.** In addition to paychecks, 401(k) plans, health benefits, and other perks are usually the responsibility of an HR manager.
4. **Retention.** Assessment of employees and strategizing on how to retain the best employees is a task that HR managers oversee, but other managers in the organization will also provide input.
5. **Training and development.** Helping new employees develop skills needed for their jobs and helping current employees grow their skills are also tasks for which the HRM department is responsible. Determination of training needs and development and implementation of training programs are important tasks in any organization. Succession planning includes handling the departure of managers and making current employees ready to take on managerial roles when a manager does leave.
6. **Regulatory issues and worker safety.** Keeping up to date on new regulations relating to employment, health care, and other issues is generally a responsibility that falls on the HRM department.

In smaller organizations, the manager or owner is likely performing the HRM. They hire people, train them, and determine how much they should be paid. Larger companies ultimately perform the same tasks, but because they have more employees, they can afford to employ specialists, or human resource managers, to handle these areas of the business. As a result, it is highly likely that you, as a manager or entrepreneur, will be performing HRM tasks, hence the value in understanding the strategic components of HRM.

HRM vs. Personnel Management

Human resource strategy is an elaborate and systematic plan of action developed by a human resource department. This definition tells us that an HR strategy includes detailed pathways to implement HRM strategic plans and HR plans. Think of the HRM strategic plan as the major objectives the organization wants to achieve, and the HR plan as the specific activities carried out to achieve the strategic plan.

As mentioned at the beginning of this chapter, human resource departments in the past were called personnel departments. This term implies that the department provided "support" for the rest of the organization. Companies now understand that the human side of the business is the most important asset in any business (especially in this global economy), and therefore HR has much more importance than it did twenty years ago. While personnel management mostly involved activities surrounding the hiring process and legal compliance, human resources involves much more, including strategic planning, which is the focus of this chapter. The Ulrich HR model, a common way to look at HRM strategic planning, provides an overall view of the role of HRM in the organization. His model is said to have started the movement that changed the view of HR; no longer merely a functional area, HR became more of a partnership within the organization. While his model has changed over the years, the current model looks at alignment of HR activities with the overall global business strategy to form a strategic partnership. His newly revised model looks at five main areas of HR:

1. **Strategic partner.** Partnership with the entire organization to ensure alignment of the HR function with the needs of the organization.
2. **Change agent.** The skill to anticipate and respond to change within the HR function, but as a company as a whole.
3. **Administrative expert and functional expert.** The ability to understand and implement policies, procedures, and processes that relate to the HR strategic plan.
4. **Human capital developer.** Means to develop talent that is projected to be needed in the future.
5. **Employee advocate**. Works for employees currently within the organization.

According to Ulrich (Ulrich, 2011), implementation of this model must happen with an understanding of the overall company objectives, problems, challenges, and opportunities. For example, the HR professional must understand the dynamic nature of the HRM environment, such as changes in labor markets, company culture and values, customers, shareholders, and the economy. Once this occurs, HR can determine how best to meet the needs of the organization within these five main areas.

To be successful in writing an HRM strategic plan, one must understand the dynamic external environment.

HRM as a Strategic Component of the Business

David Ulrich discusses the importance of bringing HR to the table in strategic planning.Keeping the Ulrich model in mind, consider these four aspects when creating a good HRM strategic plan:

1. **Make it applicable.** Often people spend an inordinate amount of time developing plans, but the plans sit in a file somewhere and are never actually used. A good strategic plan should be the guiding principles for the HRM function. It should be reviewed and changed as aspects of the business change. Involvement of all members in the HR department if it's a larger department) and communication among everyone within the department will make the plan better.
2. **Be a strategic partner.** Alignment of corporate values in the HRM strategic plan should be a major objective of the plan. In addition, the HRM strategic plan should be aligned with the mission and objectives of the organization as a whole. For example, if the mission of the organization is to promote social responsibility, then the HRM strategic plan should address this in the hiring criteria.
3. **Involve people.** An HRM strategic plan cannot be written alone. The plan should involve everyone in the organization. For example, as the plan develops, the HR manager should meet with various people in departments and find out what skills the best employees have. Then the HR manager can make sure the people recruited and interviewed have similar qualities as the best people already doing the job. In addition, the HR manager will likely want to meet with the financial department and executives who do the budgeting, so they can determine human resource needs and recruit the right number of people at the right times. In addition, once the HR department determines what is needed, communicating a plan can gain positive feedback that ensures the plan is aligned with the business objectives.

4. **Understand how technology can be used.** Organizations oftentimes do not have the money or the inclination to research software and find budget-friendly options for implementation. People are sometimes nervous about new technology. However, the best organizations are those that embrace technology and find the right technology uses for their businesses. There are thousands of HRM software options that can make the HRM processes faster, easier, and more effective. Good strategic plans address this aspect.

HR managers know the business and therefore know the needs of the business and can develop a plan to meet those needs. They also stay on top of current events, so they know what is happening globally that could affect their strategic plan. If they find out, for example, that an economic downturn is looming, they will adjust their strategic plan. In other words, the strategic plan needs to be a living document, one that changes as the business and the world changes.

The Steps to Strategic Plan Creation

HRM strategic plans must have several elements to be successful. There should be a distinction made here: the HRM strategic plan is different from the HR plan. Think of the HRM strategic plan as the major objectives the organization wants to achieve, while the HR plan consists of the detailed plans to ensure the strategic plan is achieved. Oftentimes the strategic plan is viewed as just another report that must be written. Rather than jumping in and writing it without much thought, it is best to give the plan careful consideration.

The goal of "Conduct a Strategic Analysis" is to provide you with some basic elements to consider and research before writing any HRM plans.

Conduct a Strategic Analysis

A strategic analysis looks at three aspects of the individual HRM department:

1. **Understanding of the company mission and values.** It is impossible to plan for HRM if one does not know the values and missions of the organization. As we have already addressed in this chapter, it is imperative for the HR manager to align department objectives with organizational objectives. It is worthwhile to sit down with company executives, management, and supervisors to make sure you have a good understanding of the company mission and values.

Another important aspect is the understanding of the organizational life cycle. You may have learned about the life cycle in marketing or other business classes, and this applies to HRM, too. An organizational life cycle refers to the introduction, growth, maturity, and decline of the organization, which can vary over time. For example, when the organization first begins, it is in the introduction phase, and a different staffing, compensation, training, and labor/employee relations strategy may be necessary to align HRM with the organization's goals. This might be opposed to an organization that is struggling to stay in business and is in the decline phase. That same organization, however, can create a new product, for example, which might again put the organization in the growth phase. Table 2.2 "Lifecycle Stages and HRM Strategy" explains some of the strategies that may be different depending on the organizational life cycle.

2. **Understanding of the HRM department mission and values.** HRM departments must develop their own departmental mission and values. These guiding principles for the department will change as the company's overall mission and values change. Often the mission statement is a list of what the department does, which is less of a strategic approach. Brainstorming about HR goals, values, and priorities is a good way to start. The mission statement should express how an organization's human resources help that organization meet the business goals. A poor mission statement might read as follows: "The human resource department at Techno, Inc. provides resources to hiring managers and develops compensation plans and other services to assist the employees of our company."

   A strategic statement that expresses how human resources help the organization might read as follows: "HR's responsibility is to ensure that our human resources are more talented and motivated than our competitors', giving us a competitive advantage. This will be achieved by monitoring our turnover rates, compensation, and company sales data and comparing that data to our competitors" (Kaufman, 2011). When the mission statement is written in this way, it is easier to take a strategic approach with the HR planning process.

3. **Understanding of the challenges facing the department.** HRM managers cannot deal with change quickly if they are not able to predict changes. As a result, the HRM manager should know what upcoming challenges may be faced to make plans to deal with those challenges better when they come. This makes the strategic plan and HRM plan much more usable.

Table 2.2 Lifecycle Stages and HRM Strategy

Life Cycle Stage	Staffing	Compensation	Training and Development	Labor / Employee Relations
Introduction	Attract best technical and professional talent.	Meet or exceed labor market rates to attract needed talent.	Define future skill requirements and begin establishing career ladders.	Set basic employee-relations philosophy of organization.
Growth	Recruit adequate numbers and mix of qualifying workers. Plan management succession. Manage rapid internal labor market movements.	Meet external market but consider internal equity effects. Establish formal compensation structures.	Mold effective management team through management development and organizational development.	Maintain labor peace, employee motivation, and morale.

Life Cycle Stage	Staffing	Compensation	Training and Development	Labor / Employee Relations
Maturity	Encourage sufficient turnover to minimize layoffs and provide new openings. Encourage mobility as reorganizations shift jobs around.	Control compensation costs.	Maintain flexibility and skills of an aging workforce.	Control labor costs and maintain labor peace. Improve productivity.
Decline	Plan and implement workforce reductions and reallocations; downsizing and outplacement may occur during this stage.	Implement tighter cost control.	Implement retraining and career consulting services.	Improve productivity and achieve flexibility in work rules. Negotiate job security and employment-adjustment policies

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Identify Strategic HR Issues

In this step, the HRM professionals will analyze the challenges addressed in the first step. For example, the department may see that it is not strategically aligned with the company's mission and values and opt to make changes to its departmental mission and values as a result of this information.

Many organizations and departments will use a strategic planning tool that identifies strengths, weaknesses, opportunities, and threats (SWOT analysis) to determine some of the issues they are facing. Once this analysis is performed for the business, HR can align itself with the needs of the business by understanding the business strategy. See Table 2.3 "Sample HR Department SWOT Analysis for Techno, Inc." for an example of how a company's SWOT analysis can be used to develop a SWOT analysis for the HR department.

Once the alignment of the company SWOT is completed, HR can develop its own SWOT analysis to determine the gaps between HR's strategic plan and the company's strategic plan. For example,

if the HR manager finds that a department's strength is its numerous training programs, this is something the organization should continue doing. If a weakness is the organization's lack of consistent compensation throughout all job titles, then the opportunity to review and revise the compensation policies presents itself. In other words, the company's SWOT analysis provides a basis to address some of the issues in the organization, but it can be whittled down to also address issues within the department.

Table 2.3 Sample HR Department SWOT Analysis for Techno, Inc.

Strengths	Hiring talented people
	Company growth
	Technology implementation for business processes
	Excellent relationship between HRM and management/executives
Weaknesses	No strategic plan for HRM
	No planning for up/down cycles
	No formal training processes
	Lacking of software needed to manage business processes, including go-to-market staffing strategies

Opportunities	Development of HRM staffing plan to meet industry growth
	HRM software purchase to manage training, staffing, assessment needs for an unpredictable business cycle
	Continue development of HRM and executive relationship by attendance and participation in key meetings and decision-making processes
	Develop training programs and outside development opportunities to continue development of in-house marketing expertise
Threats	Economy
	Changing technology

Prioritize Issues and Actions

Based on the data gathered in the last step, the HRM manager should prioritize the goals and then put action plans together to deal with these challenges. For example, if an organization identifies that they lack a comprehensive training program, plans should be developed that address this need.

An important aspect of this step is the involvement of the management and executives in the organization. Once you have a list of issues you will address, discuss them with the management and executives, as they may see other issues or other priorities differently than you. Remember, to be effective, HRM must work with the organization and assist the organization in meeting goals. This should be considered in every aspect of HRM planning.

Draw Up an HRM Plan

Once the HRM manager has met with executives and management, and priorities have been agreed upon, the plans are ready to be developed. Sometimes companies have great strategic plans, but when the development of the details occurs, it can be difficult to align the strategic plan with the more detailed plans. An HRM manager should always refer to the overall strategic plan before developing the HRM strategic plan and HR plans.

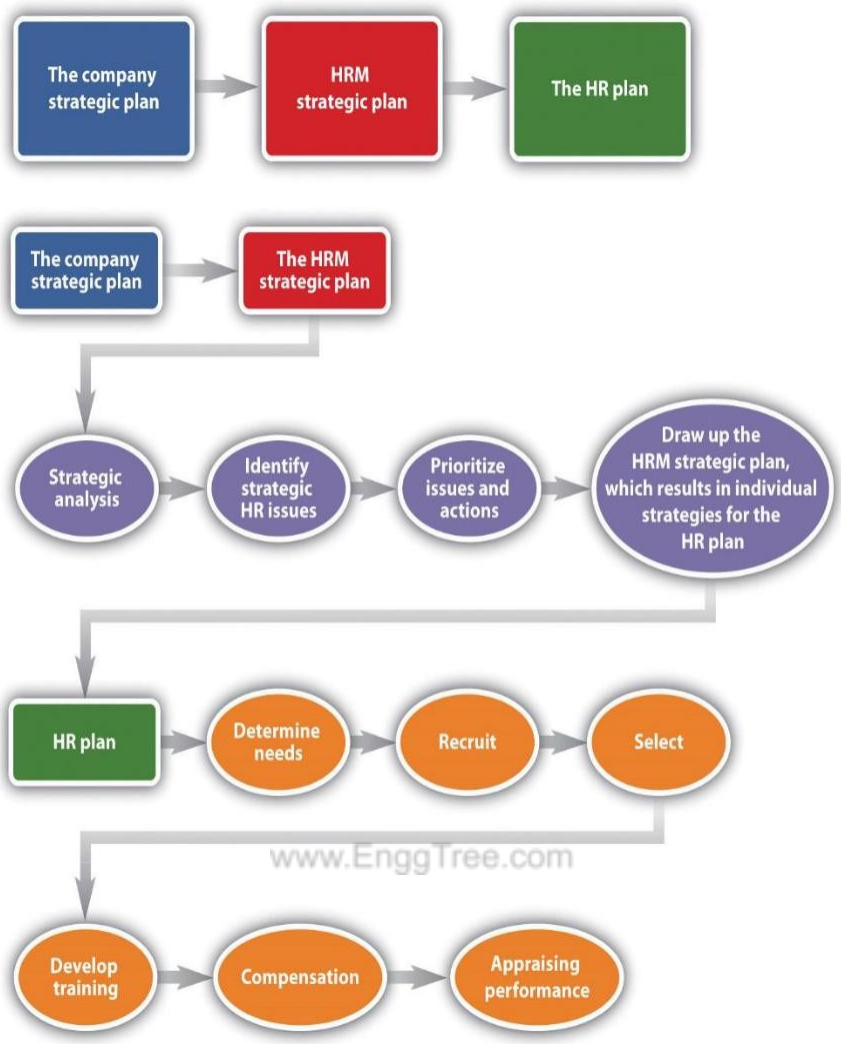
Even if a company does not have an HR department, HRM strategic plans and HR plans should still be developed by management. By developing and monitoring these plans, the organization can ensure the right processes are implemented to meet the ever-changing needs of the organization. The strategic plan looks at the organization as a whole, the HRM strategic plan looks at the department as a whole, and the HR plan addresses specific issues in the human resource department.

Writing the HRM Plan

As the HR manager, you have access to sensitive data, such as pay information. As you are looking at pay for each employee in the marketing department, you notice that two employees with the same job title and performing the same job are earning different amounts of money. As you dig deeper, you notice the employee who has been with the company for the least amount of time is actually getting paid more than the person with longer tenure. A brief look at the performance evaluations shows they are both star performers. You determine that two different managers hired the employees, and one manager is no longer with the organization. How would you handle this?

The six parts of the HRM plan include the following:

1. **Determine human resource needs.** This part is heavily involved with the strategic plan. What growth or decline is expected in the organization? How will this impact your workforce? What is the economic situation? What are your forecasted sales for next year?
2. **Determine recruiting strategy.** Once you have a plan in place, it's necessary to write down a strategy addressing how you will recruit the right people at the right time.
3. **Select employees.** The selection process consists of the interviewing and hiring process.
4. **Develop training.** Based on the strategic plan, what training needs are arising? Is there new software that everyone must learn? Are there problems in handling conflict? Whatever the training topics are, the HR manager should address plans to offer training in the HRM plan.
5. **Determine compensation.** In this aspect of the HRM plan, the manager must determine pay scales and other compensation such as health care, bonuses, and other perks.
6. **Appraise performance.** Sets of standards need to be developed so you know how to rate the performance of your employees and continue with their development.



As you can see from this figure, the company strategic plan ties into the HRM strategic plan, and from the HRM strategic plan, the HR plan can be developed.

Determine Human Resource Needs

The first part of an HR plan will consist of determining how many people are needed. This step involves looking at company operations over the last year and asking a lot of questions:

1. Were enough people hired?
2. Did you have to scramble to hire people at the last minute?
3. What are the skills your current employees possess?
4. What skills do your employees need to gain to keep up with technology?
5. Who is retiring soon? Do you have someone to replace them?
6. What are the sales forecasts? How might this affect your hiring?

These are the questions to answer in this first step of the HR plan process. As you can imagine, this cannot be done alone. Involvement of other departments, managers, and executives should take place to obtain an accurate estimate of staffing needs for now and in the future.

Many HR managers will prepare an inventory of all current employees, which includes their educational level and abilities. This gives the HR manager the big picture on what current employees can do. It can serve as a tool to develop employees' skills and abilities, if you know where they are currently in their development. For example, by taking an inventory, you may find out that Richard is going to retire next year, but no one in his department has been identified or trained to take over his role. Keeping the inventory helps you know where gaps might exist and allows you to plan for these gaps.

Recruit

Recruitment is an important job of the HR manager. Knowing how many people to hire, what skills they should possess, and hiring them when the time is right are major challenges in the area of recruiting. Hiring individuals who have not only the skills to do the job but also the attitude, personality, and fit can be the biggest challenge in recruiting. Depending on the type of job you are hiring for, you might place traditional advertisements on the web or use social networking sites as an avenue. Some companies offer bonuses to employees who refer friends. No matter where you decide to recruit, it is important to keep in mind that the recruiting process should be fair and equitable and diversity should be considered.

Depending on availability and time, some companies may choose to outsource their recruiting processes. For some types of high-level positions, a head hunter will be used to recruit people nationally and internationally. A head hunter is a person who specializes in matching jobs with people, and they usually work only with high-level positions. Another option is to use an agency that specializes in hiring people for a variety of positions, including temporary and permanent positions. Some companies decide to hire temporary employees because they anticipate only a short-term need, and it can be less expensive to hire someone for only a specified period of time.

No matter how it is done, recruitment is the process of obtaining résumés of people interested in the job. In our next step, we review those résumés, interview, and select the best person for the job.

Select

After you have reviewed résumés for a position, now is the time to work toward selecting the right person for the job. Numerous studies have been done, and while they have various results, the majority of studies say it costs an average of $45,000 to hire a new manager (Herman, 1993). While this may seem exaggerated, consider the following items that contribute to the cost:

1. Time to review résumés
2. Time to interview candidates

3. Interview expenses for candidates
4. Possible travel expenses for new hire or recruiter
5. Possible relocation expenses for new hire
6. Additional bookkeeping, payroll, 401(k), and so forth
7. Additional record keeping for government agencies
8. Increased unemployment insurance costs
9. Costs related to lack of productivity while new employee gets up to speed

Because it is so expensive to hire, it is important to do it right. First, résumés are reviewed and people who closely match the right skills are selected for interviews. Many organizations perform phone interviews first so they can further narrow the field. The HR manager is generally responsible for setting up the interviews and determining the interview schedule for a particular candidate. Usually, the more senior the position is, the longer the interview process takes, even up to eight weeks . After the interviews are conducted, there may be reference checks, background checks, or testing that will need to be performed before an offer is made to the new employee. HR managers are generally responsible for this aspect. Once the applicant has met all criteria, the HR manager will offer the selected person the position. At this point, salary, benefits, and vacation time may be negotiated. Compensation is the next step in HR management.

Develop Training

Once we have planned our staffing, recruited people, selected employees, and then compensated them, we want to make sure our new employees are successful. One way we can ensure success is by training our employees in three main areas:

1. **Company culture.** A company culture is the organization's way of doing things. Every company does things a bit differently, and by understanding the corporate culture, the employee will be set up for success. Usually this type of training is performed at an orientation, when an employee is first hired. Topics might include how to request time off, dress codes, and processes.
2. **Skills needed for the job.** If you work for a retail store, your employees need to know how to use the register. If you have sales staff, they need to have product knowledge to do the job. If your company uses particular software, training is needed in this area.
3. **Human relations skills.** These are non-job-specific skills your employees need not only to do their jobs but also to make them all-around successful employees. Skills needed include communication skills and interviewing potential employees.

Perform a Performance Appraisal

The last thing an HR manager should plan is the performance appraisal. It is definitely worth a mention here, since it is part of the strategic plan. A performance appraisal is a method by which

job performance is measured. The performance appraisal can be called many different things, such as the following:

1. Employee appraisal
2. Performance review
3. 360 review
4. Career development review

No matter what the name, these appraisals can be very beneficial in motivating and rewarding employees. The performance evaluation includes metrics on which the employee is measured. These metrics should be based on the job description, both of which the HR manager develops. Various types of rating systems can be used, and it's usually up to the HR manager to develop these as well as employee evaluation forms. The HR manager also usually ensures that every manager in the organization is trained on how to fill out the evaluation forms, but more importantly, how to discuss job performance with the employee. Then the HR manager tracks the due dates of performance appraisals and sends out e-mails to those managers letting them know it is almost time to write an evaluation.

RECRUITMENT

The *recruitment process* is an important part of human resource management (HRM). It isn't done without proper strategic planning. Recruitment is defined as a process that provides the organization with a pool of qualified job candidates from which to choose. Before company's recruit, they must implement proper staffing plans and forecasting to determine how many people they will need. The basis of the forecast will be the annual budget of the organization and the short-to long-term plans of the organization—for example, the possibility of expansion. In addition to this, the organizational life cycle will be a factor. Forecasting is based on both internal and external factors. Internal factors include the following:

1. Budget constraints
2. Expected or trend of employee separations
3. Production levels
4. Sales increases or decreases
5. Global expansion plans

External factors might include the following:

1. Changes in technology
2. Changes in laws

3. Unemployment rates
4. Shifts in population
5. Shifts in urban, suburban, and rural areas
6. Competition

Once the forecasting data are gathered and analyzed, the HR professional can see where gaps exist and then begin to recruit individuals with the right skills, education, and backgrounds. This section will discuss this step in HR planning.

Recruitment Strategy

Although it might seem easy, recruitment of the right talent, at the right place and at the right time, takes skill and practice, but more importantly, it takes strategic planning. An understanding of the labor market and the factors determining the relevant aspects of the labor market is key to being strategic about your recruiting processes.

Based on this information, when a job opening occurs, the HRM professional should be ready to fill that position. Here are the aspects of developing a recruitment strategy:

1. Refer to a staffing plan.
2. Confirm the job analysis is correct through questionnaires.
3. Write the job description and job specifications.
4. Have a bidding system to recruit and review internal candidate qualifications for possible promotions.
5. Determine the best recruitment strategies for the position.
6. Implement a recruiting strategy.

The first step in the recruitment process is acknowledgment of a job opening. At this time, the manager and/or the HRM look at the job description for the job opening (assuming it isn't a new job). We discuss how to write a job analysis and job description.

Assuming the job analysis and job description are ready, an organization may decide to look at internal candidates' qualifications first. Internal candidates are people who are already working for the company.

If an internal candidate meets the qualifications, this person might be encouraged to apply for the job, and the job opening may not be published. Many organizations have formal job posting procedures and bidding systems in place for internal candidates. For example, job postings may be sent to a listserv or other avenue so all employees have access to them. However, the advantage of publishing open positions to everyone in and outside the company is to ensure the organization is diverse.

Then the best recruiting strategies for the type of position are determined. For example, for a high-level executive position, it may be decided to hire an outside head-hunting firm. For an entry-level position, advertising on social networking websites might be the best strategy. Most organizations will use a variety of methods to obtain the best results.

Another consideration is how the recruiting process will be managed under constraining circumstances such as a short deadline or a low number of applications. In addition, establishing a protocol for how applications and résumés will be processed will save time later. For example, some HRM professionals may use software such as Microsoft Excel to communicate the time line of the hiring process to key managers.

Once these tasks are accomplished, the hope is that you will have a diverse group of people to interview (called the selection process). Before this is done, though, it is important to have information to ensure the right people are recruited. This is where the job analysis and job description come in.

Job Analysis and Job Descriptions

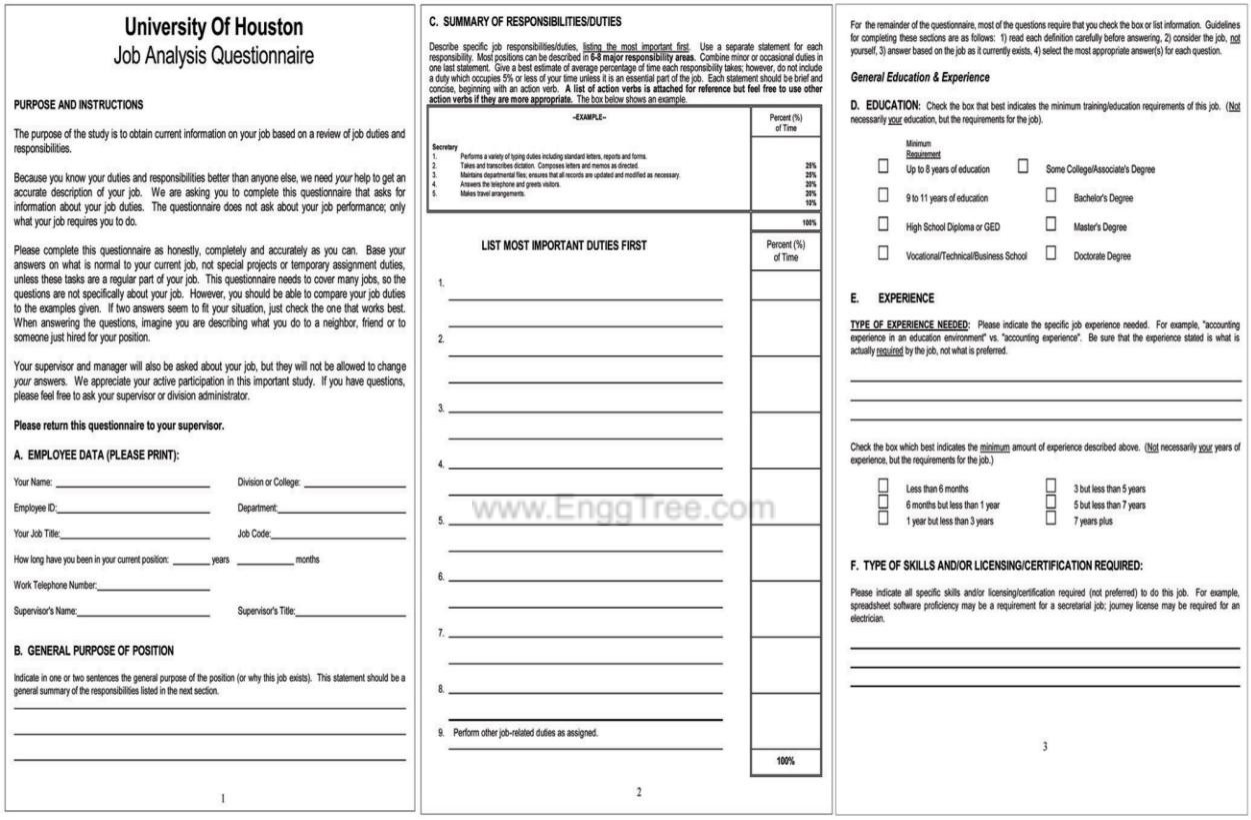
The job analysis is a formal system developed to determine what tasks people actually perform in their jobs. The purpose of a job analysis is to ensure creation of the right fit between the job and the employee and to determine how employee performance will be assessed. A major part of the job analysis includes research, which may mean reviewing job responsibilities of current employees, researching job descriptions for similar jobs with competitors, and analyzing any new responsibilities that need to be accomplished by the person with the position. According to research by Hackman and Oldham (Hackman & Oldham, 1976), a job diagnostic survey should be used to diagnose job characteristics prior to any redesign of a job.

To start writing a job analysis, data need to be gathered and analyzed, keeping in mind Hackman and Oldham's model. Figure 4.1 "Process for Writing the Job Analysis" shows the process of writing a job analysis. Please note, though, that a job analysis is different from a job design. Job design refers to how a job can be modified or changed to be more effective—for example, changing tasks as new technology becomes available.

Figure 4.1 Process for Writing the Job Analysis

The information gathered from the job analysis is used to develop both the job description and the job specifications. A job description is a list of tasks, duties, and responsibilities of a job. Job specifications, on the other hand, discuss the skills and abilities the person must have to perform the job. The two are tied together, as job descriptions are usually written to include job specifications. A job analysis must be performed first, and then based on that data, we can successfully write the job description and job specifications. Think of the analysis as "everything an employee is required and expected to do."

Figure 4.2 Sample Job Analysis Questionnaire



University Of Houston
Job Analysis Questionnaire

PURPOSE AND INSTRUCTIONS

The purpose of the study is to obtain current information on your job based on a review of job duties and responsibilities.

Because you know your duties and responsibilities better than anyone else, we need your help to get an accurate description of your job. We are asking you to complete this questionnaire that asks for information about your job duties. The questionnaire does not ask about your job performance; only what your job requires you to do.

Please complete this questionnaire as honestly, completely and accurately as you can. Base your answers on what is normal to your current job, not special projects or temporary assignment duties, unless these tasks are a regular part of your job. This questionnaire needs to cover many jobs, so the questions are not specifically about your job. However, you should be able to compare your job duties to the examples given. If two answers seem to fit your situation, just check the one that works best. When answering the questions, imagine you are describing what you do to a neighbor, friend or to someone just hired for your position.

Your supervisor and manager will also be asked about your job, but they will not be allowed to change *your* answers. We appreciate your active participation in this important study. If you have questions, please feel free to ask your supervisor or division administrator.

Please return this questionnaire to your supervisor.

A. EMPLOYEE DATA (PLEASE PRINT):

Your Name: _____ Division or College: _____

Employee ID: _____ Department: _____

Your Job Title: _____ Job Code: _____

How long have you been in your current position: _____ years _____ months

Work Telephone Number: _____

Supervisor's Name: _____ Supervisor's Title: _____

B. GENERAL PURPOSE OF POSITION

Indicate in one or two sentences the general purpose of the position (or why this job exists). This statement should be a general summary of the responsibilities listed in the next section.

1

C. SUMMARY OF RESPONSIBILITIES/DUTIES

Describe specific job responsibilities/duties, listing the most important first. Use a separate statement for each responsibility. Most positions can be described in **6-8 major responsibility areas**. Combine minor or occasional duties in one last statement. Give a best estimate of average percentage of time each responsibility takes; however, do not include a duty which occupies 5% or less of your time unless it is an essential part of the job. Each statement should be brief and concise, beginning with an action verb. **A list of action verbs is attached for reference but feel free to use other action verbs if they are more appropriate.** The box below shows an example.

–EXAMPLE–	Percent (%) of Time
Secretary	
1. Performs a variety of typing duties including standard letters, reports and forms.	
2. Takes and transcribes dictation. Composes letters and memos as directed.	25%
3. Maintains departmental files; ensures that all records are updated and modified as necessary.	25%
4. Answers the telephone and greets visitors.	20%
5. Makes travel arrangements.	20%
	10%
	100%

LIST MOST IMPORTANT DUTIES FIRST	Percent (%) of Time
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9. Perform other job-related duties as assigned.	
	100%

2

For the remainder of the questionnaire, most of the questions require that you check the box or list information. Guidelines for completing these sections are as follows: 1) read each definition carefully before answering, 2) consider the job, not yourself, 3) answer based on the job as it currently exists, 4) select the most appropriate answer(s) for each question.

General Education & Experience

D. EDUCATION: Check the box that best indicates the minimum training/education requirements of this job. (Not necessarily your education, but the requirements for the job).

Minimum Requirement			
☐	Up to 8 years of education	☐	Some College/Associate's Degree
☐	9 to 11 years of education	☐	Bachelor's Degree
☐	High School Diploma or GED	☐	Master's Degree
☐	Vocational/Technical/Business School	☐	Doctorate Degree

E. EXPERIENCE

TYPE OF EXPERIENCE NEEDED: Please indicate the specific job experience needed. For example, "accounting experience in an education environment" vs. "accounting experience". Be sure that the experience stated is what is actually required by the job, not what is preferred.

Check the box which best indicates the minimum amount of experience described above. (Not necessarily your years of experience, but the requirements for the job.)

☐	Less than 6 months	☐	3 but less than 5 years
☐	6 months but less than 1 year	☐	5 but less than 7 years
☐	1 year but less than 3 years	☐	7 years plus

F. TYPE OF SKILLS AND/OR LICENSING/CERTIFICATION REQUIRED:

Please indicate all specific skills and/or licensing/certification required (not preferred) to do this job. For example, spreadsheet software proficiency may be a requirement for a secretarial job; journey license may be required for an electrician.

3

This questionnaire shows how an HR professional might gather data for a job analysis. Questionnaires can be completed on paper or online.

G. SUPERVISORY RESPONSIBILITIES

SUPERVISORY NATURE: What is the nature of the direct supervisory responsibility your job has? Check **one** answer.

- ☐ No supervisory responsibility.
- ☐ Work leadership of one or more employees.
- ☐ Supervisor over a section of a department.
- ☐ Assistant Manager over supervisors or a small department.
- ☐ Manager of one department.
- ☐ Manager of more than one department.
- ☐ Director, through managers, of a single department.
- ☐ Director, through managers, of multiple departments.

How many positions report directly to you?

☐ None ☐ 1 ☐ 2-3 ☐ 4-6 ☐ 7 or more

List the title(s) of employee(s) whom you directly supervise:

Title	Grade/Level	Number of Positions

Indicate the total number of employees you indirectly supervise **through supervisors or managers:**

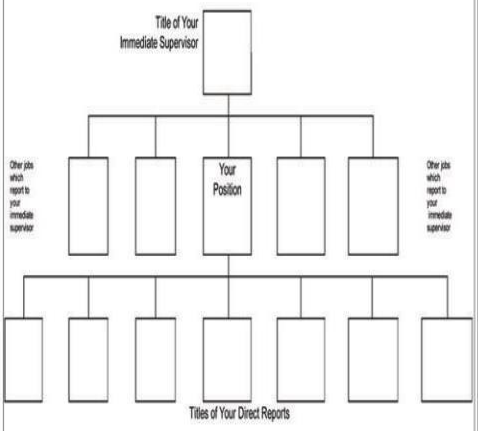
☐ None ☐ 1-5 ☐ 6-10 ☐ 11-20 ☐ 21-50 ☐ 51-100 ☐ 100 +

Does this position require functional supervision of positions that do not report directly to you?

☐ Yes ☐ No

4

Please complete organization chart below:



H. PHYSICAL DEMANDS AND WORKING CONDITIONS

Indicate how often the following physical demands are required to perform the Essential Job Responsibilities.

C=Constantly (5-8 hrs./shift) F=Frequently (2-5 hrs./shift) O=Occasionally (Up to 2 hrs./shift) R=Rarely (Does not exist as regular part of job)

Physical Demands		Environmental Conditions	
Standing		Extreme Cold	
Walking		Extreme Heat	
Sitting		Temperature Changes	
Lifting		Wet	
Carrying		Humid	
Pushing		Noise	
Pulling		Vibration	
Climbing		Hazards	
Balancing		Atmospheric Conditions	
Stooping		Other (define):	
Kneeling			
Crouching			
Crawling			
Reaching		**Physical Strength**	
Handling		Little Physical Effort	
Grasping		Light Work	
Feeling		Medium Work	
Talking		Heavy Work	
Hearing		Very Heavy Work	
Repetitive Motions			
Eye/Hand/Foot Coordination			

5

I. GENERAL EMPLOYEE COMMENTS

Because no single questionnaire can cover every part of a job, can you think of any other information that would be important in understanding your job? If so, please give us your comments below.

Employee's Signature: _____

Date: _____

6

J. SUPERVISOR'S REVIEW SECTION

Based on your understanding of the job as it currently exists, please review the employee's response and provide your own comments in the space provided below. **Please do not change the employee's responses.**

The questionnaire is intended to analyze the job as it is currently being done and not how it might be done in the future. **The employee's level of performance in the job is not part of this review and is not to be considered.**

Section *Remarks*

Supervisor's Name:_____ Title:_____

Supervisor's Signature:_____ Date:_____

Telephone Number:_____

K. REVIEWING OFFICIAL'S REVIEW SECTION

Based on your understanding of the job as it currently exists, please review the employee's response and provide your own comments in the space provided below. **Please do not change the employee's or supervisor's responses.**

The questionnaire is intended to analyze the job as it is currently being done and not how it might be done in the future. **The employee's level of performance in the job is not part of this review and is not to be considered.**

Section *Remarks*

Reviewing Official's Name:_____ Title:_____

Reviewing Official's Signature:_____ Date:_____

Telephone Number:_____

This questionnaire is to be forwarded next to your division administrator.

Division administrator, please initial to indicate review _____.
(Attach additional page(s) for clarifying comments, as necessary.)

7

ACTION VERBS
ATTACHMENT

This list of action verbs should be used to assist you in completing the Summary of Responsibilities section. These verbs are useful in identifying and defining job functions. Although many of the terms may seem obvious, definitions are provided in the interest of consistency.

Administer—Manage or direct the execution of affairs.
Adopt—Take up and practice as one's own.
Advise—Recommend a course of action; offer an informed opinion based on specialized knowledge
Analyze—Separate into elements and critically examine.
Anticipate—Foresee and deal with in advance.
Appraise—Give an expert judgement of worth or merit.
Approve—Accept as satisfactory; exercise final authority with regard to commitment of resources.
Arrange—Make preparation for an event; put in proper order.
Assemble—Collect or gather together in a predetermined order from various sources.
Assign—Specify or designate tasks or duties to be performed by others.
Assume—Undertake; take for granted.
Assure—Give confidence; make certain of.
Authorize—Approve; empower through vested authority.
Calculate—Make a mathematical computation.
Circulate—Pass from person to person or place to place.
Clean—To remove dirt or make tidy.
Clear—Gain approval of others.
Collaborate—Work jointly with; cooperate with others.
Collect—Gather.
Compile—Put together information; collect from other documents.
Concur—Agree with a position, statement, action, or opinion.
Conduct—Carry on; direct the execution of.
Confer—Consult with others to compare views.
Consolidate—Bring together.
Construct—Build, make or modify.
Consult—Seek the advice of others.
Control—Measure, interpret, and evaluate actions for conformance with plans or desired results.
Coordinate—Regulate, adjust, or combine the actions of others to attain harmony.
Correlate—Establish a reciprocal relationship.
Correspond—Communicate with.
Debug—To detect, locate and remove mistakes from a routine of malfunctions from a computer.
Delegate—Commission another to perform tasks or duties that may carry specific degrees of accountability.
Deliver—Carry to intended destination.
Design—Conceive, create, and execute according to plan.
Determine—Resolve; fix conclusively.
Develop—Disclose, discover, perfect, or unfold a plan or idea.
Devise—Come up with something new; perhaps by combining or applying known ideas or principles.
Direct—Guide work operations through the establishment of objectives, policies, rules, practices, methods, and standards.
Discuss—Exchange views for the purpose of arriving at a conclusion.
Dispose—Get rid of.
Disseminate—Spread or disperse information.
Distribute—Deliver to proper destinations.
Draft—Prepare papers or documents in preliminary form.
Endorse—Support or recommend.
Establish—Bring into existence.
Estimate—Forecast future requirements.
Evaluate—Determine or fix the value of.
Execute—Put into effect or carry out.
Exercise—Exert.

8

Expedite—Accelerate the process or progress of.
Formulate—Develop or devise.
Furnish—Provide with what is needed; supply.
Implement—Carry out; execute a plan or program.
Improve—Make something better.
Initiate—Start or introduce.
Inspect—Critically examine for suitability.
Install—To set up for use.
Interpret—Explain something to others.
Investigate—Study through close examination and systematic inquiry.
Issue—Put forth or to distribute officially.
Maintain—Keep in an existing state.
Monitor—Watch, observe, or check with an eye to reaching agreement.
Notify—Make known to.
Operate—Perform an activity or series of activities.
Participate—Take part in.
Perform—Fulfill or carry out some action.
Place—Locate and choose position for.
Plan—Devise or project the realization of a course of action.
Practice—Perform work repeatedly in order to gain proficiency.
Prepare—Make ready for a particular purpose.
Proceed—Begin to carry out an action.
Process—Subject something to special treatment; handle in accordance with prescribed procedure.
Promote—Advance to a higher level or position.
Propose—Declare a plan or intention.
Provide—Supply what is needed; furnish.
Recommend—Advise or counsel a course of action; offer or suggest for adoption.
Repair—Fix or make usable.
Represent—Act in the place of or for.
Report—Give an account of; furnish information or data.
Research—Inquire into a specific matter from several sources.
Review—Examine or re-examine.
Revise—Rework in order to correct or improve.
Schedule—Plan a timetable.
Secure—Gain possession of; make safe.
Select—Choose the best suited.
Sign—Formally approve a document by affixing a signature.
Sort—To separate or arrange according to a plan.
Specify—State precisely in detail or name explicitly.
Stimulate—Excite to activity; urge.
Submit—Yield or present for the discretion or judgement of others.
Supervise—Personally oversee, direct, inspect, or guide the work of others with responsibility for meeting standards of performance.
Train—Teach or guide others in order to bring up to a predetermined standard.
Transcribe—Transfer data from one form of record to another or from one method of preparation to another, without changing the nature of the data.
Verify—Confirm or establish authenticity; substantiate.
Write—To compose or draft.

9

Two types of job analyses can be performed: a task-based analysis and a competency- or skills-based analysis. A task-based analysis focuses on the duties of the job, as opposed to a competency-based analysis, which focuses on the specific knowledge and abilities an employee must have to perform the job. An example of a task-based analysis might include information on the following:

1. Write performance evaluations for employees.
2. Prepare reports.
3. Answer incoming phone calls.
4. Assist customers with product questions.
5. Cold-call three customers a day.

With task job analysis, the specific tasks are listed and it is clear. With competency based, it is less clear and more objective. However, competency-based analysis might be more appropriate for specific, high-level positions. For example, a competency-based analysis might include the following:

1. Able to utilize data analysis tools
2. Able to work within teams
3. Adaptable
4. Innovative

You can clearly see the difference between the two. The focus of task-based analyses is the job duties required, while the focus of competency-based analyses is on how a person can apply their skills to perform the job. One is not better than the other but is simply used for different purposes and different types of jobs. For example, a task-based analysis might be used for a receptionist, while a competency-based analysis might be used for a vice president of sales position. Consider the legal implications, however, of which job analysis is used. Because a competency-based job analysis is more subjective, it might be more difficult to tell whether someone has met the criteria.

Once you have decided if a competency-based or task-based analysis is more appropriate for the job, you can prepare to write the job analysis. Of course, this isn't something that should be done alone. Feedback from managers should be taken into consideration to make this task useful in all levels of the organization. Organization is a key component to preparing for your job analysis. For example, will you perform an analysis on all jobs in the organization or just focus on one department? Once you have determined how you will conduct the analysis, a tool to conduct the analysis should be chosen. Most organizations use questionnaires (online or hard copy) to determine the duties of each job title. Some organizations will use face-to-face interviews to perform this task, depending on time constraints and the size of the organization. A job analysis questionnaire usually includes the following types of questions, obviously depending on the type of industry:

1. Employee information such as job title, how long in position, education level, how many years of experience in the industry
2. Key tasks and responsibilities
3. Decision making and problem solving: this section asks employees to list situations in which problems needed to be solved and the types of decisions made or solutions provided.
4. Level of contact with colleagues, managers, outside vendors, and customers
5. Physical demands of the job, such as the amount of heavy lifting or ability to see, hear, or walk
6. Personal abilities required to do the job—that is, personal characteristics needed to perform well in this position
7. Specific skills required to do the job—for example, the ability to run a particular computer program
8. Certifications to perform the job

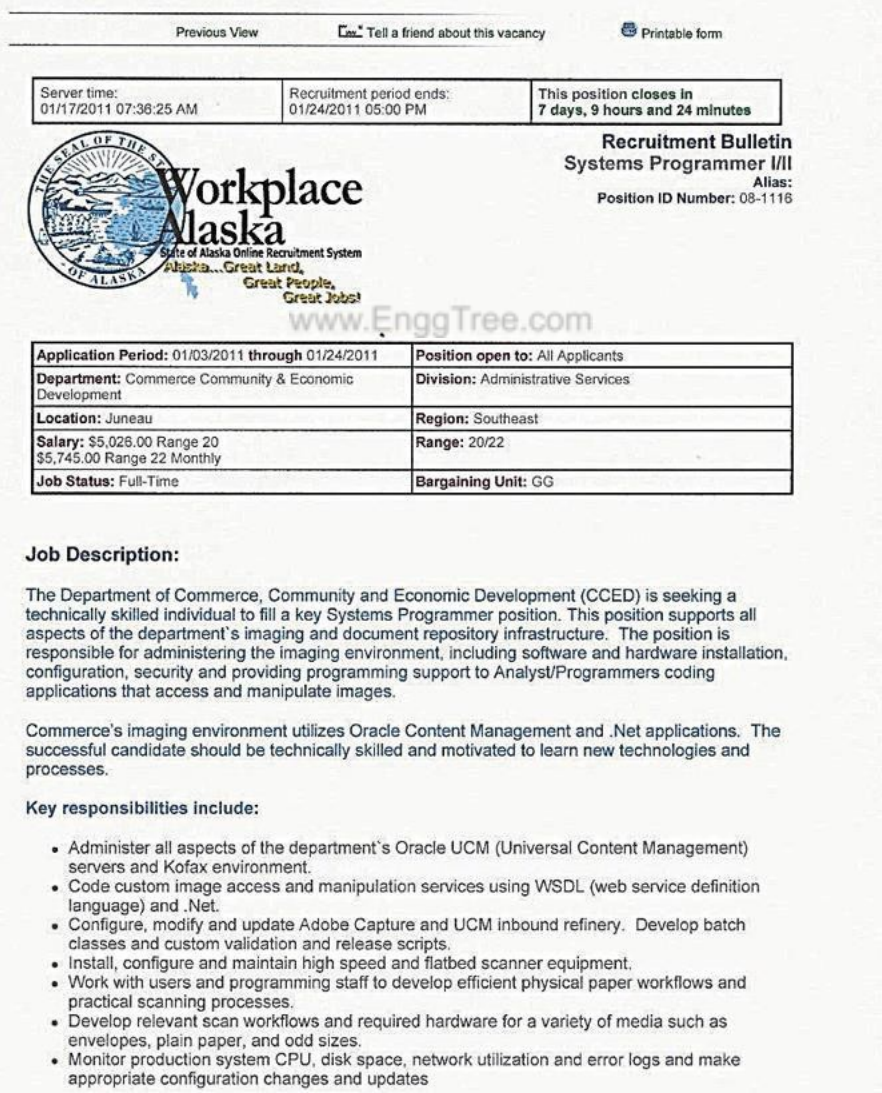
Once all employees (or the ones you have identified) have completed the questionnaire, you can organize the data, which is helpful in creating job descriptions. If there is more than one person completing a questionnaire for one job title, the data should be combined to create one job analysis

for one job title. There are a number of software packages available to help human resources perform this task, such as AutoGOJA.

Once the job analysis has been completed, it is time to write the job description and specifications, using the data you collected. Job descriptions should always include the following components:

1. Job functions (the tasks the employee performs)
2. Knowledge, skills, and abilities (what an employee is expected to know and be able to do, as well as personal attributes)
3. Education and experience required
4. Physical requirements of the job (ability to lift, see, or hear, for example)

Figure 4.3 Sample Job Description



Previous View | Tell a friend about this vacancy | Printable form

Server time: 01/17/2011 07:36:25 AM	Recruitment period ends: 01/24/2011 05:00 PM	This position closes in 7 days, 9 hours and 24 minutes

Workplace Alaska
State of Alaska Online Recruitment System
Alaska...Great Land, Great People, Great Jobs!

Recruitment Bulletin
Systems Programmer I/II
Alias:
Position ID Number: 08-1116

Application Period: 01/03/2011 **through** 01/24/2011	**Position open to:** All Applicants
Department: Commerce Community & Economic Development	**Division:** Administrative Services
Location: Juneau	**Region:** Southeast
Salary: $5,026.00 Range 20 $5,745.00 Range 22 Monthly	**Range:** 20/22
Job Status: Full-Time	**Bargaining Unit:** GG

Job Description:

The Department of Commerce, Community and Economic Development (CCED) is seeking a technically skilled individual to fill a key Systems Programmer position. This position supports all aspects of the department's imaging and document repository infrastructure. The position is responsible for administering the imaging environment, including software and hardware installation, configuration, security and providing programming support to Analyst/Programmers coding applications that access and manipulate images.

Commerce's imaging environment utilizes Oracle Content Management and .Net applications. The successful candidate should be technically skilled and motivated to learn new technologies and processes.

Key responsibilities include:

- Administer all aspects of the department's Oracle UCM (Universal Content Management) servers and Kofax environment.
- Code custom image access and manipulation services using WSDL (web service definition language) and .Net.
- Configure, modify and update Adobe Capture and UCM inbound refinery. Develop batch classes and custom validation and release scripts.
- Install, configure and maintain high speed and flatbed scanner equipment.
- Work with users and programming staff to develop efficient physical paper workflows and practical scanning processes.
- Develop relevant scan workflows and required hardware for a variety of media such as envelopes, plain paper, and odd sizes.
- Monitor production system CPU, disk space, network utilization and error logs and make appropriate configuration changes and updates

Notice how the job description includes the job function; knowledge, skills, and abilities required to do the job; education and experience required; and the physical requirements of the job.

Once the job description has been written, obtaining approval from the hiring manager is the next step. Then the HR professional can begin to recruit for the position.

Tips to Writing a Good Job Description

- Be sure to include the pertinent information:
  - Title
  - Department
  - Reports to
  - Duties and responsibilities
  - terms of employment
  - qualifications needed
- Think of the job description as a snapshot of the job.
- Communicate clearly and concisely.
- Make sure the job description is interesting to the right candidate applying for the job.
- Avoid acronyms.
- Don't try to fit all job aspects into the job description.
- Proofread the job description.

The Law and Recruitment

- *IRCA* stands for *Immigration and Reform Act*. This law requires all employers to determine eligibility of an employee to work in the United States. The reporting form is called an I-9 and must be completed and kept on file (paper or electronic) for at least three years, but some states require this documentation to be kept on file for the duration of the employee's period of employment.
- The *Patriot Act* allows the government access to data that would normally be considered private—for example, an employee's records and work voice mails and e-mails (without the

company's consent). The HR professional might consider letting employees know of the compliance with this law.

- The *EEOC* is a federal agency charged with ensuring discrimination does not occur in the workplace. They oversee the equal employment opportunity (EEO) set of laws. Organizations must post EEO laws in a visible location at their workplace and also include them on job announcements.
- Related to the EEOC, the *bona fide occupational qualification (BFOQ)* makes it legal to discriminate in hiring based on special circumstances—for example, requiring the retirement of airline pilots at a certain age due to safety concerns.
- *Disparate impact* refers to a policy that may limit a protected EEO group from receiving fair treatment. Disparate impact might include a test or requirement that negatively impacts someone based on protected group status. An example is requiring a high school diploma, which may not directly impact the job. *Disparate treatment* refers to discrimination against an individual, such as the hiring of one person over another based on race or gender.

RECRUITMENT STRATEGIES

Now that we have discussed development of the job analysis, job description, and job specifications, and you are aware of the laws relating to recruitment, it is time to start recruiting. It is important to mention, though, that a recruitment plan should be in place.

Recruiters

Some organizations choose to have specific individuals working for them who focus solely on the recruiting function of HR. Recruiters use similar sources to recruit individuals, such as professional organizations, websites, and other methods discussed in this chapter. Recruiters are excellent at networking and usually attend many events where possible candidates will be present. Recruiters keep a constant pipeline of possible candidates in case a position should arise that would be a good match. There are three main types of recruiters:

1. **Executive search firm.** These companies are focused on high-level positions, such as management and CEO roles. They typically charge 10–20 percent of the first year salary, so they can be quite expensive. However, they do much of the upfront work, sending candidates who meet the qualifications.
2. **Temporary recruitment or staffing firm.** Suppose your receptionist is going on medical leave and you need to hire somebody to replace him, but you don't want a long-term hire. You can utilize the services of a temporary recruitment firm to send you qualified candidates who are willing to work shorter contracts. Usually, the firm pays the salary of the employee and the company pays the recruitment firm, so you don't have to add this person to your payroll. If the person does a good job, there may be opportunities for you to offer him or her a full-time, permanent position. Kelly Services, Manpower, and Snelling Staffing Services are examples of staffing firms.

3. **Corporate recruiter.** A corporate recruiter is an employee within a company who focuses entirely on recruiting for his or her company. Corporate recruiters are employed by the company for which they are recruiting. This type of recruiter may be focused on a specific area, such as technical recruiting.

A contingent recruiter is paid only when the recruiter starts working, which is often the case with temporary recruitment or staffing firms. A retained recruiter gets paid up front (in full or a portion of the fee) to perform a specific search for a company.

While the HR professional, when using recruiters, may not be responsible for the details of managing the search process, he or she is still responsible for managing the process and the recruiters. The job analysis, job description, and job specifications still need to be developed and candidates will still need to be interviewed.

Campus Recruiting

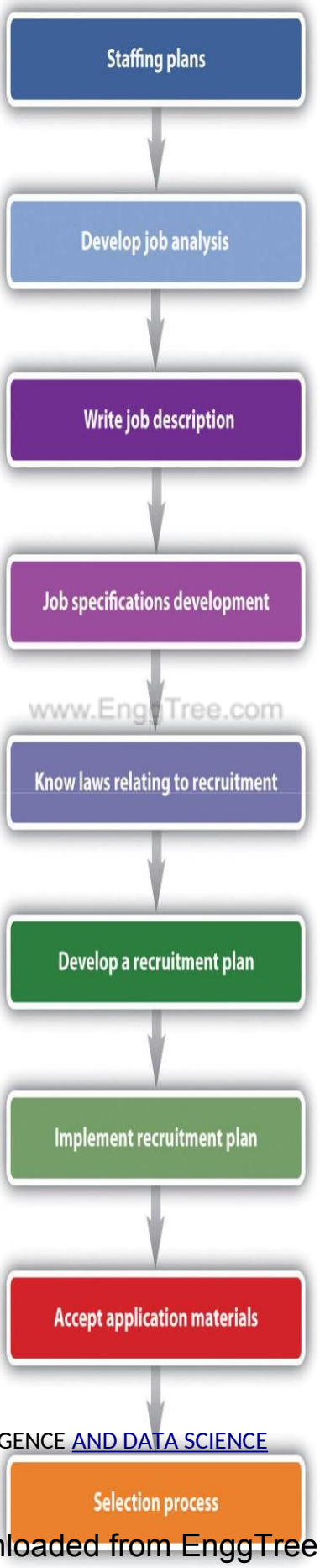
Colleges and universities can be excellent sources of new candidates, usually at entry-level positions. Consider technical colleges that teach cooking, automotive technology, or cosmetology. These can be great sources of people with specialized training in a specific area. Universities can provide people that may lack actual experience but have formal training in a specific field. Many organizations use their campus recruiting programs to develop new talent, who will eventually develop into managers.

For this type of program to work, it requires the establishment of relationships with campus communities, such as campus career services departments. It can also require time to attend campus events, such as job fairs. IBM, for example, has an excellent campus recruiting program. For IBM, recruiting out of college ensures a large number of people to grow with the organization.

Setting up a formal internship program might also be a way to utilize college and university contacts. Walgreens, for example, partners with Apollo College to recruit interns; this can result in full-time employment for the motivated intern and money saved for Walgreens by having a constant flow of talent.

Overview of the Steps to the Recruitment Process:

- HR professionals must have a recruiting plan before posting any job description. The plan should outline where the job announcements will be posted and how the management of candidate materials, such as résumés, will occur. Part of the plan should also include the expected cost of recruitment.
- Many organizations use recruiters. Recruiters can be executive recruiters, which means an outside firm performs the search. For temporary positions, a temporary or staffing firm such as Kelly Services might be used. Corporate recruiters work for the organization and function as a part of the HR team.



Websites

If you have ever had to look for a job, you know there are numerous websites to help you do that. Some examples of websites might include the following:

- Your own company website
- Yahoo HotJobs
- Monster
- CareerBuilder
- JobCentral

Social Media

Facebook, Twitter, LinkedIn, YouTube, and MySpace are excellent places to obtain a media presence to attract a variety of workers. The goal of using social media as a recruiting tool is to create a buzz about your organization, share stories of successful employees, and tout an interesting culture. Even smaller companies can utilize this technology by posting job openings as their status updates. This technique is relatively inexpensive, but there are some things to consider. For example, tweeting about a job opening might spark interest in some candidates, but the trick is to show your personality as an employer early on.

Facebook allows free job postings in Facebook Marketplace, and the company Facebook page can also be used as a recruiting tool. Some organizations decide to use Facebook ads, which are paid on a “per click” or per impression (how many people potentially see the ad) basis. Facebook ad technology allows specific regions and Facebook keywords to be targeted.

Events

Many organizations, such as Microsoft, hold events annually to allow people to network and learn about new technologies. Microsoft’s Professional Developer Conference (PDC), usually held in July, hosts thousands of web developers and other professionals looking to update their skills and meet new people.

Special/Specific Interest Groups (SIGs)

Special/specific interest groups (SIGs), which may require membership of individuals, focus on specific topics for members. Often SIGs will have areas for job posting, or a variety of discussion boards where jobs can be posted. For example, the Women in Project Management SIG provides news on project management and also has a place for job advertisements. Other examples of SIGs might include the following:

- Oracle Developer SIG
- African American Medical Librarians Alliance SIG
- American Marketing Association Global Marketing SIG
- Special Interest Group for Accounting Information Systems (SIG-ASYS)
- Junior Lawyer SIG

Recruiting using SIGs can be a great way to target a specific group of people who are trained in a specific area or who have a certain specialty.

Referrals

- Employee referrals can be a great way to get interest for a posted position. Usually, incentives are offered to the employee for referring people they know. However, diversity can be an issue, as can *nepotism*.

Costs of Recruitment

Our last consideration in the recruitment process is recruitment costs. We can determine this by looking at the total amount we have spent on all recruiting efforts compared to the number of hires. A *yield ratio* is used to determine how effective recruiting efforts are in one area. For example, we can look at the number of total applicants received from a particular form of media, and divide that by the number of those applicants who make it to the next step in the process (e.g., they receive an interview

ADVANTAGES AND DISADVANTAGES OF RECRUITING METHODS

Recruitment Method	Advantages	Disadvantages
Outside recruiters, executive search firms, and temporary employment agencies	Can be time saving	Expensive
		Less control over final candidates to be interviewed
Campus recruiting/educational institutions	Can hire people to grow with the organization	Time consuming
	Plentiful source of talent	Only appropriate for certain types of experience levels
Professional organizations and associations	Industry specific	May be a fee to place an ad
	Networking	May be time-consuming to network
Websites/Internet recruiting	Diversity friendly	Could be too broad
	Low cost	Be prepared to deal with hundreds of résumés
	Quick	
Social media	Inexpensive	Time consuming
		Overwhelming response
Events	Access to specific target markets of candidates	Can be expensive
		May not be the right target market
SIG	Industry specific	Research required for specific SIGS tied to jobs
Referrals	Higher quality people	Concern for lack of diversity
	Retention	Nepotism
Unsolicited résumés and applications	Inexpensive, especially with time-saving keyword résumé search software	Time consuming
Internet and/or traditional advertisements	Can target a specific audience	Can be expensive

Employee leasing	For smaller organizations, it means someone does not have to administer compensation and benefits, as this is handled by leasing company	Possible costs
	Can be a good alternative to temporary employment if the job is permanent	Less control of who interviews for the position
Public employment agencies	The potential ability to recruit a more diverse workforce	May receive many résumés, which can be time-consuming
	No cost, since it's a government agency	
	2,300 points of service nationwide	
Labor unions	Access to specialized skills	May not apply to some jobs or industries
		Builds relationship with the union

The Selection Process

Once you have developed your recruitment plan, recruited people, and now have plenty of people to choose from, you can begin the selection process. The selection process refers to the steps involved in choosing people who have the right qualifications to fill a current or future job opening. Usually, managers and supervisors will be ultimately responsible for the hiring of individuals, but the role of human resource management (HRM) is to define and guide managers in this process. The selection process is expensive. The time for all involved in the hiring process to review résumés, weight the applications, and interview the best candidates takes away time (and costs money) that those individuals could spend on other activities.

The selection process consists of five distinct aspects:

1. **Criteria development.** All individuals involved in the hiring process should be properly trained on the steps for interviewing, including developing criteria, reviewing résumés, developing interview questions, and weighting the candidates.

   The first aspect to selection is planning the interview process, which includes criteria development. Criteria development means determining which sources of information will be used and how those sources will be scored during the interview. The criteria should be related directly to the job analysis and the job specifications.

   In fact, some aspects of the job analysis and job specifications may be the actual criteria. In addition to this, include things like personality or cultural fit, which would also be part of criteria development. This process usually involves discussing which skills, abilities, and personal characteristics are required to be successful at any given job. By developing the criteria before reviewing any résumés, the HR manager or manager can be sure he or she is being fair in selecting

people to interview. Some organizations may need to develop an application or a biographical information sheet. Most of these are completed online and should include information about the candidate, education, and previous job experience.

2. **Application and résumé review.** Once the criteria have been developed (step one), applications can be reviewed. People have different methods of going through this process, but there are also computer programs that can search for keywords in résumés and narrow down the number of résumés that must be looked at and reviewed.
3. **Interviewing.** After the HR manager and/or manager have determined which applications meet the minimum criteria, he or she must select those people to be interviewed. Most people do not have time to review twenty or thirty candidates, so the field is sometimes narrowed even further with a phone interview.
4. **Test administration.** Any number of tests may be administered before a hiring decision is made. These include drug tests, physical tests, personality tests, and cognitive tests. Some organizations also perform reference checks, credit report checks, and background checks. Once the field of candidates has been narrowed down, tests can be administered.
5. **Making the offer.** The last step in the selection process is to offer a position to the chosen candidate. Development of an offer via e-mail or letter is sometimes a more formal part of this process. Compensation and benefits will be defined in an offer.

The Selection Process at a Glance

Criteria Development	• Understand KSAOs • Determine sources of KSAO information such as testing, interviews • Develop scoring system for each of the sources of information • Create an interview plan
Application and Resume Review	• Should be based on criteria developed in step one • Consider internal versus external candidates
Interview	• Determine types of interview(s) • Write interview questions • Be aware of interview bias
Test Administration	 • Perform testing as outlined in criteria development; could include reviewing work samples, drug testing or written cognitive and personality tests
Selection	• Determine which selection method will be used • Compare selection method criteria
Making the Offer	• Use negotiation techniques • Write the offer letter or employment agreement

TRAINING AND DEVELOPMENT

TRAINING

Any effective company has training in place to make sure employees can perform his or her job. During the recruitment and selection process, the right person should be hired to begin with. But even the right person may need training in how your company does things. Lack of training can result in lost productivity, lost customers, and poor relationships between employees and managers. It can also result in dissatisfaction, which means retention problems and high turnover. All these end up being direct costs to the organization. In fact, a study performed by the American Society for Training and Development (ASTD) found that 41 percent of employees at companies with poor training planned to leave within the year, but in companies with excellent training, only 12 percent planned to leave. To reduce some costs associated with not training or undertraining, development of training programs can help with some of the risk. This is what this chapter will address.

For effective employee training, there are four steps that generally occur. First, the new employee goes through an orientation, and then he or she will receive in-house training on job-specific areas. Next, the employee should be assigned a mentor, and then, as comfort with the job duties grows, he or she may engage in external training. **Employee training and development is the process of helping employees develop their personal and organization skills, knowledge, and abilities.**

Steps to Take in Training an Employee

(1)Employee Orientation

The first step in training is an employee orientation. Employee orientation is the process used for welcoming a new employee into the organization. The importance of employee orientation is two-fold. First, the goal is for employees to gain an understanding of the company policies and learn how their specific job fits into the big picture.

The goals of an orientation are as follows:

1. **To reduce start-up costs.** If an orientation is done right, it can help get the employee up to speed on various policies and procedures, so the employee can start working right away. It can also be a way to ensure all hiring paperwork is filled out correctly, so the employee is paid on time.
2. **To reduce anxiety.** Starting a new job can be stressful. One goal of an orientation is to reduce the stress and anxiety people feel when going into an unknown situation.
3. **To reduce employee turnover.** Employee turnover tends to be higher when employees don't feel valued or are not given the tools to perform. An employee orientation can show that the organization values the employee and provides tools necessary for a successful entry.

4. **To save time for the supervisor and coworkers.** A well-done orientation makes for a better prepared employee, which means less time having to teach the employee.
5. **To set expectations and attitudes.** If employees know from the start what the expectations are, they tend to perform better. Likewise, if employees learn the values and attitudes of the organization from the beginning, there is a higher chance of a successful tenure at the company.

(2) In-House Training

In-house training programs are learning opportunities developed by the organization in which they are used. This is usually the second step in the training process and often is ongoing. In-house training programs can be training related to a specific job, such as how to use a particular kind of software. In a manufacturing setting, in-house training might include an employee learning how to use a particular kind of machinery.

Many companies provide in-house training on various HR topics as well, meaning it doesn't always have to relate to a specific job. Some examples of in-house training include the following:

- Ethics training
- Sexual harassment training
- Multicultural training
- Communication training
- Management training
- Customer service training
- Operation of special equipment
- Training to do the job itself
- Basic skills training

As you can tell by the list of topics, HR might sometimes create and deliver this training, but often a supervisor or manager delivers the training.

(3) Mentoring

After the employee has completed orientation and in-house training, companies see the value in offering mentoring opportunities as the next step in training. Sometimes a mentor may be assigned during in-house training. A mentor is a trusted, experienced advisor who has direct investment in the development of an employee. A mentor may be a supervisor, but often a mentor is a colleague who has the experience and personality to help guide someone through processes. While mentoring may occur informally, a mentorship program can help ensure the new employee not only feels welcomed but is paired up with someone who already knows the ropes and can help guide the new employee through any on-the-job challenges.

To work effectively, a mentoring program should become part of the company culture; in other words, new mentors should receive in-house training to be a mentor. Mentors are selected based on experience, willingness, and personality.

However, potential mentors are trained and put into a database where new employees can search attributes and strengths of mentors and choose the person who closely meets their needs. Then the mentor and mentee work together in development of the new employee. “We view this as a best practice,” says Patricia Lewis-Burton, vice president of human resources, Integrated Supply Chain Division. “We view it as something that is not left to human resources alone.

Some companies use short-term mentorship programs because they find employees training other employees to be valuable for all involved. Starbucks, for example, utilizes this approach. When it opens a new store in a new market, a team of experienced store managers and baristas are sent from existing stores to the new stores to lead the store-opening efforts, including training of new employees.

(4) External Training

External training includes any type of training that is not performed in-house. This is usually the last step in training, and it can be ongoing. It can include sending an employee to a seminar to help further develop leadership skills or helping pay tuition for an employee who wants to take a marketing class. To be a Ford automotive technician, for example, you must attend the Ford ASSET Program, which is a partnership between Ford Motor Company, Ford dealers, and select technical schools.

TYPES OF TRAINING

There are a number of different types of training we can use to engage an employee. These types are usually used in all steps in a training process (orientation, in-house, mentorship, and external training). The training utilized depends on the amount of resources available for training, the type of company, and the priority the company places on training. Companies such as The Cheesecake Factory, a family restaurant, make training a high priority. The company spends an average of $2,000 per hourly employee. This includes everyone from the dishwasher and managers to the servers.

For The Cheesecake Factory, this expenditure has paid off. They measure the effectiveness of its training by looking at turnover, which is 15 percent below the industry average (Ruiz, 2006). Servers make up 40 percent of the workforce and spend two weeks training to obtain certification. Thirty days later, they receive follow-up classes, and when the menu changes, they receive additional training (Ruiz, 2006). Let’s take a look at some of the training we can offer our employees. As you will see from the types of training below, no one type would be enough for the

jobs we do. Most HR managers use a variety of these types of training to develop a holistic employee.

(1) Technical or Technology Training

Depending on the type of job, technical training will be required. Technical training is a type of training meant to teach the new employee the technological aspects of the job. In a retail environment, technical training might include teaching someone how to use the computer system to ring up customers. In a sales position, it might include showing someone how to use the customer relationship management (CRM) system to find new prospects. In a consulting business, technical training might be used so the consultant knows how to use the system to input the number of hours that should be charged to a client. In a restaurant, the server needs to be trained on how to use the system to process orders. Let's assume your company has decided to switch to the newest version of Microsoft Office. This might require some technical training of the entire company to ensure everyone uses the technology effectively. Technical training is often performed in-house, but it can also be administered externally.

(2) Quality Training

In a production-focused business, quality training is extremely important. Quality training refers to familiarizing employees with the means of preventing, detecting, and eliminating no quality items, usually in an organization that produces a product. In a world where quality can set your business apart from competitors, this type of training provides employees with the knowledge to recognize products that are not up to quality standards and teaches them what to do in this scenario. Numerous organizations, such as the International Organization for Standardization (ISO), measure quality based on a number of metrics. This organization provides the stamp of quality approval for companies producing tangible products. ISO has developed quality standards for almost every field imaginable, not only considering product quality but also certifying companies in environmental management quality. ISO9000 is the set of standards for quality management, while ISO14000 is the set of standards for environmental management. ISO has developed 18,000 standards over the last 60 years[1]. With the increase in globalization, these international quality standards are more important than ever for business development. Some companies, like 3M (QAI, 2011), choose to offer ISO training as external online training, employing companies such as QAI to deliver the training both online and in classrooms to employees.

Training employees on quality standards, including ISO standards, can give them a competitive advantage. It can result in cost savings in production as well as provide an edge in marketing of the quality-controlled products. Some quality training can happen in-house, but organizations such as ISO also perform external training.

(3) Skills Training

Skills training, the third type of training, includes proficiencies needed to actually perform the job. For example, an administrative assistant might be trained in how to answer the phone, while a salesperson at Best Buy might be trained in assessment of customer needs and on how to offer the customer information to make a buying decision. Think of skills training as the things you actually need to know to perform your job. A cashier needs to know not only the technology to ring someone up but what to do if something is priced wrong. Most of the time, skills training is given in-house and can include the use of a mentor. An example of a type of skills training is from AT&T and Apple (Whitney, 2011), who in summer 2011 asked their managers to accelerate retail employee training on the iPhone 5, which was released to market in the fall.

(4) Soft Skills Training

Our fourth type of training is called soft skills training. Soft skills refer to personality traits, social graces, communication, and personal habits that are used to characterize relationships with other people. Soft skills might include how to answer the phone or how to be friendly and welcoming to customers. It could include sexual harassment training and ethics training. In some jobs, necessary soft skills might include how to motivate others, maintain small talk, and establish rapport.

In a retail or restaurant environment, soft skills are used in every interaction with customers and are a key component of the customer experience. In fact, according to a *Computerworld* magazine survey, executives say there is an increasing need for people who have not only the skills and technical skills to do a job but also the necessary soft skills, such as strong listening and communication abilities. Many problems in organizations are due to a lack of soft skills, or interpersonal skills, not by problems with the business itself. As a result, HR and managers should work together to strengthen these employee skills. Soft skills training can be administered either in-house or externally.

(5) Professional Training and Legal Training

In some jobs, professional training must be done on an ongoing basis. Professional training is a type of training required to be up to date in one's own professional field. For example, tax laws change often, and as a result, an accountant for H&R Block must receive yearly professional training on new tax codes). Lawyers need professional training as laws change. A personal fitness trainer will undergo yearly certifications to stay up to date in new fitness and nutrition information.

Some organizations have paid a high cost for not properly training their employees on the laws relating to their industry. In 2011, Massachusetts General Hospital paid over $1 million in fines related to privacy policies that were not followed (Donnelly, 2011). As a result, the organization has agreed to develop training for workers on medical privacy. The fines could have been prevented if the organization had provided the proper training to begin with. Other types of legal training might include sexual harassment law training and discrimination law training.

(6) Team Training

Do you know the exercise in which a person is asked to close his or her eyes and fall back, and then supposedly the team members will catch that person? As a team-building exercise (and a scary one at that), this is an example of team training. The goal of team training is to develop cohesiveness among team members, allowing them to get to know each other and facilitate relationship building. We can define team training as a process that empowers teams to improve decision making, problem solving, and team-development skills to achieve business results. Often this type of training can occur after an organization has been restructured and new people are working together or perhaps after a merger or acquisition. Some reasons for team training include the following:

- Improving communication
- Making the workplace more enjoyable
- Motivating a team
- Getting to know each other
- Getting everyone "onto the same page," including goal setting
- Teaching the team self-regulation strategies
- Helping participants to learn more about themselves (strengths and weaknesses)
- Identifying and utilizing the strengths of team members
- Improving team productivity
- Practicing effective collaboration with team members

Team training can be administered either in-house or externally. Ironically, through the use of technology, team training no longer requires people to even be in the same room.

(7) Managerial Training

After someone has spent time with an organization, they might be identified as a candidate for promotion. When this occurs, managerial training would occur. Topics might include those from our soft skills section, such as how to motivate and delegate, while others may be technical in nature. For example, if management uses a particular computer system for scheduling, the manager candidate might be technically trained. Some managerial training might be performed in-house while other training, such as leadership skills, might be performed externally.

(8) Safety Training

Safety training is a type of training that occurs to ensure employees are protected from injuries caused by work-related accidents. Safety training is especially important for organizations that use

chemicals or other types of hazardous materials in their production. Safety training can also include evacuation plans, fire drills, and workplace violence procedures. Safety training can also include the following:

- Eye safety
- First aid
- Food service safety
- Hearing protection
- Asbestos
- Construction safety
- Hazmat safety

The Occupational Safety and Health Administration, or OSHA, is the main federal agency charged with enforcement of safety and health regulation in the United States. OSHA provides external training to companies on OSHA standards. Sometimes in-house training will also cover safety training.

TRAINING DELIVERY METHODS

- Training delivery methods are important to consider, depending on the type of training that needs to be performed.

- Most organizations do not use only one type of training delivery method; a combination of many methods will be used.
- *On-the-job coaching delivery method* is a training delivery method in which an employee is assigned to a more experienced employee or manager to learn the skills needed for the job. This is similar to the *mentor training delivery method*, except a mentor training method is less about skills training and more about ongoing employee development.
- *Brown bag lunch training delivery* is normally informal and can involve personal development as well as specific job-related skills.
- *Web-based training* is any type of training that is delivered using technology.
- There are numerous platforms that can be used for web-based training and considerations, such as cost, when selecting a platform for use.
- A *synchronous* training method is used for web-based training and refers to delivery that is led by a facilitator. An *asynchronous* training method is one that is self-directed.
- *Job shadowing* is a delivery method consisting of on-the-job training and the employee's learning skills by watching someone more experienced.

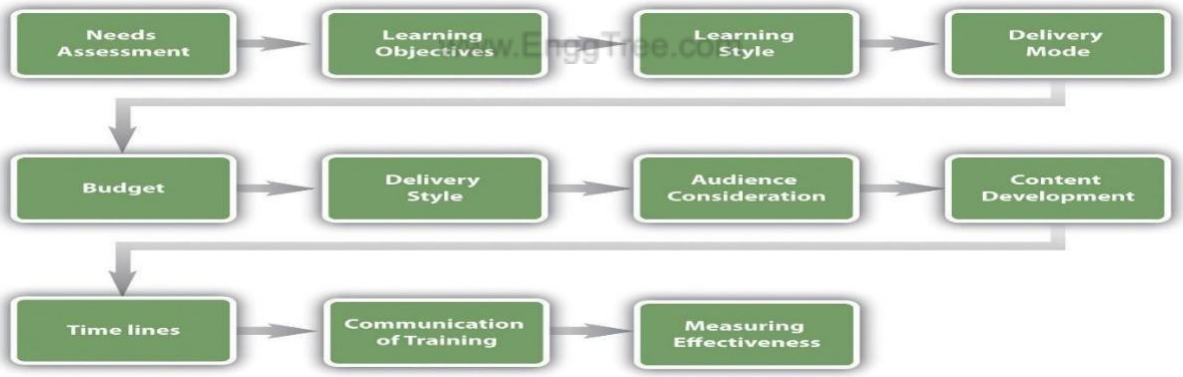
- To motivate employees and allow them to develop new skills, *job swapping* training delivery may be used. This occurs when two people change jobs for a set period of time to learn new skills. With this method, it is likely that other methods will also be used, too.
- *Vestibule training* delivery is also known as "near site" training. It normally happens in a classroom, conference room, or lecture room and works well to deliver orientations and some skills-based training. Many organizations also use vestibule training for technical training, safety training, professional training, and quality training.
- Since many companies operate overseas, providing training to those employees with international assignments can better prepare them for living and working abroad.

DESIGNING A TRAINING PROGRAM

Training Program Framework Development

When developing your training plan, there are a number of considerations. Training is something that should be planned and developed in advance.

Training Program Development Model



The considerations for developing a training program are as follows:

1. **Needs assessment and learning objectives.** This part of the framework development asks you to consider what kind of training is needed in your organization. Once you have determined the training needed, you can set learning objectives to measure at the end of the training.
2. **Consideration of learning styles.** Making sure to teach to a variety of learning styles is important to development of training programs.
3. **Delivery mode.** What is the best way to get your message across? Is web-based training more appropriate, or should mentoring be used?Most training programs will include a variety of delivery methods.

4. **Budget.** How much money do you have to spend on this training?
5. **Delivery style.** Will the training be self-paced or instructor led? What kinds of discussions and interactivity can be developed in conjunction with this training?
6. **Audience.** Who will be part of this training? Do you have a mix of roles, such as accounting people and marketing people? What are the job responsibilities of these individuals, and how can you make the training relevant to their individual jobs?
7. **Content.** What needs to be taught? How will you sequence the information?
8. **Timelines.** How long will it take to develop the training? Is there a deadline for training to be completed?
9. **Communication.** How will employees know the training is available to them?
10. **Measuring effectiveness of training.** How will you know if your training worked? What ways will you use to measure this?

SUPPLY CHAIN NETWORK

What is a supply chain network? And why are they so important for logistics and business managers?

Supply Chain is a connection of all the parties, resources, businesses and activities involved in the marketing or distribution through which a product reaches the end user. It creates a link between the channel partners like suppliers, manufacturers, wholesalers, distributors, retailers, and the customer. To put simply, it encompasses the flow and storage of the raw material; semi-finished goods and the finished goods from point of origin to its final destination i.e. consumption.

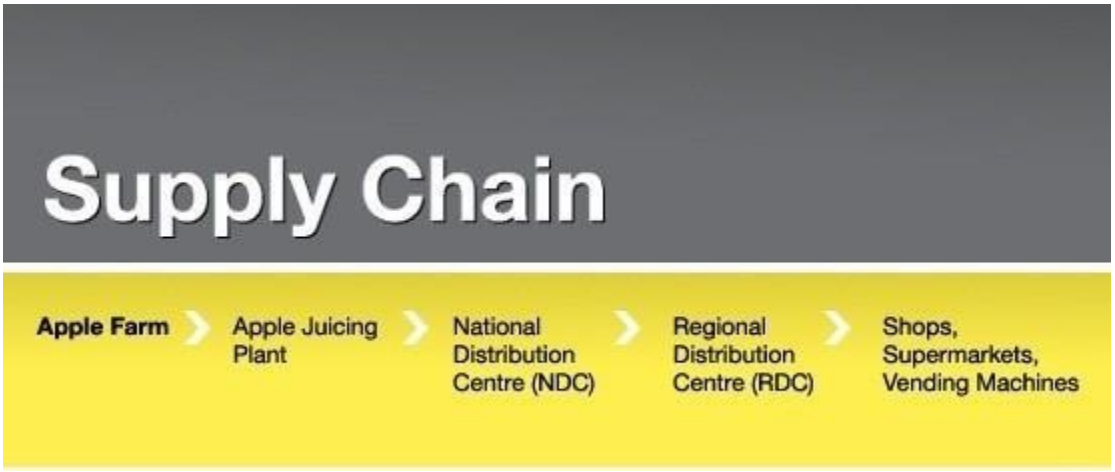
Often organisations focus only on their organisation; what they produce or provide and not what the end customer receives. Looking at a supply chain network enables firms to look at the overall movement of materials/information from start to end, allowing organisations to see the value in creating partnerships; and the value in working together to ensure the best possible value is provided to the end-customer.

Supply chains and supply networks both describe the flow and movement of materials & information, by linking organisations together to serve the end-customer.

'Network' describes a more complex structure, where organisations can be cross-linked and there are two-way exchanges between them; 'chain' describes a simpler, sequential set of links.

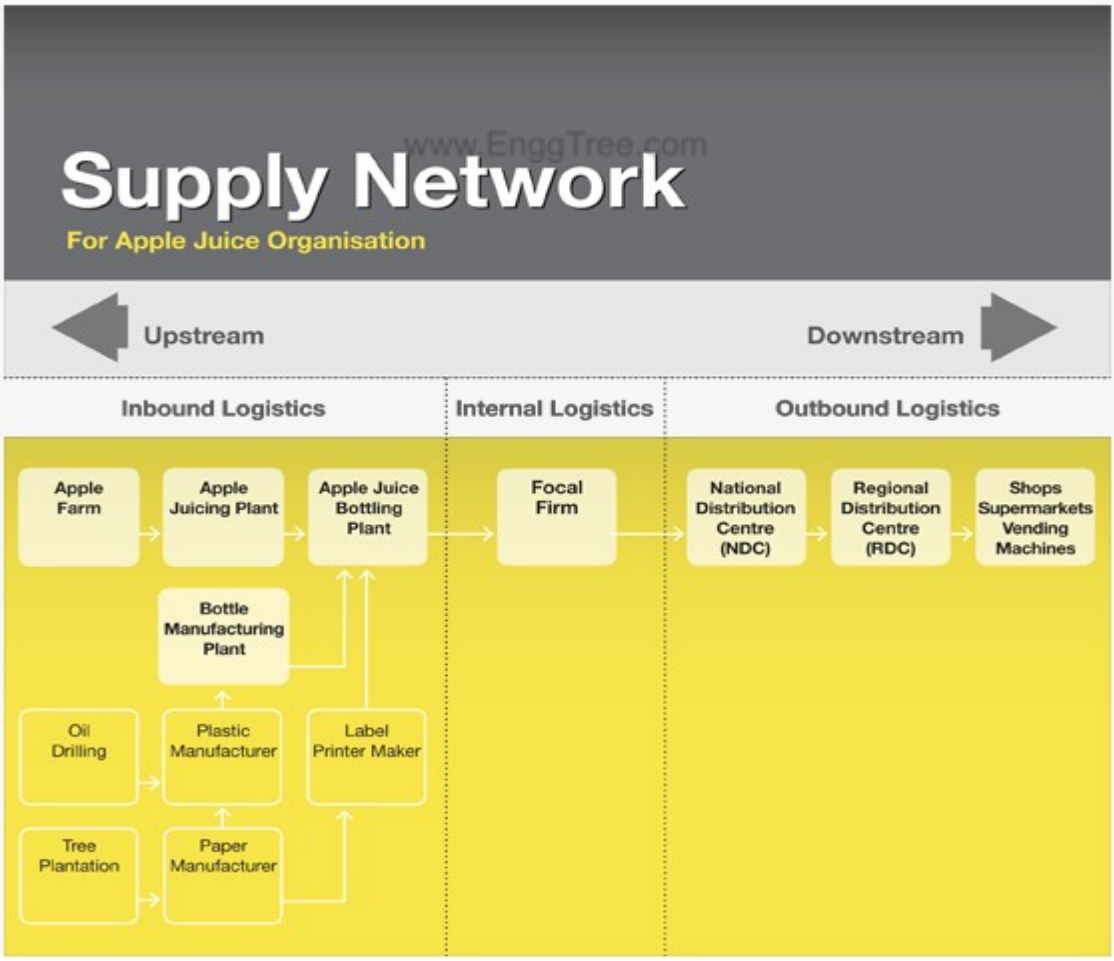
In order to understand a supply chain network; we need to understand what a supply chain is. A supply chain is a series of processes linked together to form a chain.

Supply Chain Example: for apple juice production.



The above diagram is an example of a simplified supply chain; the supply chain shows the movement of material flow from the Apple farm right through the production process to the end users.

Supply Chain Network Example: For Apple Juice Organisation



A supply chain network shows the links between organisations and how information and materials flow between these links. The more detailed the supply chain network the more complex and web like the network becomes.

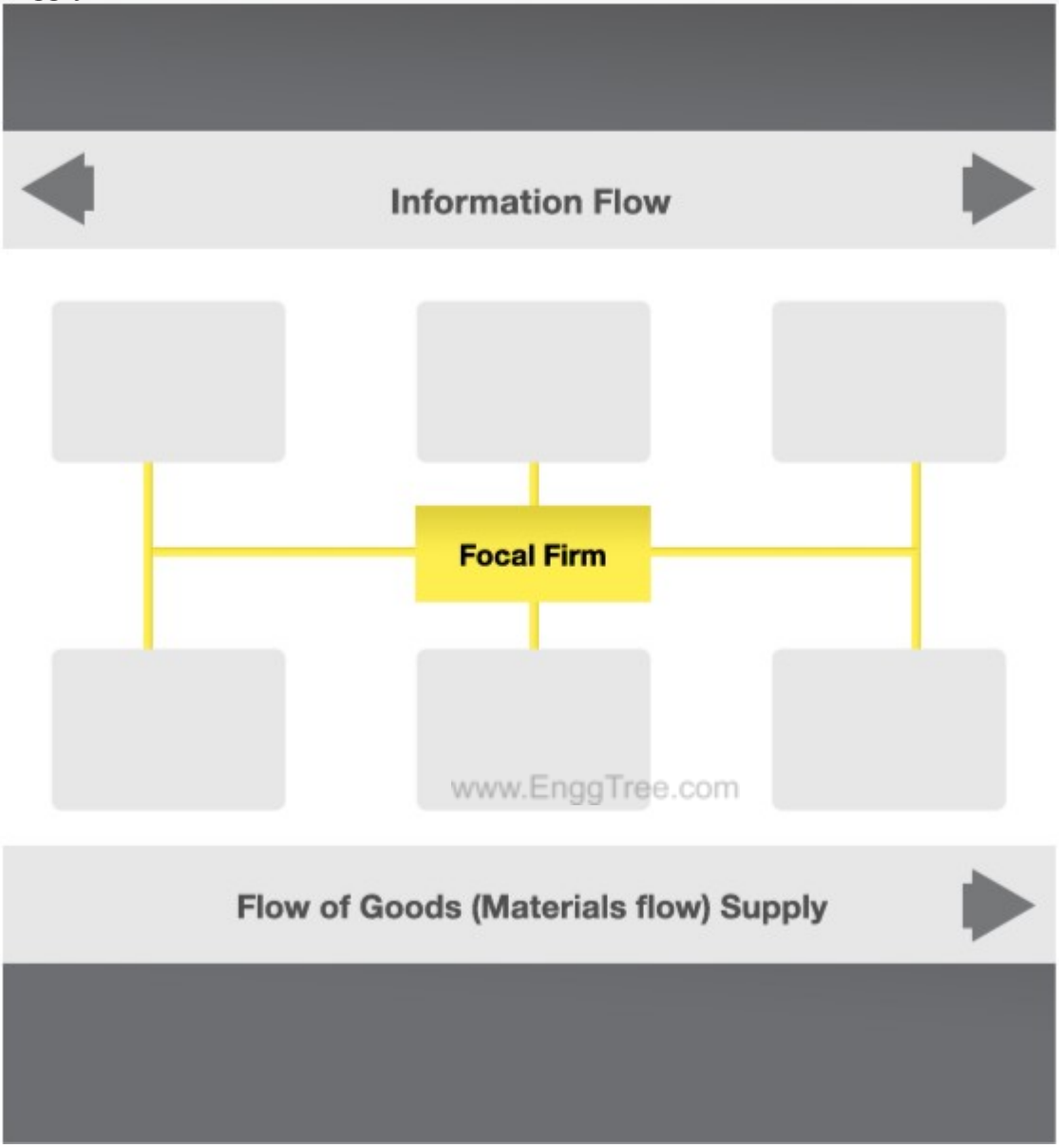
The above example demonstrates a simplified version of a supply chain network of an Apple Juice organisation. The organisation will have an upstream network and a downstream network.

Organisations are linked via two types of flows:

To get a complete picture of an organisations supply chain network; information & material flow should be mapped. Inefficiency can then be located and removed.

- **Material flow:** Is the movement of goods from raw primary goods (such as Wool, Trees and Coal etc.) to complete goods (TV's, Radios and Computers) that are to be delivered to the final customer.
- **Information flow:** Is the demand from the end-customer to preceding organisations in the network.

Supply Chain Network: Information flow, Flow of Materials



If a focal firm provides their suppliers with their sales data/ forecasting demand information; their supplier will be able to reduces costs (such as over production waste) and improve prices.

In order to better serve your end customer, it is important to develop strong partnerships within your supply network which has a flow on effect to your end customers whether you are a manufacturer, distributor or retailer. Better communication will increase efficiency and productivity. Trust is the core ingredient to developing better communication and relationships.

Supply Chain refers to the integration of all activities involved in the process of sourcing, procurement, conversion and logistics.

Supply Chain is the interconnection of all the functions that starts from the manufacturing of raw material into the finished product and ends when the product reaches the final customer. This network helps to provide quality products to the customer at a reasonable price.

Most of the time supply chain is juxtaposed with the value chain. In this, we have compiled all the substantial differences between supply chain and value chain. Have a look.

BASIS FOR COMPARISON	SUPPLY CHAIN	VALUE CHAIN
Meaning	The integration of all the activities involved in the procurement, conversion and logistics of the product is known as Supply Chain.	Value Chain is defined as the series of activities, that adds value to the product.
Originated from	Operation Management	Business Management
Concept	Conveyance	Value Addition
Sequence	Product Request - Supply Chain - Customer	Customer Request - Value Chain - Product
Objective	Customer Satisfaction	Gaining competitive advantage

SUPPLY CHAIN NETWORK DESIGN

The supply chain network design is defined as a working model that delineates the overall framework of a supply chain to assess the time and costs required to bring goods to the market. This model helps a business spot inefficiencies and potential risks in the supply chain. The model also helps analyze "what if" scenarios to optimize operations to reduce costs, improve service and increase responsiveness.

What is the goal of a Global Supply Chain Network Design?

The key objectives of a global supply chain design are to optimize inventory, working capital and logistics costs. It also increases visibility, identifies opportunities for cost savings and reduces potential risks.
Supply network design reinforces the supply chain by mapping and modeling processes and optimizing them to ensure that products or services are delivered on time and in a cost-effective manner.

What is the Importance of Supply Chain Network Design?

Analysts in a GEP white paper on the importance of supply chain network design said that 80% of supply chain costs are determined at the designing phase of the product and supply chain network. Thus, failure to consider network design can cost the enterprise dearly and be counterproductive in the longer term.
Simply mapping a global supply chain network, its flows, timelines, current costs and revenues generated can generate a bunch of troubling yet important questions, such as:

- Why are the enterprises' only suppliers based overseas?
- Why are there so many warehouses, and why in those locations?
- Why is there so much dead stock? Why has more inventory been ordered?
- Why are freight and trucking costs so high?
- Is the current network design efficient?
- Is the supply chain design aligned with the enterprises' sustainability goals?

What Are the Benefits of Supply Network Design?

Supply chain network design or SCM network design helps enterprises simulate and visualize their supply chains to optimize them. Optimization of supply chains reduces overall costs and enhances service, speed-to-market, flexibility and risk mitigation. Here are the key benefits:

- Discerning parts for streamlining and potential cost savings
- Reduction in purchase costs and inventory
- Working capital reduction
- Reduction in freight costs
- Route optimization for reducing transit time and fuel costs
- Reduction in network fixed costs (facilities, equipment) and supply chain variable costs (labor, handling, 3PL costs)

- Optimization of service levels and delivery dates for customer satisfaction
- Process and cost visibility across the supply chain network
- Providing performance visibility of the complete supply chain network by comparing its capabilities/costs against set benchmarks

What Factors Are Considered While Designing a Supply Chain Network Model?

To start with, enterprises must establish a benchmark, and to do so, the following components must be considered:

- Define the objectives as aligned with the enterprises' objectives and the supply chain design model parameters, such as capacity issues, inventory replenishment lead times, customer needs, location of facilities and sources and so on.
- Collate the required data, such as forecasts and future trends.
- Use network optimization tools and necessary data for building a “living” model, incorporating the defined parameters and data collected.
- Validate the model with historical "what if" scenarios and compare the outcome with known results.
- Finalize the supply chain network design and implement it.

How Many Types of Supply Chain Network Design Are There?

Enterprises deciding to assess their supply chain network design must zero in on the type of SCM network design to be adopted.
The three types of supply chain network design are:

Strategic Network Design:

Here, the designing of the network — location of the facilities and sources, production and warehouse capacities, market strategies — must be aligned with the objectives of the business.

Tactical Network Design:

Here, different ways to optimize the existing network are explored for implementing short-term planning decisions.

Identifying Risks and Their Mitigation:

Here, risks are identified by asking “what if” questions. A plan of action (PoA) for managing each identified risk is then made.

Should Supply Network Design Be Considered a Core Process?

A supply network design is a dynamic process due to the ever-changing conditions of the environment, markets, customers, suppliers and raw materials, including weather. Thus, a supply chain model designed earlier will no longer be valid today.
It is an iterative process that continues to refine the model and ensures a more consistent output. Regularly updating the supply chain model with the current realities and parameters will provide accurate results over time.
Many top global companies consider supply chain design a critical function and a core process, regularly rationalizing their models as required.

Ways to Make Supply Chain Design as a Core Business Process

- Ensure a permanent network design center operated by a cross-functional team with the necessary skill sets and experience.
- Plan the frequency and the critical issues that should flag the remodeling of the supply chain design and establish these rules.
- Appoint a trusted consultant having in-depth knowledge and vast experience in supply chain network design.
- Reach out for help when needed — approach other professionals or supply chain design forums for help when needed.

Conclusion

Supply chain review and design have gained traction of late and are acknowledged to effectively cope with the rapid changes and challenges faced by enterprises globally. Unfortunately, many businesses are yet to regard supply chain design as a core process and instead treat it as a one-of-a-kind case or tweak it on a project-to-person basis.
Examples of a supply chain network design model include spotting bottlenecks in a supply chain and looking to enhance the processes across the supply chain, which is vital in today's scenario. Tech-savvy enterprises can thus leverage a dynamic supply chain model to ensure that their supply chains deliver and exceed business expectations long into the future.

DEMAND PLANNING

What is Demand Planning?

Demand planning is a supply chain management process of forecasting, or predicting, the demand for products to ensure they can be delivered and satisfy customers. The goal is to strike a balance between having sufficient inventory levels to meet customer needs without having a surplus. A wide variety of factors can influence demand, including labor force changes, economic shifts, **severe weather**, natural disasters or **global crisis events**.

What are the Aspects of Demand Planning?

Demand planning spans several aspects, with the three primary areas being:

(1) Product Portfolio Management

Product portfolio management oversees the overall product lifecycle, beginning with the introduction of a new product through to its end-of-life planning. In many cases, product lines are interdependent, and understanding how new products may influence demand for other products is important to understanding the overall product mix required to maximize market share.

(2) Statistical Forecasting

Using historical data, statistical forecasting creates supply chain forecasts with advanced statistical algorithms. In this area, it is important to determine the accuracy of each model, identify outliers and exclusions and understand assumptions. Seasonal shifts (think the spurt of holiday shopping that occurs between October and December for retailers, or the boost in yard equipment sales in spring months) can also be assessed with statistical forecasting.

(3) Trade Promotion Management

Trade promotion or marketing events can influence demand, especially in the retail industry. The goal of a trade promotion is to help a brand connect with a customer, often through an in-store giveaway, discount, or promotion, and these events can impact the demand for a product.

Why is Demand Planning Important?

If product isn't available for customers to purchase because it's out of stock, businesses lose out on revenue, and over time, they could lose the customer to a competitor. On the other hand, sitting on a slew of unused inventory incurs both space and production costs unnecessarily. With demand planning, business leaders can stay in front of market shifts and make more proactive decisions, while being responsive to their customers' needs.

Best Practices for Demand Planning

Demand planning is a multi-step process, dependent on the right tools, information and processes. Often, there can be unique nuances in the process, based on product positioning, inventory needs and organizational goals, but some best practices to keep in mind include:

Implement the Right Software

There is a plethora of options when it comes to enterprise resource planning (ERP) systems, so choosing the right one can be tricky. When considering ERP software, it's important to examine the ability of the tool to handle forecasting nuances as well as the provider's reputation, reporting capabilities, and the transparency and reliability of the forecasts it produces.

Gather and Prepare Data

Data drives demand planning, now more than ever. **Real-time visibility** into inventory movements coupled with metrics reports that paint a clear picture and data mining and aggregation that can identify areas for improvement or reaction can help to create more agile process modelling.

Define Process Models

Lacking a defined process for a demand planning cycle leads to chaos. Confusing process with information that is simply a set of widely known facts around an organization is all too common,

making it difficult to hold anyone accountable, and thus hurting overall performance. For most companies, the steps in the demand planning process go something like this:

- Preparation of data
- Initial forecasting
- Incorporation of market intelligence
- Consideration of sales goals and financial reports to reconcile bottom-up forecasts with top-down financial and sales forecasts
- Refine a final forecast
- Performance monitoring based on real-time analytics

Implement and Monitor

Successful demand planners usually design a pilot version of the plan using historical data, or **descriptive analytics**, as a basis. They also make regular adjustments and have a team of people dedicated solely to devising the plan, implementing it, reducing error and bias, and designing processes for execution.

The Future of Demand Planning in the Supply Chain

Like many business needs, supply chain and demand planning are going digital. Advances in applications of machine learning within the supply chain are making it possible to adapt and update forecasts in real time, allowing inventory to run leaner, without missing the mark on demand.

For supply chain professionals, understanding how to use digital enterprise architectures and implementing artificial intelligence and machine learning programs that can help optimize a lean, agile and data-driven approach will reveal new ways to cut costs in operations, boost revenue and offer a greater competitive edge.

A better-connected supply chain means demand planning can be conducted even more in the moment. When implemented well, demand planning can be a pivotal process in boosting a supply chain's profitability.

INVENTORY AND SUPPLY CHAIN MANAGEMENT

INVENTORY MANAGEMENT

Retail inventory is the stocking of products that you sell to consumers. Use the system to set profitable prices and ensure you have the right amount of stock to meet demand.

Manufacturing Inventory Management

Manufacturing inventory management is the practice of keeping enough stock on hand so production lines can fulfill orders. The process helps managers see stock levels at a glance and tracks raw materials, parts, work-in-progress and finished goods.

What Is Multi-Location Inventory Management?

Multi-location inventory management is the process of managing stock across multiple locations, warehouses, and retail stores or across multiple selling channels. With multi-location management, you can watch stock levels in all locations and optimize your inventory to fulfill orders.

What Is an Inventory Management System?

An inventory management system combines varying software packages to track stock levels and stock movements. The solution can integrate with multichannel sales systems or shipping systems.

An inventory management system optimizes inventory levels and ensures product availability across multiple channels. It provides a single, real-time view of items, inventory and orders across all locations and selling channels. This enables businesses to carry less inventory on hand and frees up cash to be used in other parts of the business. An inventory management system helps keep inventory costs low while delivering on customer expectations.

How to Choose an Inventory Management System?

Choosing an inventory management system is a matter of identifying the features your business needs. Do you need to track stock movements and location within a warehouse, or plan inventory and track trends, or both?

INVENTORY MANAGEMENT FAQS

There are many questions in a broad and complicated topic like inventory management. Here are answers to a few:

What Are the Objectives of Inventory Management?

One objective of inventory management is to keep enough stock to satisfy customers. Another is to invest as little as possible in stock while still earning the most profit.

Why Inventory Management Is Important in the Supply Chain

Inventory management is vital in the supply chain because a company must balance customer demand with storage space and cash limitations. Inventory management provides visibility into the supply chain (procurement, production, fulfillment, etc.) so managers can coordinate lead times for deliveries with production timetables.

How Can Inventory Management Be Improved?

Keeping accurate accounting records and taking regular physical stock counts can improve your inventory management efforts. A system that provides your organization with real-time visibility into inventory can help stakeholders make critical business decisions. You should also be aware of a stock's condition, especially if you're dealing with perishables.

How Inventory Management Affects the Working Capital

Real goods in warehouses tie up working capital until they sell. Making the supply chain more efficient keeps you from holding too much stock. Improving inventory management processes helps you prevent storing, picking and shipping errors that reduce sales.

What Are Inventory Management Policies?

Inventory management policies are plans for how to use inventory to make customers happy and reduce costs. Policies outline such things as the stock management method the company uses.

What Are the Types of Inventory Management Systems?

There are several types of inventory management systems that businesses use depending on how they operate. Three examples are manual inventory, periodic inventory and perpetual inventory. Manual methods are the least sophisticated and least accurate, and perpetual systems are the most sophisticated and most accurate.

- **Manual Inventory System:** This involves physically counting items and recording them on paper or in a spreadsheet. Small businesses may use manual systems.

- **Periodic Inventory System:** Periodic inventory systems include manual and periodic counts. Periodic counts record item details as items move in and out of stock. Barcodes simplify stocktaking. A database contains the records of stock levels and locations.

- **Perpetual Inventory System:** Perpetual inventory systems provide real-time stock data, as they rely on active radio frequency identification (RFID) tags that are always on and sending updates on item movements. Passive RFID tags, meanwhile, use a scanner to send stock information to the database.

What Is Service Level in Inventory Management?

A service level for inventory management is how much a company believes it can successfully store a particular stock. In other words, it's the probability a company will avoid stockouts and support sales.

How Does ERP Help in Inventory Management?

Enterprise resource planning (ERP) is helpful for inventory management because it tracks and provides insights into supply chain operation, accounting and purchasing, consolidating the information and making it visible in one place.

What Is Poor Inventory Management?

Poor inventory management is an imbalance between keeping too much and too little stock. The definition of a perfect balance can change as demand changes: Sales change when trends or seasons change. Poor stock management increases costs and thereby reduces profits.

HOW IS INVENTORY MANAGEMENT DIFFERENT FROM OTHER PROCESSES?

People sometimes confuse inventory management with related practices. Inventory management controls all stock within a company. Supply chain management manages the process from supplier to delivering the product to the customer. Warehouse management is a part of inventory control and focuses on stock in a specific location.

Inventory Management vs. Inventory Control

inventory control is a part of the overall inventory management process. Inventory control manages the movement of items within the warehouse.

Inventory Management vs. Inventory Optimization

Inventory optimization is the process of using inventory in the most efficient way, and as a result minimizing the dollars spent on stock and storing those items.

You can also think about inventory optimization as seeing inventory across all locations and selling channels, being able to use any of it to fulfill customer orders—in doing so, you can hold less stock overall.

Inventory Management vs. Order Management

Inventory management is responsible for ordering and tracking stock as it arrives at the warehouse. Order management is the process of receiving and tracking customer orders. Software often combines both tasks.

Inventory management plays an important role in order management. As orders are received, inventory can be allocated to specific orders, and then the status can be changed in the inventory record to essentially put it "on hold" for that order. Furthermore, when the order management system and inventory system are integrated, the inventory system can recommend which location should fulfill the order, based on where all the items in the order are available—this eliminates multiple shipments for a single order.

Inventory Management vs. Supply Chain Management

Supply chain management is a process of managing supply relationships outside a company and the flow of stock into and through a company. Inventory management may focus on trends and orders for the company or a part of the company.

Inventory management is essential for a properly running supply chain. Inventory management follows the flow of goods to, through and out of the warehouse. The supply chain includes demand planning, procurement, production, quality, fulfillment, warehousing and customer service—all of which require inventory visibility.

Inventory Management vs. Warehouse Management

Warehouse management complements inventory management. Warehouse management organizes stock in a warehouse. Inventory management manages stock and trends for many warehouses or an entire company.

The key to streamlining your warehouse operations is a thoughtfully laid out and meticulously organized facility. When each product has a specific place in the warehouse, it prevents staff from moving about inefficiently and maximizes labor efficiency. But these processes are only as good as the inventory records that drive them.

Inventory Management vs. Logistics

Logistics is the practice of controlling processes in a warehouse and in the replenishment and delivery systems. Inventory management maintains stock levels and manages stock location.

Inventory management is a crucial part of how companies manipulate their logistics. The relationship between inventory management and logistics is interdependent. Logistics need inventory management to perform their activities. Good logistics systems improve warehouse and operational activities.

Inventory Management vs. ERP

An enterprise resource planning (ERP) system is software that manages business activities such as accounting, purchasing, compliance and supply chain operations. By contrast, inventory management is a part of a modern ERP system, providing insight into stock levels, inventory en route and the status of current inventory—this makes it visible across the organization in real time.

Inventory management helps to properly plan a company's replenishment orders. ERP systems give companies accurate inventory data, so they have the most current information for their inventory management plan. ERP systems optimize the data so inventory management is successful.

LOGISTICS

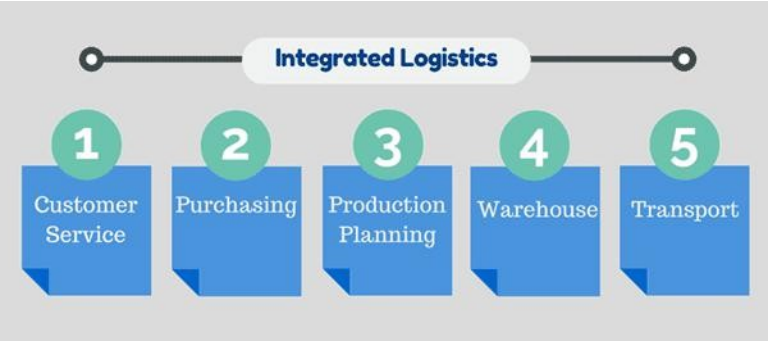
What is Logistics and Supply Chain Management?

"Logistics typically refers to activities that occur within the boundaries of a single organization and Supply Chain refers to networks of companies that work together and coordinate their actions to deliver a product to market. Also, traditional logistics focuses its attention on activities such as procurement, distribution, maintenance, and inventory management. Supply Chain Management (SCM) acknowledges all of traditional logistics and also includes activities such as marketing, new product development, finance, and customer service" - Michael Hugos

What is Logistics?

"Logistics is about getting the right product, to the right customer, in the right quantity, in the right condition, at the right place, at the right time, and at the right cost (the 7 Rs)" - John J. Coyle et al

In the past, various tasks were under different departments, but now they are under the same department and report to the same head as below,



What is Logistics Management?

"Logistics Management deals with the efficient and effective management of day-to-day activity in producing the company's finished goods and services" - Paul Schönsleben

What is Supply Chain?

"Supply Chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer" - Martin Christopher

What is Supply Chain Management?

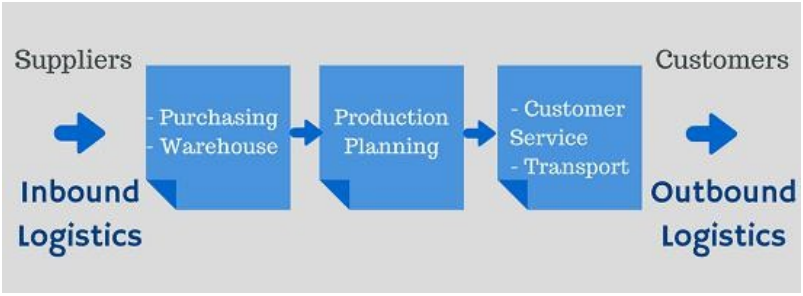
Each researcher defines supply chain management differently. However, we would like to provide the simple definition as below,

"Supply Chain Management (SCM) refers to the coordination of production, inventory, location, and transportation among the participants in a supply chain to achieve the best mix of responsiveness and efficiency for the market being served" -Michael Hugos

What is the Difference Between Inbound and Outbound Logistics?

"Inbound Logistics refers to movement of goods and raw materials from suppliers to your company. In contrast, Outbound Logistics refers to movement of finished goods from your company to customers"

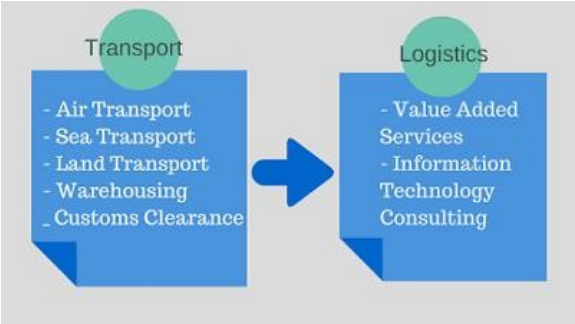
To illustrate this term, we make a small graphic as below,



As you can see, purchasing and warehouse (distribution center) communicate with suppliers and they are sometimes called "supplier facing function". Production planning and inventory control function is the center point of this chart. Customer service and transport functions communicate with customers and they are sometimes called "customer-facing functions.

What is Transport and Logistics?

"Transport and Logistics refers to 2 types of activities, namely, traditional services such as air/sea/land transportation, warehousing, customs clearance and value-added services which including information technology and consulting"



What is International Logistics?

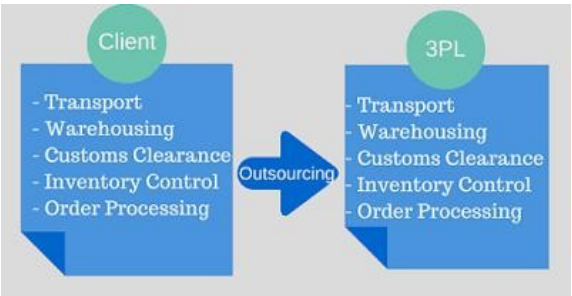
These are one of the most ambiguous groups of terms in international business out there. They are used interchangeably with international supply chains or international production and transportation activities. However, the most concise definition is as below,

"International Logistics focuses on how to manage and control overseas activities effectively as a single business unit. Therefore, companies should try to harness the value of overseas product, services, marketing, R&D and turn them into competitive advantage"

What is Third Party Logistics or 3PL?

The concept of 3PL appeared on the scene in the 1980s as a way to reduce costs and improve services which can be defined as below,

"Third Party Logistics or 3PL refers to the outsourcing of activities, ranging from a specific task, such as trucking or marine cargo transport to broader activities serving the whole supply chain such as inventory management, order processing and consulting."



In the past, many 3PL providers didn't have adequate expertise to operate in complex supply chain structures and processes. The result was the inception of another concept.

What is Fourth Party Logistics or 4PL?

The 4PL is the concept proposed by Accenture Ltd in 1996 and it was defined as below,

"Fourth Party Logistics or 4PL refers to a party who works on behalf of the client to do contract negotiations and management of performance of 3PL providers, including the design of the whole supply chain network and control of day-to-day operations"

You may wonder if a 4PL provider is really needed. According to the research by Nezar Al-Mugren from the University of Wisconsin-Stout, the top 3 reasons why customers would like to use 4PL providers are as below,

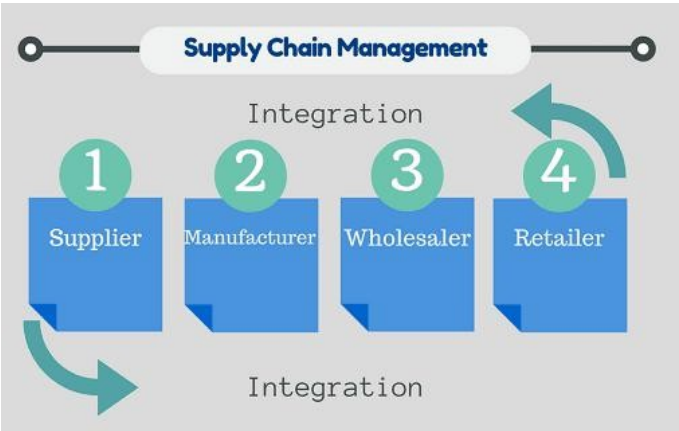
- Lack of technology to integrate supply chain processes

- The increase in operating complexities

- The sharp increase of the operations in the global supply chains

What is Supply Chain Network?

Many companies have a department that controls supply chain activity so they believe that SCM is a "function". Some companies think SCM is a kind of management system under IT (information system or enterprise resource planning.) In fact, SCM is actually a "network" consisting of many players as below,

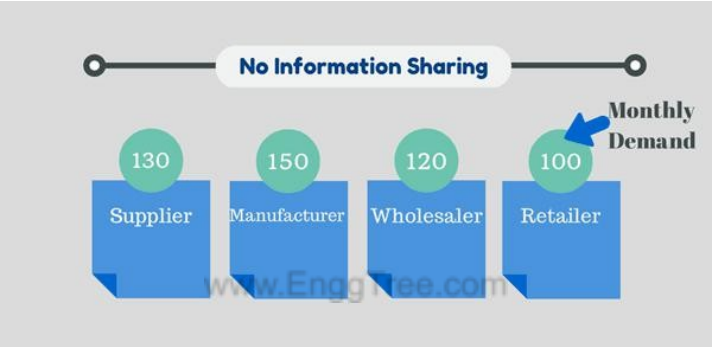


A generic supply chain structure is as simple as Supplier, Manufacturer, Wholesaler, and Retailer (it's more complex in the real world but a simple illustration serves the purpose.)

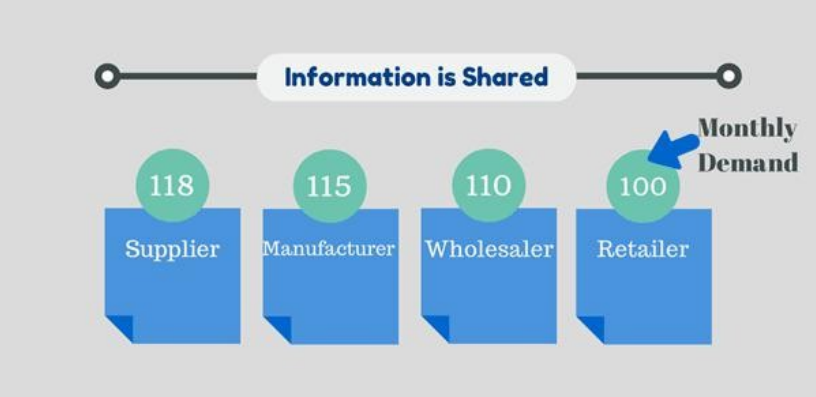
The word "management" can be explained briefly as "planning, implementing, controlling". Supply Chain Management (in the supply chain education context) is then the planning, implementing, and controlling of the networks.

What is Information Sharing?

Another important attribute of supply chain management is the flow of material, information, and finance (these are things that can be found in lean manufacturing and the six sigma project too). Even though there are 3 types of flow, the most important one is information flow aka information sharing. Let's see the example of this through the simplified version of the bullwhip effect as below,



When customer demand data is not shared, each player in the same supply chain must make some sort of speculation and this can become a management issue. According to the above graphic, the retailer has a demand for 100 units, but each player tends to keep stock more and more every step of the way. This results in higher costs for everyone in the same supply chain.



When information is shared via demand management from retailer down to supplier, everyone doesn't have to keep stock that much. The result is a lower cost for everyone. This is sometimes called the extended supply chain or supply chain visibility.

Information sharing will also reduce the need to use digital transformation solutions such as supply chain systems, digital supply chain, predictive analytics, or artificial intelligence.

What is Supply Chain Coordination?

Information sharing requires a certain degree of "coordination" (it's also referred to as collaboration or integration in scholarly articles). Do you wonder when people started working together as a network? In 1984, companies in the apparel business worked together to reduce overall lead time. In 1995, companies in the automotive industry used Electronic Data Interchange to share information. So, working as a "chain" is a real-world practice.

What are Conflicting Objectives?

Working as a network requires the same objective, but this is often not the case (even with someone in the same company). "Conflicting Objectives" is the term used to describe the situation when each function wants something that won't go well together. For example, purchasing people always place the orders with the cheapest vendors (with a very long lead-time) but production people or project managers need material more quickly.

To avoid conflicting objectives, you need to decide if you want to adopt a time-based strategy, low-cost strategy, or differentiation strategy. A clear direction is needed so people can make the decisions accordingly.

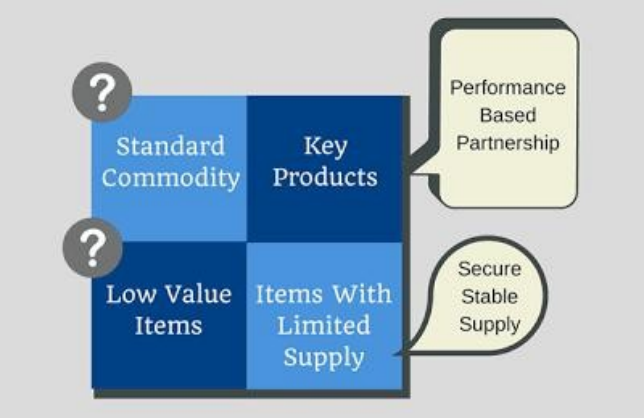
What is the Cost/Service Trade-off?

The concept of the Cost/Service Trade-off appeared as early as 1985 but it seems that people really don't get it.When you want to improve service, the cost goes up. When you want to cut costs, service suffers. It's like a "seesaw", the best way you can do is to try to balance both sides.

A real-world example is that a "new boss" asks you to cut costs by 10%, improve service level by 15%, and double inventory turns so the financial statement looks good. If you really understand the cost/service trade-off concept, you will agree that you can't win them all. The most appropriate way to handle this is to prioritize your KPIs.

What is Supply Chain Relationship?

To work as the same team, a long-term relationship is key. Otherwise, you're just a separate company with a different strategy/agenda. So academia keeps preaching about the importance of relationship-building but is not for everyone.



Since there are too many suppliers to deal with, a portfolio matrix is often used to prioritize relationship-building to create supply chain partners. Focus your time and energy to create a long-term relationship with suppliers of key products and items with limited sources of supply (or items with high supply chain risk.) Because people and human resources are the factors that can make or break your supply chain.

ANALYTICS APPLICATIONS IN HR & SUPPLY CHAIN

Advanced analytics can be leveraged by HR teams to positively impact both talent and business decisions in the organization. HR can evolve from being just a people-management function to playing a more transformational role in human capital management and being a strategic business partner in the company.

8 Applications Of Advanced Analytics In HR

1. Hiring The Right Talent With Competency Acquisition Analytics
Hiring the right talent is instrumental to a company's success with employees amounting to one of the biggest costs and greatest opportunities in most businesses. Hence, in order to study whether or not you are acquiring the right talent for your business, competency acquisition analytics can be used.

The primary step includes identifying the core competencies that are crucial for the success of your business. Then, you can map these competencies against the existing talent, their current capabilities and their potential for growth. Talent gaps, if any, can also be identified at this stage.

The HR team can assess whether the existing resources can be trained to plug the identified competency gaps, or whether new talent with those competencies need to be hired.

2. Recruitment Channel Analytics

Just as important as hiring the right talent, is understanding where the best talent is coming from. Recruitment channel analytics is a process that helps determine where an organization's best employees have been recruited from, and what recruitment channels have been most effective in hiring the right resources for the company.

This analysis includes gaining insights by drilling down into historical employee data, surveys and feedback records and assessing KPIs such as the return per employee and human capital value-added.

3. Classification Analysis To Determine The Success Rate Of Teams

Classification analysis is the process of analyzing historical data to identify patterns that help us predict which category a particular observation or data entity belongs to. In HR, this analytical method can be used to study the composition of a team, and other context variables in order to determine how successful the team will be.

Instead of forming teams merely on the experience, availability of resources, organizations can use insights from classification analytics to understand what other factors such as leadership style, team dynamics and size, the duration of a project, etc, impact the success rate of a team. Being able to determine the success rate of a team beforehand, enables organizations to form the right teams for a project.

4. Attrition Analysis

High attrition is a huge challenge for HR teams and cost intensive for companies. Job postings, recruiting, onboarding and training are some significant expenses of losing employees and replacing them. This is a bigger problem if you're in a customer-facing business as customers prefer to work with a particular set of people they're habituated with. One way to reduce attrition is by using advanced analytics and NLP to harness the employee reviews data from employment websites like Glassdoor, Indeed, Comparably etc. This analysis helps you measure the employee satisfaction towards the brand and understand the common factors that lead to attrition.

5. Personalizing Training Programmes

Instead of applying run-of-the-mill training methods and general programs for all employees, the HR team can instead personalize courses to suit the learner's preference.

In order to do so, 'adaptive' learning technology must be used in which data analytics determines the learning pace of the employee, the mode of training, as well as what questions are best suited for them, in order to personalize the course to suit the learner.

6. Capacity Analytics And Utilization

One of the major business benefits of advanced analytics in HR is in cutting down costs. HR teams can use Capacity Analytics to determine:

- What the team capacity is and how much of it is actually being utilized.
- What activities the team is engaged in when they are working.
- What processes, tools, and applications are being used to complete the work and how much they cost the company.
- How operationally efficient the team is – helps determine if the team is either overworked or underutilized.
- The capacity for growth.

7. Improving Employee Performance

Although traditional methods of determining and managing employee performance such as peer and manager review, monitoring KPIs, etc, are globally used, they have not been very impactful in improving employee performance. In fact, a PwC report on Performance Management highlights that 52 percent of organizations have made or are planning to make changes to employee performance management in the near future.

But with Employee performance analytics, individual employee performance can be measured much more efficiently with the help of both historical and real-time data. Employee performance analytics provides both a retrospective as well as a forward-looking analysis of what employee performance was and how we can improve it. With the resulting insights, we can identify the employees that are performing well and which employees need additional training and motivation in order to perform better.

8. Anomaly Detection Analysis

Anomaly detection analysis is used to recognize unexpected or deviant patterns. In HR management, anomaly detection analysis can help identify relationships between accidents at work and employees who are working longer working hours and possibly fatigued. By identifying resources that work longer than a specified threshold, HR teams could prevent accidents and injuries in the workplace.

Examples Of Companies Using HR Analytics

- **UPS Improves Employee Performance And Productivity**

An example of a company using HR analytics to improve employee performance can be seen in the logistics giant, UPS. UPS has provided its drivers with intelligent handheld computers that help drivers make better decisions, such as determining which order to deliver parcels in for the most efficient route.

Additionally, the company collects crucial data on the behavior of the driver with the help of more than 200 sensors that are fitted onto the trucks. These sensors record data on everything the driver does, such as whether or not they wore a seatbelt or how many times they reversed the vehicle.

This data is then used to provide feedback to the drivers and suggest improvements or training wherever needed. Another major impact the insights have had is on the revenue of the company –

UPS has achieved a reduction of 8.5 million gallons of fuel and 85 million miles per year. Drivers are now making more deliveries per day with an average of 120 stops a day as opposed to less than 100 in the past.

- **Bank Of America Saves $15 Million With Retention Analytics**

Turnover rates in US-based call centres are generally high – about 40%. And Bank of America was experiencing a similar problem with its call centres as well. This in turn led to poor customer experience and customer frustration. After collecting data from all its call centers, the company leveraged analytics to understand the root cause for such high turnover rates. The company found that the call centers which promoted inter-office collaboration have higher retention compared to the ones that did not.

Using this insight, the bank optimized its business policies and allowed everyone to take breaks together. After just a few weeks of this change, Bank of America witnessed that the call handling time was 23% faster and cohesiveness was up by 18%. This led to the company saving $15 million with the increased productivity and decreased employee turnover.

UNIT V MARKETING AND SALES ANALYTICS

Marketing Strategy, Marketing Mix, Customer Behavior – selling Process – Sales Planning – Analytics applications in Marketing and Sales

1. Marketing Strategy

- Analytical marketing strategies help to measure the effectiveness of marketing tools and the development of any brand. An advertising campaign and marketing initiatives require a huge amount of investment. So how to understand the budget? Which channels are most effective? How much profit is to be obtained? Marketing analytics strategies provide the answers to all these questions.

1.1 Significance of Marketing Analytics Strategies

- Marketing analytical strategies are critical in addressing and resolving marketing issues. The prime motive behind implementing these strategies is to evaluate the effective marketing programs in terms of return on investments in a business.
- The outcomes of adopting these strategies:
- Comparisons with competitors
- Recommendations for effective allocation of budget and resources
- Data processing analysis
- Collection of data through all the channels of communication and units in the company
- Creating a structured template for reporting the purpose of effective analysis of units
- Thus the marketing analysis strategies help in the given aspects:
- Having a holistic view of business
- Improving the management of the company and finance
- Forecasting and planning marketing initiatives
- Increasing the effectiveness of existing marketing programs through the allocation of resources
- Increase the profitability and return on investments
- Thus you should set a proper marketing analytics framework within the organization to have the right processes along with the right technology platforms to

capture data-driven strategy and deliver consistent information about this.

1.2 Analytics Marketing Strategies

• Marketing analytics is the practice of combining and analyzing databases, identifying patterns and then coming up with actionable insights that improve the return on investments of marketing efforts. Modern marketing analytics provides a holistic picture of the business and lets you plan and optimize the whole process based on revenue attribution. Besides this you should follow a new marketing strategy to survive long term with competition from customer-focused services and products. Today almost all businesses are following self-service, AI-powered analytics to analyze and visualize the data and design the dashboards. Here are some prime analytics marketing strategies as described below:

1. Exploring The Top Marketing Analytics Resources

You need to explore top marketing analytics resources, some of these are as follows:

- Hear From Peers
- Get the Buyers Guide
- Know the Trends

These all are prime tools that can be used by you to explore marketing techniques. You should get the buyer's guide, this will enable you to meet the expectations and requirements of customers. Besides this, you should also follow the latest marketing trends to navigate today's fast-paced world.

2. Website Marketing Analysis

As far as digital marketing tools are considered, the website is the best tool for it. Here you should understand the top pages of the websites to generate a high amount of conversion and traffic. Besides this, you should also identify the pages that are receiving high traffic but not conversions. Heatmaps can help you in analyzing the audience interaction with each element on your page. This will enable you to identify pages that are getting a high bounce, identify the audience, their demographics, devices they are using to access your content and the ranking of keywords on your web pages.

3. Social Media Analytics

The social media platform has become the most accessible and diverse tool from the perspective of marketing. This marketing strategy can help you to understand the sentiments of people and how they are responding and engaging with you. This will enable you to take decisive action and approach the right audience of the target market. To implement a successful analytics marketing strategy you would have to reach more people and engage with the followers to understand the improvements they are looking for.

4. Campaign Analytics

This strategy helps you in tracking your campaign, like how these are performing, getting the leads or not. So what you can do is understand the lead conversion rates from multiple channels and sources. After doing this, you have to identify the opportunities by product category and the source of lead. With this, you need to identify the content and platform that is majorly resonating with your audience. This will enable you to optimize the messaging and target of your content strategy.

5. Link Analytics

- Link is the most crucial aspect of searching algorithms. By taking the assistance of link analytics you can view the link of the site, the domain, and page authority of referring domains, like the total number of inbound links, top pages by link, anchor text and many more.

- Thus having transparency is the prime motive of marketing managers. For this, they have to set a common agreement on different KPIs. in today's competitive age it is essential to opt for effective marketing strategies by learning the art of positioning your brand, as it can help to win over the competitors. In addition to this, another important element of a reliable marketing analytics framework is to build an effective analytics dashboard. This dashboard should represent KPIs by unifying data strategies from different marketing data sources.

6.Keyword Research–

With keyword research, you can obtain very detailed insights into how your business is appealing to your potential customers and if there are areas that you can optimise. View how competitive your target keywords are, the average monthly search volume for that particular keyword, the estimated CPC's if you decide to bid on those keywords, the number of clicks that you are getting for that keyword and the click-through rates.

Thus the marketing analytics strategies are necessary for any business to obtain timely, reliable, complete and operative information.

Tools

- It is the practice of studying the data of Marketing efforts of various channels and campaigns and form models in order to report the metrics like ROI, Channel Performance, etc. to identify parameters for improvement. Marketers will be able to provide answers

to the analytics questions that are most important to their stakeholders by monitoring and reporting on business performance results, diagnostic metrics, and leading indicator metrics

- The intelligence derived from marketing analytics allows you to spend each dollar as effectively as possible.

- However, despite the emergence of several platforms and technologies that can streamline the marketing analytics workflows, it remains a challenge for companies to build concrete, actionable data analytics solutions for marketing efforts. According to a survey of senior marketing executives published in the Harvard Business Review, “more than 80% of respondents were dissatisfied with their ability to measure marketing ROI.”

- To set up a practical marketing analytics framework within your organisation, you must have the right processes along with investing in the right technology platforms to capture data-driven strategy and deliver unified and consistent information on your measurement metrics.

1.3 Marketing Analytics Strategies Process

- With marketing analytics, you can gather intelligence into several different areas of your marketing strategy. It will help you understand how your programs are performing against the cost and which programs are delivering the best ROI. It will help you to segregate your efforts and identify the area that you need to focus on the most.

- Analytics strategy will help you to realise how your programs are working in conjunction to nurture your leads. With this, you can build a solid base upon which you can qualify them and pass the leads on to your sales reps as opportunities.

- With marketing analytics, you can also identify laggards, i.e. the programs that are not providing adequate return based on efforts invested at them. You can then choose to redefine your data-driven strategy at them or remove them from your focus altogether.

- Market and competitor analysis will give you crucial insights into your competitor data-driven strategy and which channels/ programs are working for them. Learning from your competitors is an old business principle and marketing analytics can give you a powerful arsenal to use and base your actions on the digital platforms.

- Even better! Advanced analytics can provide insights into trends, make forecasts and capitalise on opportunities before anyone else.

- This will help grow your bottom line and avoid wastage on marketing spending, optimising the dollar spend and viewing campaign performance in real-time. It helps you to measure the impact of your strategies and compare it against the cost. •

Marketing strategies and tactics are normally based on explicit and implicit beliefs about consumer behavior. Decisions based on explicit assumptions and sound theory and research are more likely to be successful than the decisions based solely on implicit intuition.

• Knowledge of consumer behavior can be an important competitive advantage while formulating marketing strategies. It can greatly reduce the odds of bad decisions and market failures. The principles of consumer behavior are useful in many areas of marketing, some of which are listed below –

- **Analyzing Market Opportunity**

Consumer behavior helps in identifying the unfulfilled needs and wants of consumers. This requires scanning the trends and conditions operating in the market area, customer's lifestyles, income levels and growing influences.

- **Selecting Target Market**

The scanning and evaluating of market opportunities helps in identifying different consumer segments with different and exceptional wants and needs. Identifying these groups, learning how to make buying decisions enables the marketer to design products or services as per the requirements.

Example – Consumer studies show that many existing and potential shampoo users did not want to buy shampoo packs priced at Rs 60 or more. They would rather prefer a low price packet/sachet containing sufficient quantity for one or two washes. This resulted in companies introducing shampoo sachets at a minimal price which has provided unbelievable returns and the trick paid off wonderfully well.

- **Marketing-Mix Decisions**

Once the unfulfilled needs and wants are identified, the marketer has to determine the precise mix of four P's, i.e., Product, Price, Place, and Promotion.

- **Product**

A marketer needs to design products or services that would satisfy the unsatisfied needs or wants of consumers. Decisions taken for the product are related to size, shape, and features. The marketer also has to decide about packaging, important aspects of service, warranties, conditions, and accessories.

Example – Nestle first introduced Maggi noodles in masala and capsicum flavors.Subsequently, keeping consumer preferences in other regions in mind, the company introduced Garlic, Sambar, Atta Maggi, Soupy noodles, and other flavours.

- **Price**

The second important component of marketing mix is price. Marketers must decide what price to be charged for a product or service, to stay competitive in a tough market. These decisions influence the flow of returns to the company.

- **Place**

The next decision is related to the distribution channel, i.e., where and how to offer the products and services at the final stage. The following decisions are taken regarding the distribution mix –

- Are the products to be sold through all the retail outlets or only through the selected ones?
- Should the marketer use only the existing outlets that sell the competing brands? Or, should they indulge in new elite outlets selling only the marketer's brands?
- Is the location of the retail outlets important from the customers' point of view?
- Should the company think of direct marketing and selling?

Promotion

- Promotion deals with building a relationship with the consumers through the channels of marketing communication. Some of the popular promotion techniques include advertising, personal selling, sales promotion, publicity, and direct marketing and selling.
- The marketer has to decide which method would be most suitable to effectively reach the consumers. Should it be advertising alone or should it be combined with sales promotion techniques? The company has to know its target consumers, their location, their taste and preferences, which media do they have access to, lifestyles, etc.

2. Marketing Mix

- Marketing mix modeling is a marketing analytics strategy that can help your brand maximize on return and get a deeper understanding of how your business actually functions. Let's look into the benefits that this strategy can provide for your brand. As the world of digital marketing has exploded, the rise of big data and incredibly technical and complex data sets has been both a blessing and a curse to brands big and small.
- While it's true that detailed data can help businesses understand their consumers and grow their businesses, it's often the case that the data is overwhelming.
- With technology platforms and analytics tools being able to collect enormous amounts of data, brands are often left struggling to get through it all and understand what it is that they've gathered.
- In order to address the issue of how to manage incoming data and then use that information to make impactful decisions, a clear analytics strategy is necessary for all brands.
- Picking the right strategy for your business is the key to making sure you are getting the most out of your planning and marketing activity.
- Marketing mix modeling is one example of a marketing analytics strategy that can really help your brand manage data and learn the best places to invest your budget and time on.
- Keep reading this post to learn more.

2.1 What is Marketing Mix Modeling?

- Marketing mix modeling is a statistical marketing method that attempts to determine the effectiveness of marketing campaigns and initiatives by taking apart data and attributing contributions to different marketing tactics and factors to better predict future success.

- Put another way, marketing mix modeling looks at different pre-determined factors and the data that has been gathered from marketing campaigns to see which factors have had the biggest impact on return and which factors have contributed the most to success.

- Once this data has been collected and organized, the marketing mix modeling system will use the past and historical data to predict or forecast future marketing and sales success.

- By looking at the trends that have worked before, the marketing mix modeling will theoretically be able to forecast with more accuracy than other analytical methods.

2.2 The 5 P's of Marketing Mix Modeling

As stated above, marketing mix modeling distributes success from data to different pre-determined factors.

Those factors are often referred to as the 5 P's of marketing, which are derived from other marketing research and studies. Let's look at those 5 P's now.

- **Product :** Product refers to the actual products or services that are created and offered to customers by a brand.
- **Price :**The price takes into consideration any deals, sales, pricing models, and methods of payment involved in a sale.
- **Place :** Place refers to the channels through which products are available to consumers and how consumers are able to find the offers that the brand has. Promotion
- **Promotion** : is the method by which products or services are marketed and shared among audiences.
- **People:** People is the final P, and is sometimes left off of marketing mix modeling. People refers to both the internal staff and the customers that drive sales in a brand.

2.3 Marketing Mix Modeling vs. Attribution Modeling

- Marketing mix modeling is often compared to another popular model of marketing analytics, attribution modeling.

- Attribution modeling is the process of setting up different touchpoints that trigger events on the customer's journey.

- Each touchpoint is assigned a value to help determine which points in the customer's journey are responsible for bringing in revenue. • While attribution modeling can be helpful to understand data and provide context for ROI, it also has a few major drawbacks.

- The biggest problem is that not every touchpoint in a customer's journey can possibly be tracked and analyzed through collected data.
- Another drawback of attribution modeling is that it functions mainly through clicks and clicks alone — other potential data points are put aside in favor of clicks that can "prove" a conversion has taken place at a touchpoint.
- Attribution modeling also doesn't prove the effectiveness of a campaign. After all, a customer will have to pass through the same touchpoints whether they were convinced through an advertisement to make a conversion or not.
- That makes it difficult to assign return to specific touchpoints.

2.4 Benefits of the Marketing Mix Modeling

Let's take a deeper dive into the benefits that it can provide to your brand's analytics and reporting models.

- **Prove the ROI of Marketing Initiatives**

Marketing mix modeling allows marketers to really prove the ROI of their initiatives. By relating data insights back to the factors in each campaign that provided success, it can help brands understand the full impact of their efforts.

- **Gather Insights**

Marketing mix modeling is also great for understanding key insights from business initiatives. Those insights can be used to drive effective budget allocations within marketing and sales departments and convince stakeholders of the benefits of the model.

- **Create Better Sales Forecasting**

Sales forecasting refers to the practice of estimating how much revenue can be generated in the future based on the impact that your sales and marketing efforts have had in the past.

By allocating success to key factors, marketing mix modeling allows brands to have more accurate forecasting.

- **Understand Historical Data and Trends**

Marketing mix modeling is based on understanding the past data that has been collected during initiatives and campaigns.Many other analytics models will ignore this valuable data or only look at parts of it. The marketing mix system ensures historical data and trends are examined closely for value.

- **Account for Negative Impacts**

  Just as marketing mix modeling allows brands to see the positive impacts that their efforts have created, it can also be used to see negative impacts on different marketing factors.That helps brands know which areas of the business need work and where serious corrections need to take place.

2.5 What are the Limitations of Marketing Mix Modeling?

Like all marketing analytics methods, there are drawbacks and limitations to this system.The amount of data collected means that there isn't one method of analytics that can address every data set. Here are some of the major drawbacks of marketing mix modeling:

- Infrequent reporting, meaning no real-time data analytics.
- Does not analyze the customer's experience or journey.
- Doesn't provide the 1:1 analysis of attribution modeling.
- Doesn't examine relationships between channels.
- Doesn't look into brand awareness, messaging, or reach.
- Requires a large marketing analysis budget.
- Harder to implement in B2B businesses than B2C brands.

2.6 How to Build the Marketing Mix Modeling

While there are some setbacks, marketing mix modeling can provide major benefits to your brand. Let's take a look at how you can go about building this system in your own organization.

1. Establish Your Goals

- The end goal of any marketing analytics strategy is to parse through and gather insights from your data sets.
- That means that marketing mix modeling is meant to help organize your data and your analytics methods.
- Therefore, it makes sense that the first step is to establish the specific goals you want to attain through your strategy.
- Your goals might center around budgets, marketing campaigns, product pricing, or your brand in comparison to competitors.

2. Create Internal Alignment

In order to succeed, you need to have clear alignment across your organization.

- As with most data analytics, marketing mix modeling requires you to pull data from many different systems from different departments.
- That requires compliance across different teams and with the key stakeholders in your organization, such as:

CMO, Media agencies, Marketing agencies, Marketing executives and managers,CRM managers,Sales leads

3.0 Consumer Behavior

Consumer behavior is about the approach of how people buy and the use merchandise and services. Understanding consumer behavior will assist business entities to be more practical at selling, designing, development of products or services, and every other different initiative that impacts their customers. In this tutorial, it has been our endeavor to cover the multidimensional aspects of Consumer Behavior in an easy-to-understand manner.

- **Audience**

This tutorial will help management students as well as industry professionals who work in a product development environment, or in packaging, or for that matter, any part of a company that has an interface with the customers.

- **Prerequisites**

To understand this tutorial, it is advisable to have a foundation level knowledge of basic business and management studies. However, general students and entrepreneurs who wish to get an understanding about consumer behavior may find it quite useful.

Consumer Behavior - Consumerism

Consumerism is the organized form of efforts from different individuals, groups, governments and various related organizations which helps to protect the consumer from unfair practices and to safeguard their rights.The growth of consumerism has led to many organizations improving their services to the customer.

Consumerism

Consumer is regarded as the king in modern marketing. In a market economy, the concept of consumer is given the highest priority, and every effort is made to encourage consumer satisfaction. However, there might be instances where consumers are generally ignored and sometimes they are being exploited as well. Therefore, consumers come together for protecting their individual interests. It is a peaceful and democratic movement for self-protection against their exploitation. Consumer movement is also referred as consumerism.

3.1 Features of Consumerism

Highlighted here are some of the notable features of consumerism –

Protection of Rights – Consumerism helps in building business communities and institutions to protect their rights from unfair practices.

Prevention of Malpractices – Consumerism prevents unfair practices within the business community, such as hoarding, adulteration, black marketing, profiteering, etc.

Unity among Consumers – Consumerism aims at creating knowledge and harmony among consumers and to take group measures on issues like consumer laws, supply of information about marketing malpractices, misleading and restrictive trade practices.

Enforcing Consumer Rights – Consumerism aims at applying the four basic rights of consumers which are Right to Safety, Right to be Informed, Right to Choose, and Right to Redress.

Advertising and technology are the two driving forces of consumerism –

- **The first driving force of consumerism is advertising**. Here, it is connected with the ideas and thoughts through which the product is made and the consumer buys the product. Through advertising, we get the necessary information about the product we have to buy.

- **Technology** is upgrading very fast. It is necessary to check the environment on a daily basis as the environment is dynamic in nature. Product should be manufactured using new technology to satisfy the consumers. Old and outdated technology won't help product manufacturers to sustain their business in the long run.

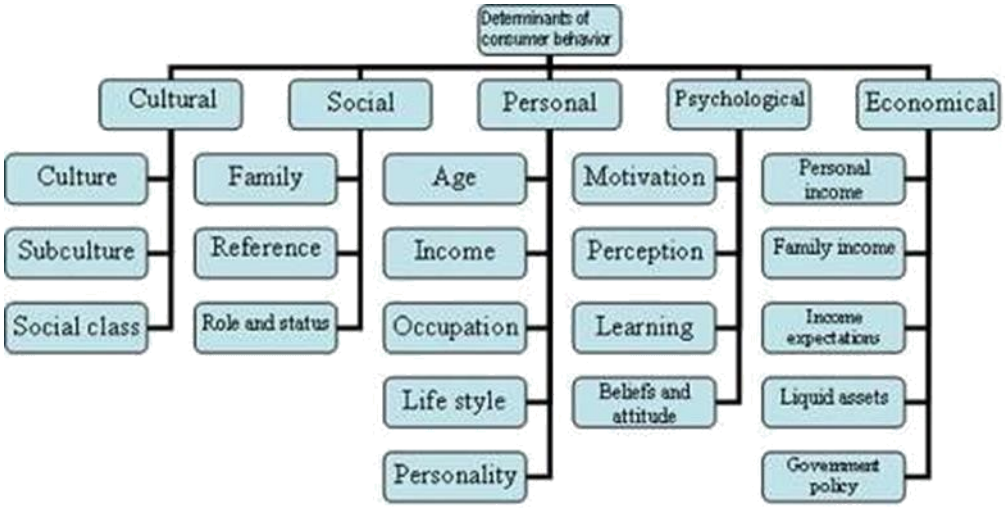
3.2 Consumer Behavior – Significance

- Consumer behavior covers a broad variety of consumers based on diversity in age, sex, culture, taste, preference, educational level, income level, etc. Consumer behavior can be defined as "the decision process and physical activity engaged in evaluating, acquiring, using or disposing of goods and services."

- With all of the diversity to the surplus of goods and services offered to us, and the freedom of choices, one may speculate how individual marketers actually reach us with their highly definite marketing messages. Understanding consumer behavior helps in identifying whom to target, how to target, when to reach them, and what message is to be given to them to reach the target audience to buy the product.

The following illustration shows the determinants of consumer behavior.

- The study of Consumer Behavior helps in understanding how individuals make decisions to spend their available resources like time, money, and effort while purchasing goods and services. It is a subject that explains the basic questions that a normal consumer faces – what to buy, why to buy, when to buy, where to buy from, how often to buy, and how they use it.



• Consumer behavior is a complex and multidimensional process that reflects the totality of consumer decisions with respect to acquisition, consumption, and disposal of goods and services.

3.3 Dimensions of Consumer Behavior

Consumer behavior is multidimensional in nature and it is influenced by the following subjects –

• **Psychology** is a discipline that deals with the study of mind and behavior. It helps in understanding individuals and groups by establishing general principles and researching specific cases. Psychology plays a vital role in understanding how consumers behave while making a purchase.

• **Sociology** is the study of groups. When individuals form groups, their actions are sometimes relatively different from the actions of those individuals when they are operating individually.

• **Social Psychology** is a combination of sociology and psychology. It explains how an individual operates in a group. Group dynamics play an important role in purchasing decisions. Opinions of peers, reference groups, their families and opinion leaders influence individuals in their behavior.

- **Cultural Anthropology** is the study of human beings in society. It explores the development of central beliefs, values and customs that individuals inherit from their parents, which influence their purchasing patterns.

3.4 How Consumer Behavior affects Marketing Strategy ?

- Business organizations across globe try to influence consumer by encouraging them to buy products and services. This is done by studying about the needs of the consumer and creating appropriate strategies so that consumer buys products. There are several marketing strategies used for influencing consumer behavior which affects the buying decision.

- The first thing to be kept in mind while building strategies for marketing products is communicating with consumers emotionally. This can be done by giving promotional material in order to get attention of consumer. It has been found that consumers are attracted to products that create emotions in the form of joy and surprise.

- All businesses throughout the world are seeking for solutions to assure long-term sales and profitability, as well as market sustainability. To do so, companies must pay close attention to their source of profit – consumers – and, more crucially, their behaviour.

- Consumer behaviour is the study of consumer demands and how consumers (customers and organizations) meet these needs, as well as their motivation for using and purchasing a certain product or service.

- This is an exceptionally helpful study for corporations looking seeking strategies to stay relevant in the market since it assists them in determining the best marketing plan for their items.

- After rigorously analyzing consumer behaviour, only a relevant marketing plan can be established to advertise the service/product to the correct segment of the audience by finding a market gap or demand; failing to do so exposes the firm to

product/service failure. Businesses are expected to research all the criteria listed below to effectively analyze their customers.

- A successful marketing strategy is critical to a company's success since it assists the company in developing a product or service that has the potential to sell and provide high levels of profit yield A marketing strategy is a company's plan for selling its product, which includes considering the four variables listed below.

Consumer behaviour and marketing strategy are inextricably linked:

- Consumer behaviour assists firms in determining whether what they are selling will be lucrative, as well as in tailoring their marketing plan to the appropriate target population for their product/service.

- Catering a product/service to the wrong audience may be detrimental to a business, whereas, Catering the appropriate product/service to the right consumers by observing their behaviour, on the other hand, might be invaluable to a company.

- Many organizations look for the most cost-effective way to do consumer research. By using technologies like Google Analytics, Google Survey, CRM, and the social networking sites listed above, businesses may keep track of their customers' web activity, making it easier to determine client preferences. Keepingtrack of consumer behaviour is critical for ensuring profitability

With the recent change towards the Covid-19 crisis, businesses must monitor customer behaviour more now than ever.Observably Covid-19 has bought drastic changes in consumer behaviour.Consumers are also less likely to make large purchases during an economic- financial crisis such as the recession; therefore, businesses must study and analyze consumer behaviour to ensure sustainability through having the right marketing strategy catered to the consumer's financial and emotional preferences. Failure to do so may result in the suspension of operations or bankruptcy.

In conclusion, consumer behaviour has a significant influence on marketing strategy and is important to the success of a product; so, the marketing strategy must be determined through analyzing consumer behaviour to understand what customers want. Meeting consumer demand is the quickest method to make profits – the ultimate objective of any and every firm.

4. Selling process

The sales process – also known as a sales cycle – is the method your company follows to sell your product or service to customers. It involves a series of steps, from initial contact with a lead to the final sale.

The sales process is similar to developing a relationship with someone new. When you first meet, you get to know each other, learn what they like, and determine their goals. Along the way, you decide if you can work together and whether you are a match. If this is the case, the relationship can proceed and grow.

4.1 Importance of building a sales process

These are some benefits of building a sales process for your business:

You can optimize the structure of your sales team to support the sales process and identify the main challenges in the sales cycle.

It will be easier to onboard new sales personnel.

It helps you identify short-term and long-term goals and how each step in the sales process supports the next one.

It highlights where time and resources are being wasted, so you can remove activities with low return on investment and focus your efforts on activities with more positive returns.

It identifies the steps that need to be improved. This allows you to invest in training, education, and practice to get better in areas of weakness, which will help match your success in other parts of the sales process.

4.2 The 7-step sales process

Prospecting

Preparation

Approach

Presentation

Handling objections

Closing

Follow-up

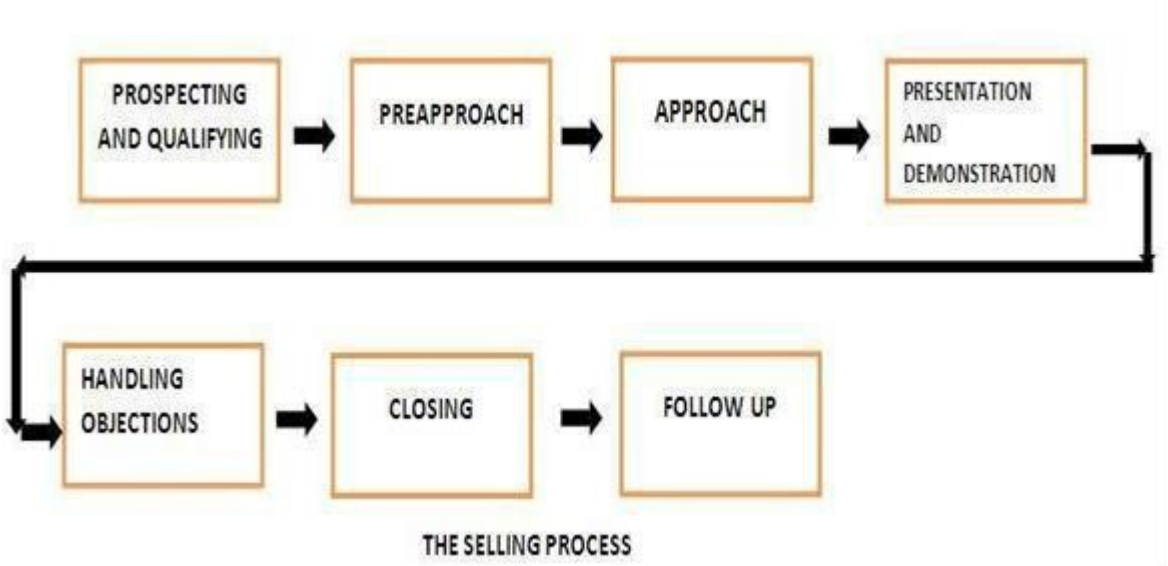
If you are one of the 2.5 million employees in the United States working in sales, you know that even for the most natural salesperson, it can sometimes be difficult to turn potential leads into closed sales. Across industries, you need different skills and knowledge to prove to your potential customers that your solution is best for their particular problem.

The seven-step sales process outlined in business textbooks is a good start, especially since leading sales ops teams attribute to 60% or more of their total pipeline in any quarter to actively designed and deployed sales plays. The seven- step sales process is not only a good start to customizing it to your particular business but more importantly, customizing it to your target customers as you move them through the sales funnel.

As the old adage goes, “Learn the rules like a pro so you can break them like an artist.” Once you’ve mastered the seven steps of the sales process you might learn in a business class or sales seminar, then you can break the rules where necessary to create a sales process that may not necessarily follow procedure but gets results.

The textbook 7-step sales process

What are the seven steps of the sales process according to most sales masters? The following steps provide a good outline for what you should be doing to find potential customers, close the sale, and retain your clients for repeat business and referrals in the future.



THE SELLING PROCESS

1. Prospecting

The first step in the sales process is prospecting. In this stage, you find potential customers and determine whether they have a need for your product or service— and whether they can afford what you offer. Evaluating whether the customers need your product or service and can afford it is known as qualifying.

Keep in mind that, in modern sales, it's not enough to find one prospect at a company: There are an average of 6.8 customer stakeholders involved in a typical purchase, so you'll want to practice multi-threading, or connecting with multipledecision-makers on the purchasing side. Account maps are an effective way .

2. Preparation

The next step is preparing for initial contact with a potential customer, researching the market and collecting all relevant information regarding your product or service. Develop your sales presentation and tailor it to your potential client's particular needs. Preparation is key to setting you up for success. The better you understand your prospect and their needs, the better you can address their objections and set yourself apart from the competition.

3. Approach

Next, make first contact with your client. This is called the approach. Sometimes this is a face-to-face meeting, sometimes it's over the phone. There are three common approach methods. Premium approach: Presenting your potential client with a gift at the beginning of your interaction

Question approach: Asking a question to get the prospect interested.

Product approach: Giving the prospect a sample or a free trial to review and evaluate your service

4. Presentation

In the presentation phase, you actively demonstrate how your product or service meets the needs of your potential customer. The word presentation implies using PowerPoint and giving a salesy spiel, but it doesn't always have to be that way—you should actively listen to your customer's needs and then act and respond accordingly.

5. Handling objections

Perhaps the most underrated step of the sales process is handling objections. This is where you listen to your prospect's concerns and address them. It's also where many unsuccessful salespeople drop out of the process—44% of salespeople abandoning pursuit after one rejection, 22% after two rejections, 14% after three,and 12% after four, even though 80% of sales require at least five follow-ups to convert. Successfully handling objections and alleviating concerns separates good salespeople from bad and great from good.

6. Closing

In the closing stage, you get the decision from the client to move forward. Depending on your business, you might try one of these three closing techniques.

Alternative choice close: Assuming the sale and offering the prospect a choice, where both options close the sale—for example, "Will you be paying the whole fee up front or in installments?" or "Will that be cash or charge?"

Extra inducement close: Offering something extra to get the prospect to close, such as a free month of service or a discount.

Standing room only close: Creating urgency by expressing that time is of the essence— for example, "The price will be going up after this month" or "We only have six spots left"

7.Follow-up

Once you have closed the sale, your job is not done. The follow-up stage keeps you in contact with customers you have closed, not only for potential repeat business but for referrals as well. And since retaining current customers is six to seven times less costly than acquiring new ones, maintaining relationships is key.

4.3 **Prospect for potential customers**

The first step is to prospect for customers, which requires some research. This stage has three components.

1.Create an ideal customer profile (ICP). The goal is to identify and understand your ideal customers. This helps you determine whom to contact and why you are contacting

them as potential customers. The ICP uses real data to create a fictional characterization of a client who:

Can provide your company with value (e.g., revenue, influence)

Your company can provide value to (e.g., return on investment, better service)

2.Identify potential leads. Use the ICP to create a list of potential leads that fit this profile. Use a variety of sources (e.g., online databases, social media) to develop a list of ideal client companies. Then create a list of prospects from these companies that your sales team can contact and qualify.

3.Perform initial qualification. First, qualify the company by conducting research to see if it meets the criteria that matter to you (e.g., company size, geography, industry, growth phase). Then qualify the prospects with an interview to determine if they are a good fit as a customer. Determine if the prospect has:

- A need for your product or service.
- The budget to purchase your product or service.
- The authority to make the purchasing decision.
- The timing to make the purchase

4. Make contact with prospects

- After identifying the ideal prospect, reach out to contact them. This step has two parts:
- Determine the best way to contact the prospect (e.g., telephone, email, social media).
- Reach out to the prospect. Make sure you are prepared (e.g., with a script, introduction and questions) before making contact. Introduce yourself and work on building trust, not making a sale.

5. Qualify prospects.

- Although you have already done your research to qualify the prospect before making contact, you still need to determine if they would make an ideal customer. This can only happen in a direct conversation with the prospect (either over the phone or in person).
- To qualify the prospect, learn more about them. Ask about their goals, budget, challenges and other issues that will help you to make your decision. Make sure that the person you are speaking with has the power to make decisions on doing business with you. When speaking with the prospect, identify opportunities to provide value.
- Qualifying the prospect involves confirming whether they meet the criteria of a good customer. If they are not a good fit, tell the prospect why. If they are still interested, determine why.

6..Nurture prospects.

Once you have qualified the prospect, demonstrate the relevance of your solution to them. This typically involves answering questions about your unique offer, the benefits you provide, and the problems you solve.
When answering the prospect's questions and learning about their needs, you have to nurture them along the process of making a decision. This involves:
Moving the prospect along the stages of awareness

Unaware: The person does not know they have a problem.
Problem aware / pain aware: The person knows they have a problem but is not aware of a solution.
Solution aware: The person knows there is a solution but does not know about your product.
Product aware: The person knows about your product but does not know if it can solve their problem.
Most aware: The person knows a lot about your product but needs to know about its benefits.

- Educating the prospect about the product, service or industry Personalizing your communications
- Responding to common challenges

- Building your reputation with the prospect as someone who is helpful, responsible and reliable in your area of expertise.

Some prospects may be both interested in your offering and qualified, but might not be ready or able to become a customer at this time. To nurture this type of prospect, stay in touch going forward and demonstrate your ability to help. This will help to keep you top of mind when they are ready to buy.

7.. Present your offer.

Use the information you have collected to this point to present the prospect with your best possible offer. Make the offer personalized, targeted and relevant to your prospect's needs. Craft the offer to address their challenges, budget and goals.
While the content of your offer is very important, how you present the offer can be the difference between success and failure. Consider your audience and the situation when deciding how to present your offer. Creativity can be very effective, but you should also focus on what works best for you given the experience of previous presentations.

8.. Overcome objections.

You've made the best possible offer – now it's up to the prospect to make the next move. The most common response is some type of objection to your offer, such as:
Price (e.g., too expensive for the value provided)
Risk (e.g., too "dangerous" to switch to a new solution)

Content of offer (e.g., offer does not provide enough detail) Contract terms (e.g., term is too long)

Ideally, you addressed the common objections during the nurturing phase or when creating the offer. However, you cannot always address every objection before the prospect makes it.

To overcome or address objections:

Be patient and measured in your response. Listen to the prospect's concerns objectively. Do not rush or pressure the prospect to move forward. Address objections that are related to each other. For example, if the prospect questions the value and price, go over everything you've included in the offer to show how the value you provide exceeds the price.

When you have explained your reasoning, ask the prospect if you have properly addressed their objection.

Read between the lines of generic objections (e.g., "We are not interested"). Ask more questions to determine the real reasons behind each objection. Listen carefully to the answers before responding.

9 .Close the deal.

Once you have overcome all objections, you can close the deal to make the sale.

First, work on sealing the deal. The goal is to confirm the prospect's engagement and work toward the next steps. The key is to make it easier for the prospect to say yes to the deal. Prime the prospect by reminding them how they will achieve a specific goal in purchasing your product or service.

To close the deal:

Ask a direct question or make a direct statement (e.g., "Would you like to sign the deal now?").

Ask an indirect question (e.g., "Are you satisfied with what is included in the offer?").

Provide an incentive to close the deal (e.g., add a sign-up bonus). Offer a free trial period (e.g., "Try it for one week").

Emphasize the urgency or scarcity of the offer (e.g., "This is a limited-time offer"). Ask what else the prospect requires to make a decision. When the prospect has committed to the purchase, answer any additional questions they have and give them details on the next steps. Provide a written agreement and summary of the conversation so that their supervisor or other stakeholders can review it for accuracy.

If the prospect still responds with "not yet" or "not now" for reasons beyond your control (or theirs), then return the prospect to the nurturing stage. Stay in touch and follow up with prospects who are not ready to purchase.

4.4 How to implement a sales process

Consider the following approach to implement the sales process in your organization.

1.Understand the customer.

The sales process begins with the buyer. To implement an effective sales process, you must understand the buyer and then design your sales process to address their goals, motivations, and needs. This requires identifying and then answering their “why” question. For instance, why is the buyer looking for a solution? Why are they looking to you for the solution?
Build a sales process to help your salespeople find the answer to the key question. Conduct interviews with buyers and salespeople and perform industry research to find the answers to include in the process.

2.Set milestones.

Once you’ve defined the stages of your sales process, establish the key steps and milestones within those stages. A milestone could be identifying where the buyer is in the sales process or engaging with stakeholders within a certain time period. Score each milestone to determine how many resources to invest into that part of the sales process. When you set a milestone for each stage, train salespeople to meet that milestone at the assigned stage. This will prevent them from skipping steps or taking the wrong approach at the wrong time (such as talking about the price too soon). Instructing salespeople on when and how to do handoffs will also help correct problems in the sales process. This simplifies the process of helping buyers move from one stage to the next.

3.Apply skills and resources.

Build skills, resources and activities into the sales process to help your salespeople move to the next milestone. Resources could include brochures, case studies and whitepapers for a salesperson to share with customers. Provide your salespeople with specific training for particular milestones or have them engage in activities for other milestones.

4.Iterate and improve.

A sales process is not static; it should be refined and improved over time. Get feedback from salespeople, measure buyer behavior, and track and analyze sales data to evaluate the effectiveness of your sales process. Use the results to solidify the successful activities and resources within the sales process, implement activities and processes to prevent negative outcomes, and remove activities and resources that do not advance the sales process. This will keep the sales process relevant, actionable and efficient.
By constantly iterating and improving your sales process, you will: Reduce the time it takes to onboard new salespeople.

5.Increase the percentage of successful sales.

- Minimize costly mistakes.
- Improve sales forecasting.
- Reach sales targets on a more consistent basis.
- Align your technology and systems with the sales process.

It's important to equip your salespeople with technology (such as CRM software) that enables them to perform each step of the sales process efficiently. However, software tools alone won't make salespeople more effective or encourage them to follow best practices. You need to combine the technology with supportive systems, guidance and resources.

- Provide technology that streamlines the sales process, collects and organizes information on customers, and lists the required activities for salespeople to follow.
- Create systems and resources to support the sales team's use of the technology during the sales process, such as these:
- Checklists to make sure all steps are performed in order
- Content and video to demonstrate the importance of the stages and milestones Buyer-focused content tied to where they are in the sales process
- Reminders to prevent salespeople from skipping steps
- Training content for each step in the sales process

5. Sales Planning

Sales planning is a set of strategies that are designed to help sales teams reach their target sales quotas and help the company reach its overall sales goals. Sales planning helps to forecast the level of sales you want to achieve and outlines a plan to help you accomplish your goals. A sales plan covers past sales, risks, market conditions, your target personas, and plans for prospecting and selling. Sales planning occurs at various stages of the sales cycle. Generally, businesses set monthly or quarterly sales goals. Sales don't happen all on their own just because your sales manager sets goals. By defining the steps in a sales plan, sales managers can help their teams reach their targets and enjoy the rewards that come with collective success.

Another important part of the sales planning process is evaluating the company and understanding its position in the marketplace. Market conditions are ever-changing, so it's important to study them and to adjust your sales plan accordingly.

Sales plans typically account for short- and long-term planning. Goals without rewards aren't sufficient to incentivize each salesperson to reach for the sky. The right tools and sales strategies go a long way toward motivating salespeople to reach their targets.

As salespeople reach their goals, you'll want to set new ones. Every time you set new targets, it's appropriate to amend your sales plan. Changes to your sales

plan may also mean that you need to change how your company allocates resources to ensure that your salespeople have the resources they need. If you haven't already invested in a cloud-based phone system and VoIP integrations, you might consider how setting up a sales call center, complete with call center software, could help streamline your sales activities and help you reach your goals more easily.

5.1 The Role of a Sales Plan for Your Business

In case there's any doubt about the important role that your sales plan plays in your business, you may be interested to know that a little more than half of sales professionals annually miss their sales quotas. Sales experts attribute this underwhelming percentage to the lack of strategic planning and failure to align sales goals in accordance with conditions in the marketplace.

Top sales performances only come about after proper planning and preparation. A well-thought-out plan streamlines sales tasks, which increases the efficiency and productivity of your sales teams.

For the best results, develop your sales plan well in advance. The best plans account for multiple levels. A common approach is to start with annual targets and break them down by the quarter, month, and week. Also, you'll need to pre-plan your resources, logistics, and activities for every part of your sales plan. These activities will give you a road map that leads to sales success. **Short-term planning and monitoring** are important activities because they give you the opportunity to make changes to your sales plan based on weekly or monthly sales results. If your salespeople are way ahead of – or way behind on – your projections, short-term planning will ensure that sales goals are reasonable and attainable.

A good sales plan means that your sales teams can function as efficiently as possible. Inside sales reps and call center agents can easily use call center software for sales call planning, freeing up outside salespeople to focus on making in-person calls and closing sales.

5.2 Sales Planning & Aligning Your Sales Strategy

- When your business is experiencing a downturn in revenue generation, this is usually a sign of poor sales and marketing alignment. Misalignment between sales and marketing reduces revenue, negatively impacts customer experience, and makes it tougher for salespeople to meet their quotas.
- Here some interesting things about marketing and sales alignment:
- Sales and marketing productivity decline when there is a misalignment between them.

- Alignment between sales and marketing improves the customer experience because it helps to improve customer service and to create a single customer journey.
- Salespeople don't always use marketing content when there's no alignment.

- Marketing software and sales automation software make it possible to develop data-driven sales and marketing plans.
- Alignment ensures that marketing and sales teams develop profiles of the same audience segments and target personas.
- Strong alignment means that marketing and sales messaging to customers are consistent and tell the same story.
- Sales and marketing alignment also has a positive impact on post-sale growth, retention, and brand loyalty.
- Overall, when sales and marketing teams align with each other, it positions your company to get the most value from prospects and customers. It's the best path to take your company to new heights.

5.3 How to Use Sales Planning Templates

A proven sales plan template should be part of your brand strategy because it will guide your business growth every step of the way. You could think of it as telling your sales story. Every story tells the who, what, why, where, when, and how from beginning to end.

Let's break the strategic process down into five parts:

1.Goal setting
2.Sales forecasting
3.Market and customer research
4. Prospecting
5. Sales

- One process seamlessly dovetails with the next. Start with your high-level goals and then factor in the various market factors. Set realistic goals as a benchmark for forecasting reasonable goals in the future. You'll need to base your goals on several things, including the size of the market, your annual company goals, your sales teams' experience, and the resources that you have available.
- A cloud-based phone system offers dashboard analytics that gives you metrics such as the number of inbound calls and outbound calls and the average call length. This will allow you to set standards for your call agents. Also, it will help you to scale your contact center so that it's not over- or understaffed.
- Marketing and customer research is an important activity that helps you position your company properly for business growth. The right data will determine your niche markets so you can start building traction with a receptive audience. Your niche encompasses your products, content, culture, and branding.

- The next step is to identify the most likely sources for finding high-quality leads so that you can start building a quality prospect list. It's also a great idea to leverage current client relationships as you build your prospecting plan.

5.4 Importance of sales planning

- Sales planning is an important aspect of business that identifies current issues, such as a lack in sales, and seeks to find solutions or develop strategies. Sales planning takes advantage of new opportunities, such as when a company develops a new product, to create brand awareness or interest. Sales plans address various sales opportunities and the plan's objectives may vary depending on whether the company sells directly to the consumer, or to another business.
  Ideally, a sales plan:

- Define targets
- Creates strategies
- Identifies tactics
- Motivates teams
- Sets budgets to achieve targets
- Reviews goals and suggests improvements

6.0 Analytics applications in Marketing and Sales

- **Measure Performance of Marketing Campaigns**

  The most basic form of marketing analytics is to provide marketers with the tools to understand what business impact their marketing campaigns have. This task can range from something as straightforward as providing standard metrics (click- through rate, ROI, etc..) at the campaign level to an analysis as complex as developing a Market Mix Model to come up with the optimal marketing strategy to maximize profit.
- **Find Opportunities in Marketing Performance**
  While marketing performance analytics will let you know on the whole how a campaign performs, it isn't until someone digs in to many cuts of data to uncover whether there are certain types of users that respond better to particular marketing treatment - perhaps some campaigns work better in certain markets or on mobile. Marketing analysts mine and model your data to uncover nuggets that can be acted on by marketers.
- **Understand Your Customers**

Diving deep into customer demographics and behaviors can help you understand which are more likely to be successful. This information can then be used by marketers when selecting their target audiences. Through data mining and statistical modeling, marketing analysts can provide a rich understanding of your customers and what drives success.

- **Understand Your Competition**

Market research is often within the domain of marketing analytics and it can help marketers understand the competition better and adjust their strategy accordingly.

Sales analytics applications

The full list of applications we have seen are:

- Sales forecasting
- Sales force management Sizing
- Geo-distribution
- Predictive/prescriptive lead scoring Customer contact analytics
- Sales rep compensation improvements
- Sales attribution between marketing and sales
- Sales process improvements
- Performance management

Additionally sales analytics enables numerous applications we listed above. Some of these applications have dramatic benefits:

- **Reduction of sales support activities**

Sales reps spend more time on non-sales activities according to most research on the topic. These include making sales forecasts, prioritizing leads, deciding how to approach leads which can all be automated with sales analytics applications. To perform such tasks, sales reps can use behavioural analytics.

- **Improved prioritization**

There are several levels of improved prioritization thanks to sales analytics: Predictive/prescriptive lead scoring techniques enable improved prioritization by sales reps.Sales rep compensation can be improved with advanced analytics enabling company to focus on successful sales reps.

- **Sales attribution models** allow the company to focus its resources appropriately between sales and marketing.

Improved sales processes and practices

- Insights can lead managers to learn from top performers, improve their coaching and sales processes .