MIT | School of Distance Education

Chapter 6

Decision Support System (DSS)

Chapter Index

Learning Objectives

- Explain the process of decision making
- Discuss the function of decision support systems
- List the types of decision support systems
- Explain tools and technologies supporting DSS
- Outline the importance of GDSS
- State the functions of ESS
- Define business intelligence
- Describe the concept of business analytics

Concept of Decision Making

Decision making is a process of identifying and selecting an alternative from various available options in order to find a solution for a given problem.

Decision making is a problem-solving technique through which a viable solution is developed for the prevailing problem.

The decision-making process of an organisation can be successful if the organisation takes into consideration certain principles, which are explained as follows:

People participating in the decision-making process must be aware of the reason why the process is being carried out.

People involved in the process need to have a significant interest in the issues being discussed.

The process of decision making should be designed in such a way that it meets the needs of the given situation.

The process should be flexible to accommodate changes in business environment and various other constraints related to resources.

The suggestions and ideas from participants should be encouraged and respected.

The participants who agreed to establish the process should be accountable to the process.

Types of Decisions

In any organisation, there are different levels like strategic level, managerial level and operational level. Based on these levels, decisions can be categorised as follows:

Unstructured/ strategic-level decisions

These decisions are taken at the top management level (President, CEO and Board of Directors). These decisions are related to organisational objectives and strategic planning. These decisions do not involve any specified set of rules and procedures but instead focus on solving problems which are complex and non-routine in nature.

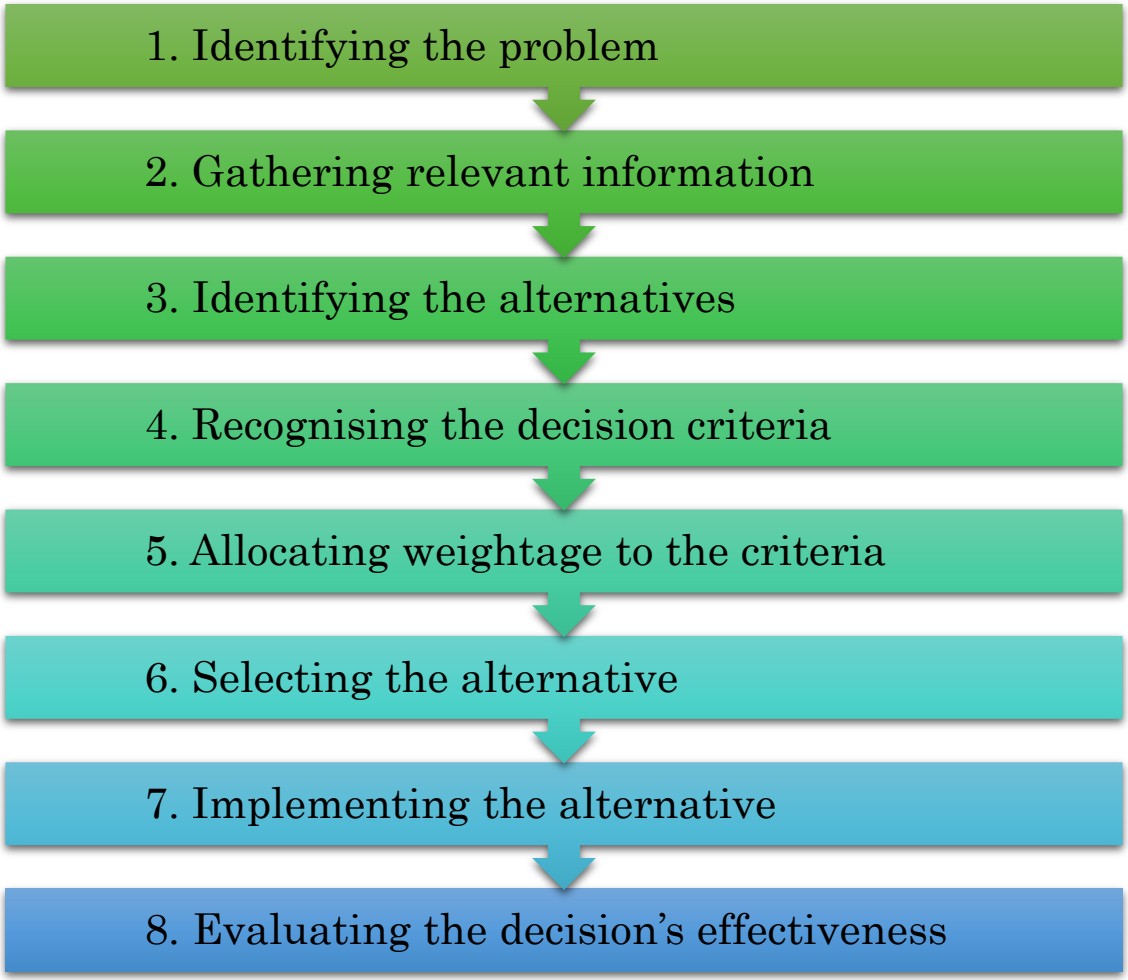
Unstructured/ strategic-level decisions

These decisions are taken by managers who focus on monitoring and controlling activities at the operational level and providing information to the top level. Decisions at this level can be pre-specified to a certain extent; thus they are neither structured nor unstructured.

Structured/ operational decisions

These decisions are related to routine business processes and have clearly defined rules and regulations. These decisions are not only highly structured but also repetitive in nature.

Decision-Making Process



Models of Decision Making

Rational Model

- In the rational model, logic is employed to take decisions.
- In this model, the decision maker analyses all alternatives for solving a problem to select the most rational alternative.
- In the rational model, all possible solutions are rated and the one with the highest rating is selected as the best solution for the problem.
- Some examples of rational model are decision matrix, Pugh matrix, decision grid, selection matrix, and criteria rating form.

Simon's Model of Decision Making

The Simon's Model of Decision Making serves as the basis of most models of management decision making. As per this model, decision making is divided into three phases:

1. Intelligence phase

This phase of the Simon's model of decision making focuses on identifying/detecting the problem or opportunity. The 'intelligence' phase of the model involves the following two activities: Problem searching and Problem formulation

2. Design phase

This phase focuses on developing all possible solutions to a defined problem. At this stage, the decision maker needs to make a detailed analysis of every aspect of the problem using various quantitative tools and models.

3. Choice phase

This phase of decision making involves selecting the best possible solution by testing and evaluating all alternatives. For selecting the most suitable solution, the decision maker may use a combination of quantitative tools such as decision tree analysis and qualitative tools such as the Six Thinking Hats technique, force field analysis, etc.

Techniques of Decision Making

Commonly used techniques of decision making are as follows:

- Pareto analysis
- Paired comparison analysis
- Grid analysis
- Force field analysis
- Six thinking hats
- Cost-benefit analysis
- Decision tree analysis
- Monte Carlo analysis
- Linear programming
- Delphi method

Understanding Decision Support System (DSS)

- DSS is an interactive system that stores and provides access to information to business experts and managers for making effective decisions.
- DSS helps in gathering, analysing, interpreting and reporting information for the selection of the best solution to the business problem.

Popular Definitions of DSS

According to **Hicks**, "DSS is an integrated set of computer tools that allow a decision-maker to interact directly with computers to create information useful in making decisions."

According to **Keen** and **Scott-Morton** (1978), "A DSS couples the intellectual resources of individuals with the capabilities of the computer to improve the quality of decisions. It is a computer-based support system for management decision makers who deal with semi-structured problems."

DSS supports data integration from different sources within the organisation and supplies analytical information, needed to make a better business decision.

Advantages of DSS

- It supports the decision-making process of an organisation by allowing managers to make better selection from the available alternatives.
- It allows the organisation to perform a 'what-if' analysis, which shows a logical view of decision making.
- It saves the time and effort of managers required in manual decision making, which boosts the productivity of the organisation.

Problem Solving and DSS

The problem-solving process involves identifying the problem, generating alternatives for solving the problem, analysing alternatives and selecting the best alternative to solve the problem.

DSS identifies a potential problem with its intelligence and expertise. After identification, it analyses its knowledge base to find out alternative solutions and opportunities for improvement of business process.

It examines all alternatives and assesses the anticipated effects of the implementation of each alternative solution.

Evolution of DSS

The DSS concept was first given by Meador and Ness (1974) in their article 'An application to corporate planning'.

The early development in this field was the classic management information system which could provide pre-defined management reports to support decision making. This development introduced the DSS with ad hoc and interactive support in decision making by 1970.

The advent of micro-computers and advance operating systems in the 1980s equipped the DSS with the more interactive system.

Changes in technology from the main frame-based DSS to client/server-based DSS occurred in the early 1990s. During this time, desktop Online Analytical Processing (OLAP) tools were introduced.

In 1995, data warehousing and the World Wide Web began to have an impact on practitioners and academics who were interested in decision support technologies.

DSS Architecture

Database Management System (DBMS)

The DBMS is a key component of the DSS as it helps in reducing the cost and data redundancy and increasing data control and sharing.

Knowledge Base Management System

It provides intelligence and support for collecting useful information. A large number of decisions are made on a day-to-day basis, which range from simple to complex. These decisions involve the usage of knowledge, which forms the basis of the decision-making process.

Model Management system

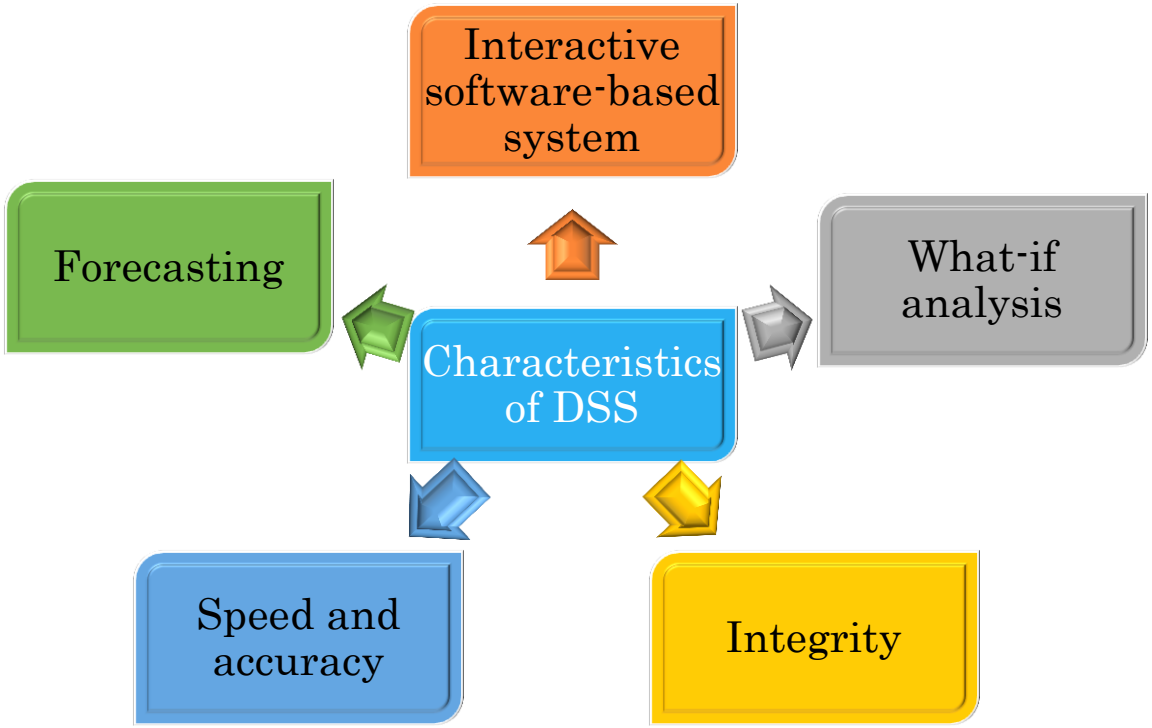
It provides various techniques and skills to produce reliable, insightful and useful results. The modelling component gives decision makers the ability to analyse a problem using various techniques including statistical method, sensitivity analysis and computer simulation.

User Interface Management System

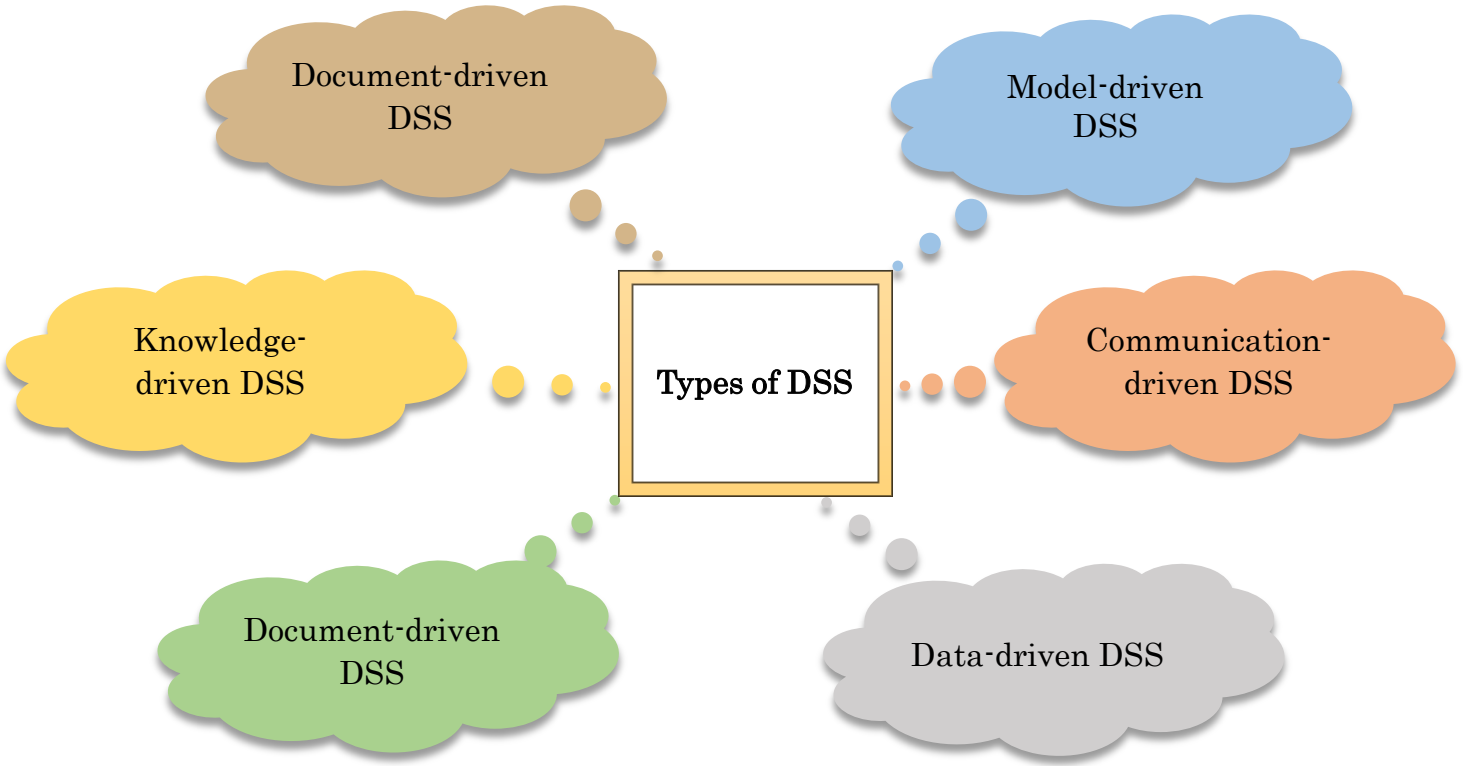
It refers to a framework through which interaction between human beings and computers takes place.

Characteristics of DSS

The DSS is an interactive computer-based system that provides data to solve problems related to the decision-making process of an organisation.



Types of DSS


Document-driven DSS
Model-driven DSS
Knowledge-driven DSS
Types of DSS
Communication-driven DSS
Document-driven DSS
Data-driven DSS

Model-driven DSS

- The model-driven DSS manipulates data to generate statistical and financial reports as well as simulation models.
- This helps decision makers in analysing decisions and making choice among different alternatives.
- The model-driven DSS follows 'what-if' analysis as an analytical tool.
- This type of DSS is helpful in analysing the effect of change in certain variables on the efficiency of business.

Communication-driven DSS

- The communication-driven DSS enhances decision making by facilitating a free flow of information among groups and people.
- This type of DSS basically supports group decision making. It can be implemented by using the Web or client-server technology.
- The communication-driven DSS can be ranging from a simple e-mail to a complex Web conferencing application.

Data-driven DSS

- The data-driven DSS focuses mainly on internal and external data for decision making. This data is obtained from a data warehouse.
- This DSS can be implemented by using a mainframe or client-server technology.
- This system utilises online analytical processing tools for data analysis.

Document-driven DSS

- The document-driven DSS is common for large user groups and is able to convert documents into useful data for business.
- The document-driven DSS uses data which cannot be easily standardised and stored. It utilises different forms of data, such as oral, written and visual.
- The data obtained from these sources is not standardised. Therefore, managers need DSS tools to convert this data into meaningful information.

Knowledge-driven DSS

- The knowledge-driven DSS provides advice related to various business decisions.
- It is implemented by using client/server systems.
- The knowledge-driven DSS is usually designed to recommend actions to users.
- It helps in analysing a huge amount of data for determining hidden patterns and recommendations.

Web-based DSS

- The DSS that uses a Web browser is known as the Web-based DSS.
- The technologies used to implement the Web-based DSS are client/server system and Web.
- The Web-based DSS delivers decision support information or decision support tools to managers through various Web browsers.
- The Web-driven DSS embodies the features of all DSSs like communication-driven DSS, data-driven DSS, document-driven DSS, etc.

Tools and Technologies Supporting DSS

DSS includes many tools that are key factors for its operational support.

Some of the major tools supporting DSS are discussed as follows:

- Extraction, Transformation and Loading (ELT)
- Online Analytical Processing (OLAP)
- Relational Online Analytical Processing (ROLAP)
- Multidimensional Online Analytical Processing (MOLAP)
- Hybrid Online Analytical Processing (HOLAP)
- Dialogue management

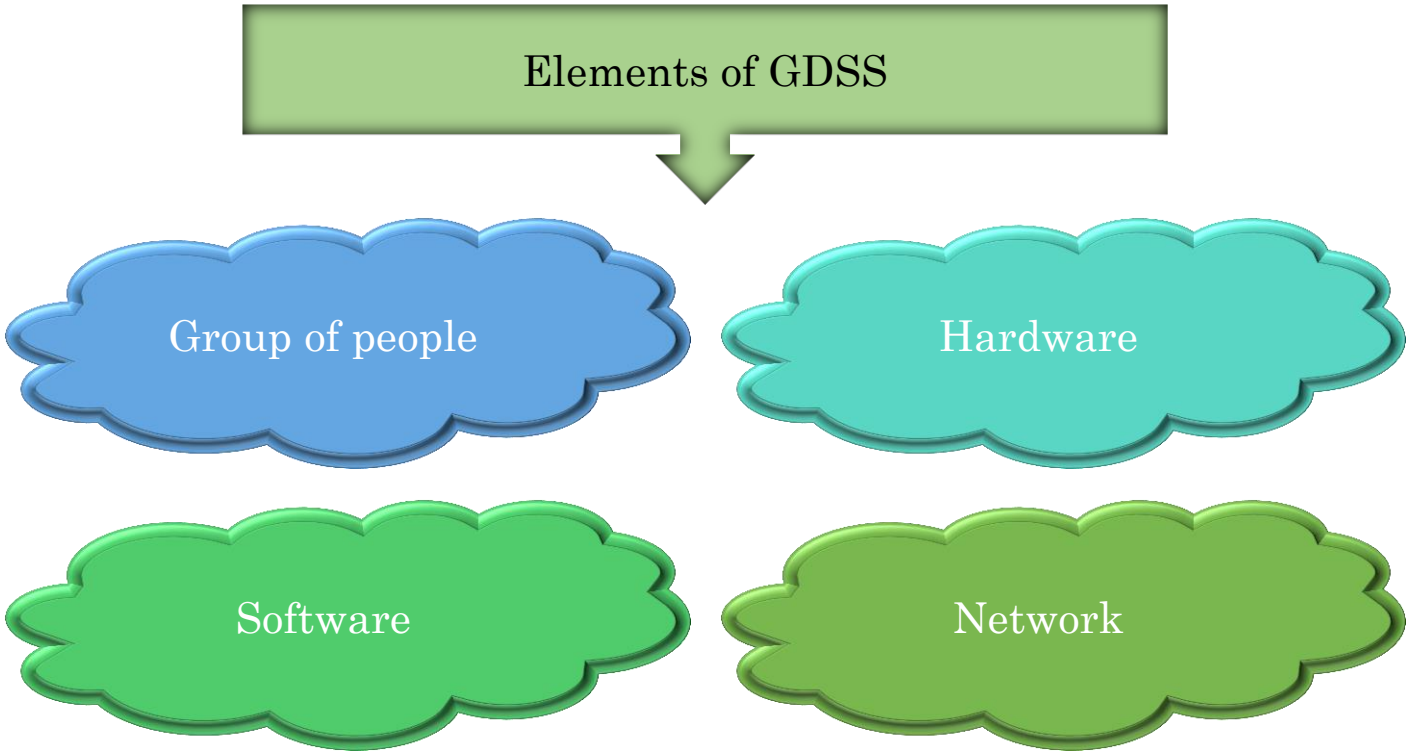
Group Decision Support System

A Group Decision Support System (GDSS) is an interactive computer-based system that is designed to support a group or team of decision makers instead of individual decision makers.

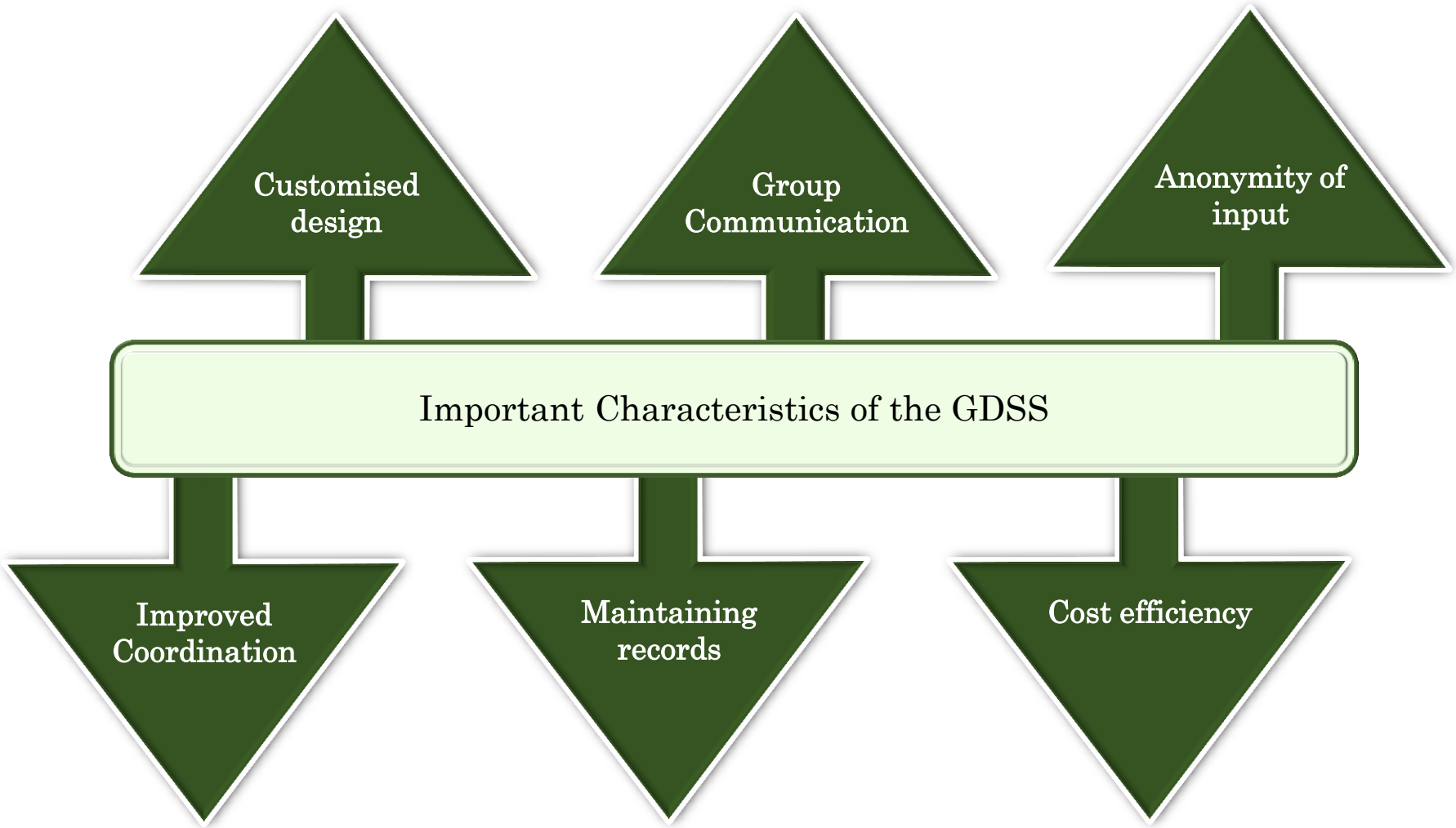
It is important for decision makers to select the most suitable method of decision making and maintain proper interaction with other decision makers of the group.

The GDSS enables individuals involved in the decision-making process to communicate and exchange knowledge among themselves.

Elements of GDSS



Characteristics of GDSS



Executive Support System (ESS)

ESS refers to a computerised system that helps executive-level managers in converting an organisation's data into useful summarised reports.

The ESS provides managers with quick access to reports coming from all departments such as accounts, finance, human resource, operations, etc.

The ESS also provides analysis tools that can predict performance of the input data.

It also predicts possible outcomes and helps in decision making by providing quick reference to statistics and numbers.

ESS helps top executives and policy makers in getting permanent and updated estimation of key questions mostly related to information and knowledge.

The advantages of the ESS are:

- Facilitates access to information, both internal and external, which is vital for understanding and assessing the situations quickly
- Helps with the capability to communicate and tackle problems
- Enables the presentation of information in combination with graphics, tables and text
- Facilitates improvement in routine business activities of an organisation such as scheduling, setting of agenda and follow-ups
- Supports with the capability of working in coordination with various other software available to the organisation
- Helps with statistical and drill-down capabilities
- Provides functionality for decision support such as what-if analysis and handling queries
- Needs minimum learning time for users by making it easier for them to use menu systems
- Makes information about critical success factors easily accessible

Concept of Business Intelligence

Business Intelligence (BI) is an umbrella term that encompasses technologies, applications and practices for collecting, integrating, analysing and presenting business information.

Elements of Business Intelligence

Reporting	Analysis	Data mining	Data quality and interpretation	Predictive analysis
It is a process of retrieving data, formatting it and delivering it to users internally and externally.	It is a process of identifying patterns and creating relationships in a group of data.	It represents mining of original information from data.	It represents greater or lesser connection between data and real-world objects.	It is a branch of data mining, which predicts probabilities and trends in business.

Evolution of Business Intelligence

Business intelligence (BI) has evolved and emerged as the critical need of every organisation.

Introduction of BI has minimised the use of traditional systems of analysis and data interpretation such as manual data gathering and analysis and mainframe computers.

BI does not just refer to standard SQL-based reports provided by IT but also it has turned out to be a self-service, visual, interactive environment that includes some advanced analytics.

Importance of Business Intelligence in Organisations

Organisations use BI to identify noteworthy events and monitor their businesses to adapt quickly to the changing business environment.

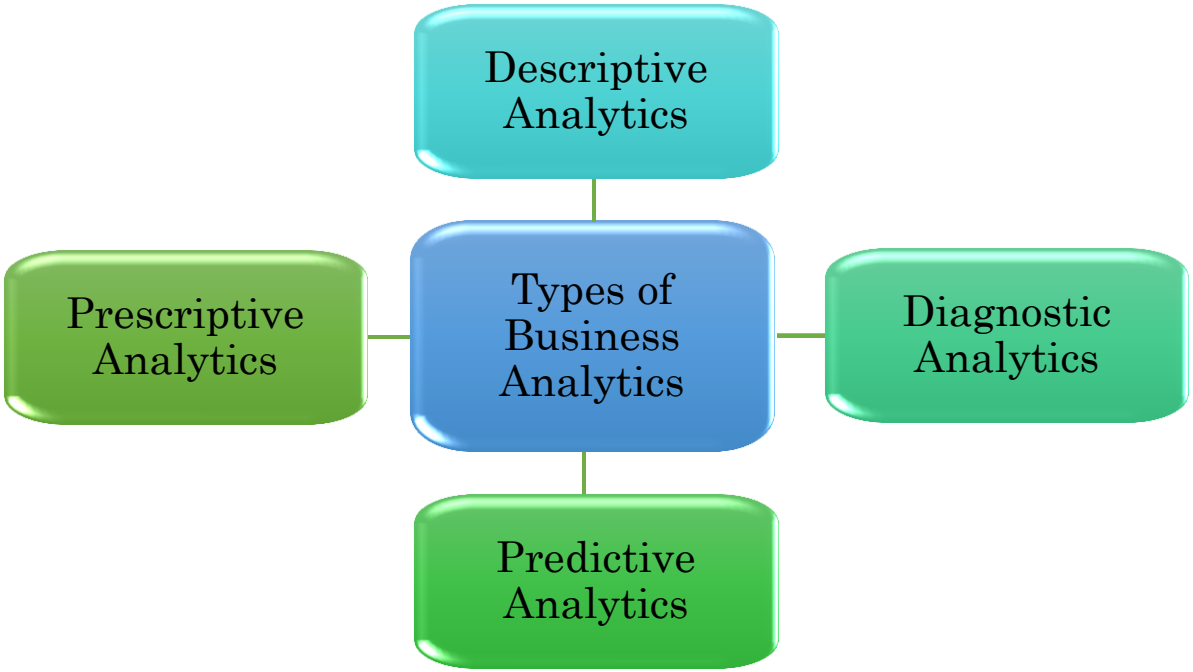
BI can improve decision-making processes at all levels of the management by providing relevant business information.

BI helps organisations in the following ways:

- Consumer behaviour insight
- Improved visibility
- Actionable information
- Improved Efficiency

Business Analytics, Its Types and Applications

Business analytics (BA) refers to the combination of skills, technologies and practices that are applied over the past data and processes in order to generate certain insight that can be used for future business planning.



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