

Business Intelligence and Decision Support Systems

Syllabus Topic : Business Intelligence

1.1 Introduction to Business Intelligence

Q. 1.1.1 What do you mean by business intelligence ? Write its advantages.

(Ref. Sec. 1.1)

(5 Marks)

- The term **Business Intelligence (BI)** refers to technologies, applications and practices for the collection, integration, analysis, and presentation of business information. The main reason behind Business Intelligence is to provide better business decision making.
- These systems are data-driven **Decision Support Systems (DSS)**. Business Intelligence is sometimes used interchangeably with briefing books, report and query tools and executive information systems. It is also called as a set of mathematical model and analysis methodology which is very useful for decision making process which are complex.
- Large amount of data can be easily accessed by individuals and organizations because of numerous internet connections and low data storage technologies.
- Transactions are commercial, financial and administrative, making the data heterogeneous in origin, content and representation. Emails, texts and hypertexts, and the results of clinical tests, are a few examples.
- Their accessibility opens various scenarios and opportunities, and raises a rather important question: is it possible to convert such data into information and knowledge that can then be used by decision makers to assist and improve the operation of enterprises and of public administration?

Syllabus Topic : Effective and Timely Decisions

1.2 Effective and Timely Decisions

Q. 1.2.1 Write short note on Effective and Timely decisions. (Ref. Sec. 1.2) (5 Marks)

- In public or private organizations, decisions are made continuously. Such decisions can prove to be critical, have long-term or short-term effects and involve people and roles at various rankings.
- Performance and competitive strength of an organization is based on the ability of skilled workers to make decisions as individuals and a community.
- Most people reach their decisions mainly using simple and easy approaches, which use specific elements such as experience, knowledge of the application domain and the available information.
- Decision-making processes within today's organizations are often too complex and dynamic to be effectively dealt with through an intuitive approach, and instead require a much stricter attitude based on analytical tactics and mathematical models.
- Example 1 shows two complex decision-making processes in rapidly changing conditions.

☞ Example 1 – Retention in the cellular industry

- The marketing person of a cellular company realizes that most of the customers are diverting towards other service provider due to better option and low cost. It is critical for the company as it will reduce the number of customer which affects business.
- So company manager can decide conduct a customer retention campaign. With the help of this campaign they can select the best target group which will maximize customer retention this will help them in to business growth.
- The main purpose of business intelligence systems is to provide skilled workers with tools and methodologies that allow them to make effective and timely decisions.

☞ Effective decisions

- The application of stricter analytical methods allows decision makers to rely on information and knowledge, which are more dependable.
- As a result, they are able to make better decisions and formulate action plans that allow their objectives to be reached in a more effective way.
- Turning to formal analytical methods forces decision makers to describe both the criteria for accessing alternative choices and the mechanisms regulates the problem under investigation.

- Furthermore, the ensuing observation and thought lead to a better awareness and knowledge of the unhidden logic of the decision-making process.

☛ **Timely decisions**

- Enterprises operate in economic environments characterized by growing levels of competition and high dynamism. As a consequence, the ability to rapidly react to the actions of competitors and to new market conditions is a critical factor in the success or even the survival of a company.
- Fig. 1.2.1 shows the benefits provided to organization, which can draw from the adoption of a business intelligence system. When they face problem decision makers can ask themselves a group of questions on the basis of that they can make analysis based on it.
- Now it is easy to choose best solution by comparing several options.
- If decision makers follow business intelligence system then the overall quality of the decision-making process can be improved.

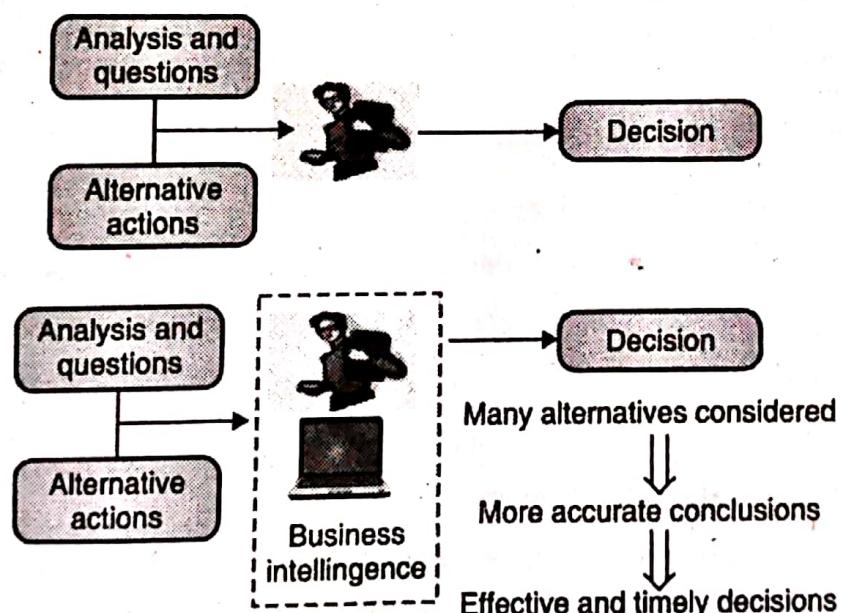


Fig. 1.2.1 : Benefits of a business intelligence system

- Therefore we can say that it is effective and advantageous to use a business intelligence system for making decision.
- As we saw that, a big amount of data we can store into the systems of public and private organizations.
- This data can be from internal transactions of an administrative, logistical and commercial nature and some from external sources.

- But even we collect it and store it systematically we cannot use it directly for decision-making purposes. For that we need an extraction tools and methods which will convert that information which can be used for decision making.

Syllabus Topic : Data, Information and Knowledge

1.3 Data, Information and Knowledge

Q. 1.3.1 What do mean by data, knowledge and information? (Ref. Sec. 1.3) (5 Marks)

The difference between data, information and knowledge can be better understood through the below explanation :

☞ Knowledge

- Knowledge means what we know. We build world map in our brain as we know.
- It's like a physical map which helps us to know where things are but it contains more than that. It also has our beliefs and expectations.
- If we do this, we will probably get that." Crucially, the human brain links all these things together into a giant network of ideas, memories, predictions, beliefs, etc. It is from this "map" that we base our decisions, not the real world itself.
- Our brains constantly update this map from the signals coming through our eyes, ears, nose, mouth and skin. We can't currently store knowledge in anything other than a brain, because a brain connects it all together.
- Everything is inter-connected in our brain. Computers are not artificial brains. Computers don't understand what they are processing, and can't make decisions by themselves and it does what we tell them.
- The knowledge uses two sources to build it they are Information and data.

☞ Data

- Data is a set of representation of plain facts. Data are the facts of the world.
- For example, take yourself. You may be 6ft tall, have black hair and brown eyes. All of this is "data".
- The confusion between data and information often arises because information is made out of data. Data can be defined differently in different sectors.



- We can perceive this data with our senses, and then the brain can process this. Human beings have used data as long as we've existed to form knowledge of the world.

Information

- Information is used to expand our knowledge beyond the range of our senses. We can capture data in information, and then move it about so that other people can access it at different mediums.
- For example if we click picture then photo is information how we look like is the data.
- We can send the picture around through various medium without moving that person who is in the picture. If we lose that photo it won't change your look. In this case we lose information not the data.

Syllabus Topic : The Role of Mathematical Models

1.4 The Role of Mathematical Models

Q. 1.4.1 Write short note on the role of mathematical models. (Ref. Sec. 1.4) (5 Marks)

- Mathematical models and algorithms help decision makers to extract information and knowledge from the data through the means of a business intelligence system.
- Data can be graphically represented by histograms, whereas more elaborate analysis requires development of advanced learning models.
- Generally, business intelligence system is used to promote a scientific and rational approach of organization.
- Example- a spreadsheet is used to estimate the effects on the fluctuations in interest rates with the help of that decision makers can generate a mental representation of the financial flows process.
- Classical scientific fields, such as physics, have always resorted to mathematical models for the abstract representation of real systems.
- Other areas, such as operations research, have instead made full use of the application of scientific methods and mathematical models to the study of artificial systems, for example public and private organizations.

- The characteristics of a business intelligence analysis which is used for summarizing schematically are as follows :
 - o They identify the objectives of the analysis and the performance indicators which used for identifying evaluating alternative options.
 - o Then mathematical models can be developed by exploiting the relationship of parameters of system control also the parameters of evaluation metrics.
 - o Finally on the basis of variation in the control variable and changes in the parameters the effects of the performance can be determined.

Syllabus Topic : Business Intelligence Architectures

1.5 Business Intelligence Architectures

Q. 1.5.1 Draw and explain architecture of Business Intelligence. (Ref. Sec. 1.5) (5 Marks)

Fig. 1.5.1, shows the architecture of a business intelligence system, which consist of three major components they are as follows :

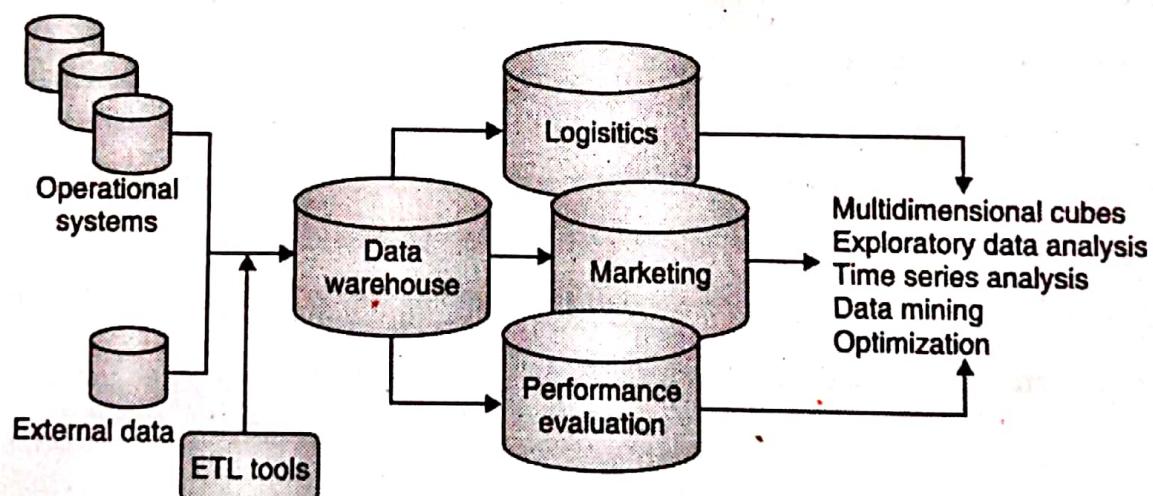


Fig. 1.5.1 : A typical business intelligence architecture

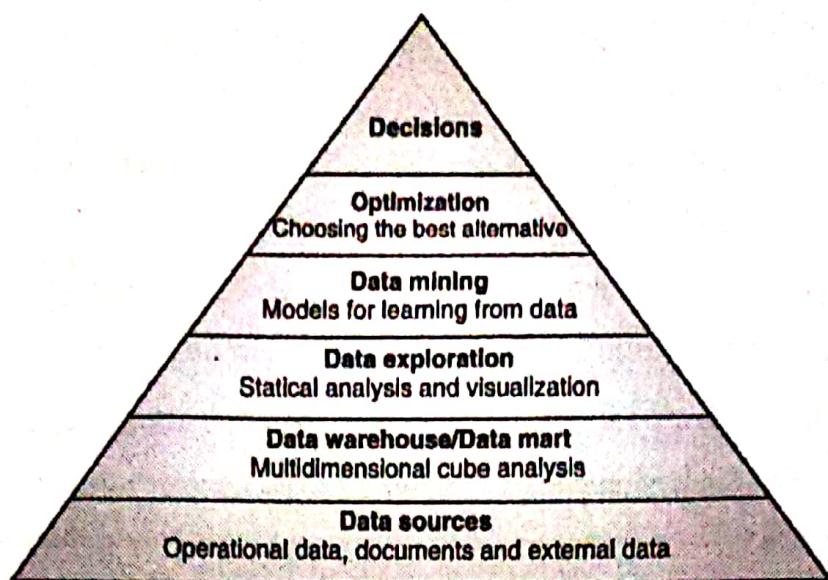


Fig. 1.5.2 : The main components of a business intelligence system

→ **1. Data sources**

- It is very important to collect and integrate the data which are stored in the various primary and secondary sources, they are heterogeneous in origin and type.
- The sources for most of the part of data belongs to operational system which also includes unstructured documents like emails and data received from various external sources.

→ **2. Data warehouses and data marts**

- ETL stands for Extract Transform Load. In an ETL process data is extracted from the operational systems and loaded into a data warehouse.
- The data from various sources are stored into a database which is made to support business intelligence analysis. This database is called as data warehouse and data mart.

→ **Business intelligence methodologies**

- Methodologies provide a best practice framework for delivering successful business intelligence and data warehouse projects.
- This data is extracted to provide input to mathematical model and support decision makers.
 1. Time series analysis;
 2. Inductive learning models for data mining;
 3. Optimization models.
- The pyramid in Fig. 1.5.2 shows pyramid of a business intelligence system. We have discussed components of first two levels in Fig 1.5.1.



- The description of the upper tiers:

→ 3. Data exploration

- This is the third level called as Data exploration. Data exploration is an informative search which is used by data consumers to form real and true analysis from the information collected. Data Exploration is about describing the data by means of statistical and visualization techniques.
- We explore data in order to bring important aspects of that data into focus for further analysis. Often, data is gathered in a non-rigid or controlled manner in large bulks.
- For true analysis, this unorganized bulk of data needs to be narrowed down. This is where data exploration is used to analyze the data and information from the data to form further analysis.
- Data often converges in a central warehouse called a data warehouse. This data can come from various sources using various formats.
- Relevant data is needed for tasks such as statistical reporting, trend spotting and pattern spotting. Data exploration is the process of gathering such relevant data.

→ 4. Data mining

- The fourth level is data mining. Data mining technique has to be chosen based on the type of business and the type of problem your business faces.
- A generalized approach has to be used to improve the accuracy and cost effectiveness of using data mining techniques.

→ 5. Optimization

If we go one level on top we get optimization models which allow us to select best solutions among all other alternative.

→ 6. Decisions

- The top most level of the pyramid is the decision where we need to select best alternative for decision making process.
- When business intelligence methodology is successfully adopted it helps to make decision.

1.5.1 Cycle of a Business Intelligence Analysis

Q. 1.5.2 Draw and explain Cycle of Business Intelligence Analysis.
(Ref. Sec. 1.5.1)

(5 Marks)

- Fig. 1.5.3 shows the cycle of business intelligence analysis where it follows the path. This is an ideal path which characterizes the evolution of business intelligence analysis.

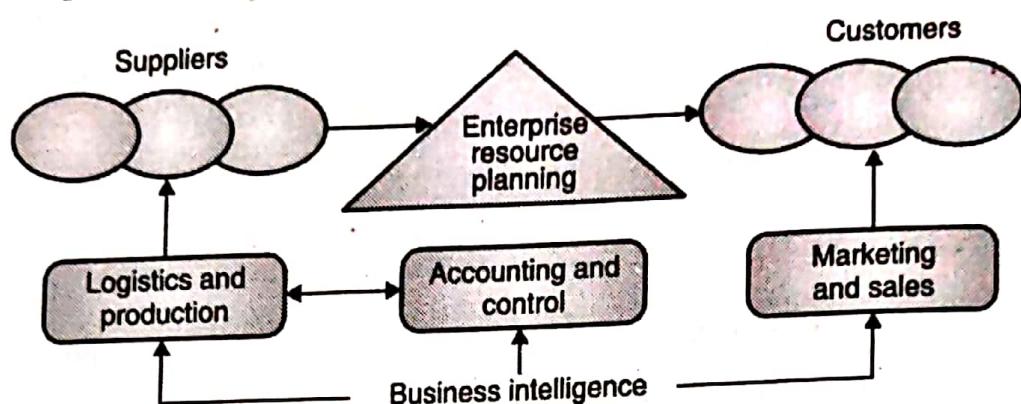


Fig. 1.5.3 : Departments of an enterprise concerned with business intelligence systems

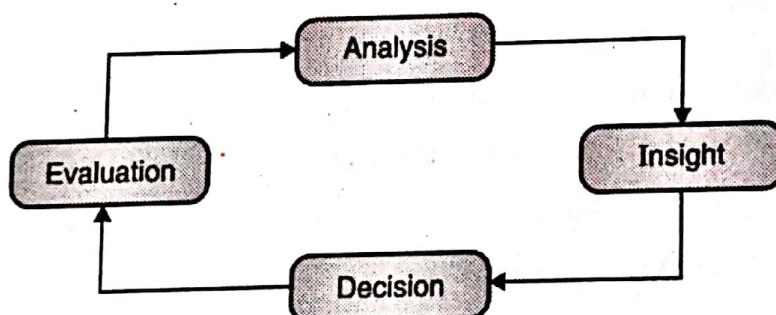


Fig. 1.5.4 : Cycle of a business intelligence analysis

→ 1. Analysis

- In this phase we find out the problem and understand which path is critical for making decision. Analysis is very important to proceed further to the next step.
- This phase helps us to take best suitable decision.

→ 2. Insight

- This phase helps us to understand the problem properly.
- For example if first phase shows the information of many customers who wants to discontinue insurance policy after validity expires and second phase gives information about the customers which is shared by the customer.

- In this phase information is carried out through the analysis phase. Insight Assessment specializes in full service solutions for measuring learning outcomes.
- We provide world class test instruments supported by high quality customer service to higher education institutions worldwide.
- At each phase of the assessment process, we offer the instrumentation, data gathering capacity and report options to guide you to your goal of demonstrating institutional effectiveness.

→ **3. Decision**

- This is a third phase where decision makers take decision. The availability of BI helps analysis and Insight phase to take fastest decision.
- This is an important phase which decides over all time for execution.

→ **4. Evaluation**

This is the final phase of cycle which performance measurement and evaluation.

1.5.2 Development of a Business Intelligence System

Q. 1.5.3 Draw and explain phases of Business Intelligence. (Ref. Sec. 1.5.2) (5 Marks)

→ **1. Analysis**

- This step is about analyzing the performance of the software at various stages and making notes on additional requirements. Analysis is very important to proceed further to the next step. Needs of the organization should be identified properly.
- This phase consist of some interviews and knowledge of workers who performs various roles in the organization. We also needs to decide costing and benefits of developing business intelligence system.

→ **2. Design**

- Once the analysis is complete, the step of designing takes over, which is basically building the architecture of the project.
- This step helps remove possible flaws by setting a standard and attempting to stick to it. It is very important to make assessment of existing information.

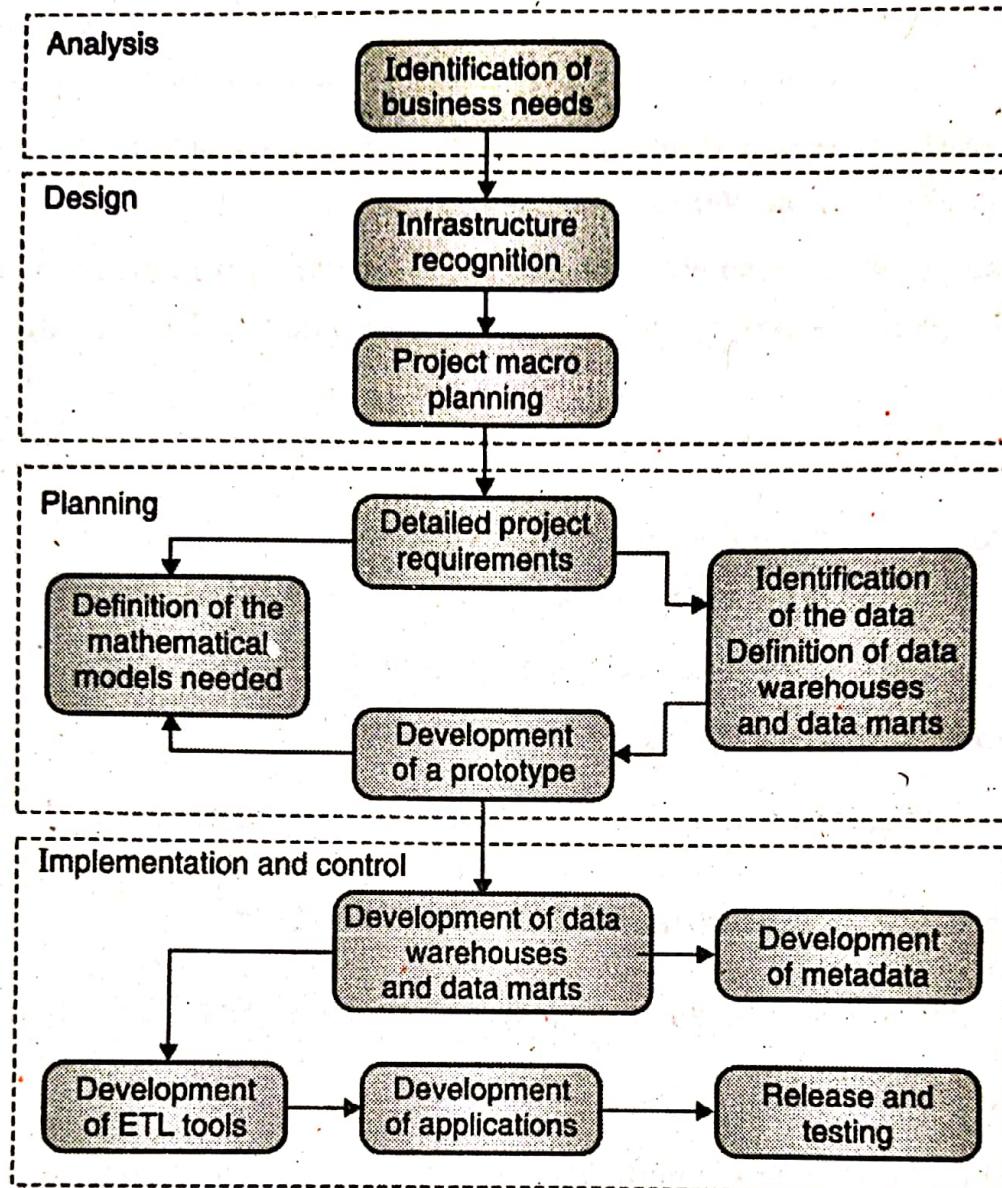


Fig. 1.5.5 : Phases in the development of a business intelligence system

→ 3. Planning

- The main purpose of the planning phase is to know the requirement and understand opportunities. In this we need to find out cost, time, and benefits of the system.
- What is the scope of the system? What will be the problem and solution for it?
- Without the perfect plan, calculating the strengths and weaknesses of the project, development of software is meaningless. Planning kicks off a project flawlessly and affects its progress positively.

→ 4. Implementation and control

- The actual task of developing the software starts here with data recording going on in the background. Once the software is developed, the stage of implementation comes in where the product goes through a pilot study to see if it's functioning properly.

- A Metadata achieve should be created for this ETL procedures are used. And finally the system can be release for testing and to use it.

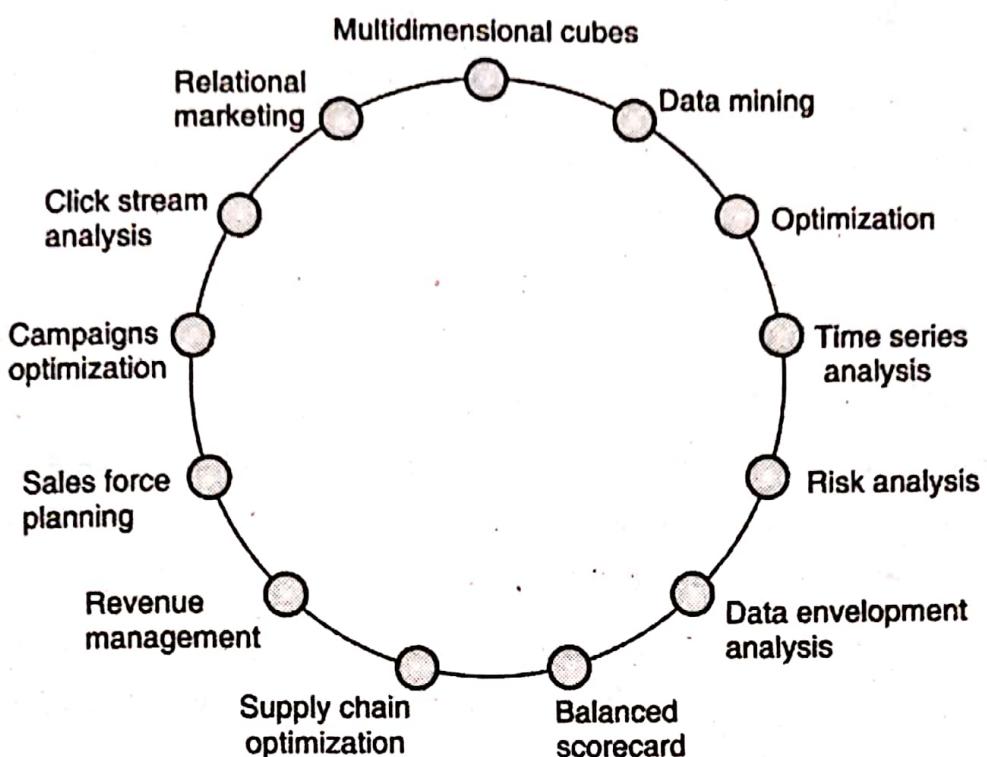


Fig. 1.5.6 : Portfolio of available methodologies in a business intelligence system

Syllabus Topic : Ethics and Business Intelligence

1.6 Ethics and Business Intelligence

Q. 1.6.1 What are the ethics of Business Intelligence? (Ref. Sec. 1.6) (5 Marks)

- The type of ethics in **Business Intelligence (BI)** is the ethical principles of conduct that govern an individual in the workplace or a company in general. It is also known as professional ethics and not to be confused with other forms of philosophical ethics including religious conviction, or popular conviction.
- Professional ethics according to Griffin (1986) is that profit is not the only important strategy of a business anymore. There is also more of a concern and motivator of companies to do what is right.
- Companies must acknowledge that they have a common good to protect their local community, improve employee relations and promote informational press to the public. While back in 1986, Griffin was directing his argument towards ethics in accounting but it is also true today in Business Intelligence.

- Government regulations are not changing fast enough to cover all the changes in technology that bombards users on day to day bases. It is up to corporations to create a code of ethics, and to persistently be receptive to the needs of the public being served.
- Everyday in BI management professionals may be at risk of making unethical practices in their decisions that regards the consumer, business and/or other employees data. Ethics is a touchy subject, there is always going to be controversy on how companies choose to handle business decisions.
- There is no definite decision to make when it comes to ethical decisions. While sometimes it may involve illegal practices, other times it is just a decision that needs to be made in a company to promote a better way of life for all.
- An example of an ethical decision would be a manager of a BI system that chooses to use cheaper data in his/her data mining activities to save money. The data he/she chooses to implement involves personal credit score reports.
- The cheaper data sets have a 20% possibility of being incorrect. The manager did not see it as being an unethical decision when it was made, just a way to continue to generate close-to-accurate reports and save money.
- The impacting decision on 20% of the company's customers may have different results as more people are turned down for credit because inaccurate reports. It is not a crime to have implemented the inaccurate data sets but it may seem as an unethical practice to others.
- While it is important for managers to be able to make their own decisions, this example decision being made should have involved more managers since it affected the whole business.
- The manager's choice could bankrupt the company as users start to leave their business for more accurate competitive companies. As the example points out, sometimes there is no really clear answer to whether an issue involves an ethical or legal choice and each situation can be different.
- Trying to make decisions based on individuals' beliefs when dealing with a company can amount to intellectual stalls and trying to come to a decision can be expensive and time consuming.
- Today's society has come to the point where there are more solutions to problems than ever before. What once was impossible can now be accomplished through the use of BI and other technology similar to BI.

- It is not going to stop; technology is going to keep advancing. What seems improbable now may be common in the near future.
- Because of business globalization, there is also a larger separation between companies and customers, companies and competitors than there was when everything was done locally in the past.
- Larger separation between companies and the consumer has resulted in unethical and sometimes illegal business decisions like data theft.
- Because of all the technology used in big businesses, and resulting exposure to unethical practices by some of the larger corporations like Enron, there is growing anxiety of large companies to be free of unethical practices.
- Additionally the general trust level of users has eroded to the point where trust really has to be earned. Users are very aware of cases of identity information being lost to theft as well as other case examples in the media.
- Users have taken up with the attitude of show me or prove to me that they are safe, that their information is safe or they will not do business.

Syllabus Topic : Decision Support Systems

1.7 Introduction to Decision Support Systems

Q. 1.7.1 Write short note on Decision Support System. (Ref. Sec. 1.7) (5 Marks)

- A Decision Support System (DSS) is a computer program application which analyzes business data and presents it so that users who can make business decisions more easily.
- A DSS allows users to compile information which can be used to solve problems and make better decisions.
- The advantage of decision support system is that it includes more informed decision-making, timely problem-solving and improved efficiency for dealing with problems with rapidly changing variables.

Syllabus Topic : Definition of System

1.8 Definition of System

Q. 1.8.1 Explain system with neat diagram. (Ref. Sec. 1.8)

(5 Marks)

- The term system is widely used in everyday language: for example, we refer to the solar system, the nervous system or the judiciary system.
- All these systems contain a common characteristic, which can be used for abstract definition of the notion of system: each of them is made using collection of components which are some way connected to each other to get the single collective result and a common purpose.
- Every system is characterized by boundaries that separate its internal components from the external environment. A system is also called as open if its boundaries can be crossed in both directions by flowing of materials and information.
- When such weakness is lacking in the system then it is known as closed. In other words, any system receives specific input flows, and gives an internal transformation process then generates observable output flows.
- This definition of the system can be used to describe a broad class of real-world phenomena.
- From the Fig. 1.8.1 it can be seen it uses a structure for describing concept of the system. In this system it receives a group of input flows then returns a group of output flows from the transformation process which is regulated by internal and external conditions.
- Measurable performance indicators are used to assess effectiveness and efficiency of the system. It can be classified into different categories.
- The Fig. 1.8.1 shows the main types of metrics which is used to evaluate systems embedded within the enterprises and the public administration.
- A system uses feedback mechanism. Feedback occurs when a system component generates an output flow i.e. fed back into the system itself as an input flow, possibly because of a further transformation.

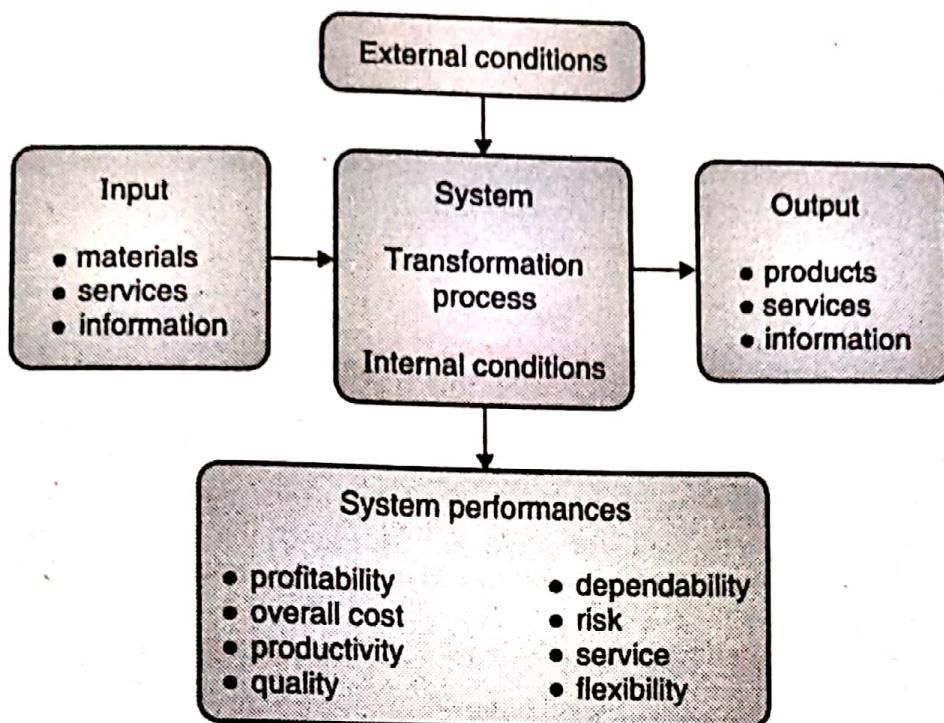


Fig. 1.8.1 : Abstract representation of a system

- System which modifies their output flaws depending upon feedback is known as closed cycle system. For example, the closed cycle system explained in Fig. 1.8.2 describes the development of a sequence of marketing campaigns.

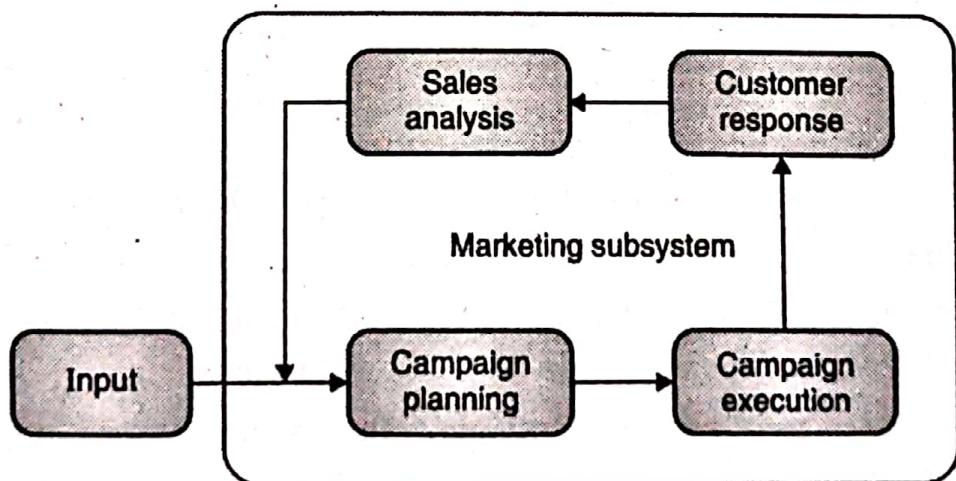


Fig. 1.8.2 : A closed cycle marketing system with feedback effects

- The sales results of each campaign are collected and used as feedback input to design subsequent marketing promotions so that they can make decision and improve the system.
- It is very important for decision-making process. For this purpose we can use two main evaluation metrics they are as follows.

☛ Effectiveness

Effectiveness means whether we are achieving desired outcome or not. In other word doing effectiveness means doing accurate thing.

☛ Efficiency

- Efficiency means whatever we are producing or performing is perfect or not. It should be done in perfect way.
- Effectiveness metrics shows that whether the right action is being taken or not, whereas efficiency metrics is used to check whether taken action is best possible way or not.

Syllabus Topic : Representation of the Decision-Making Process

1.9 Representation of the Decision-Making Process

- To build effective DSSs, we first need to describe in general terms how a decision-making process is joined.
- We wish to understand the steps that lead individuals to make decisions and the extent of the influence applied on them by the subjective attitudes of the decision makers and the specific context within which decisions are taken.

1.9.1 Rationality and Problem Solving

Q. 1.9.1 Explain process of problem solving. (Ref. Sec. 1.9.1)	(5 Marks)
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- A decision is done by selecting best alternative. Decision is very important in personal or professional life.
- It's plays vital role to achieve desired goal. We are focusing on decision which is made by enterprises and organizations which can be public or private.
- This decision is used to developing strategic plan. The decision-making process is used for problem solving, individuals fills the gap between current system's operating condition also tries to achieve better conditions in the future.
- In other words, the transition of a system towards the desired state implies overcoming certain obstacles and is not easy to attain. It will force decision makes to devise a set of alternative best options to get the required goal, and then it will make a decision based on a comparison between the merits and demerit of each alternative.
- Therefore, the decision selected should be put into use first then check whether it has enabled the planned objectives to be achieving goals. When this fails then problem is reconsidered, according to recursive logic.

- Fig. 1.9.1 shows the process of the problem-solving. The alternatives represent the possible actions targeted for solving the given problem and helping to achieve the planned objective.
- Sometime number of alternatives available can be less. While making decision of granting loan of an applicant there are only two alternatives available they are either approve or reject.
- But in other cases there can be many alternatives where we need to select best alternative among all available alternative.

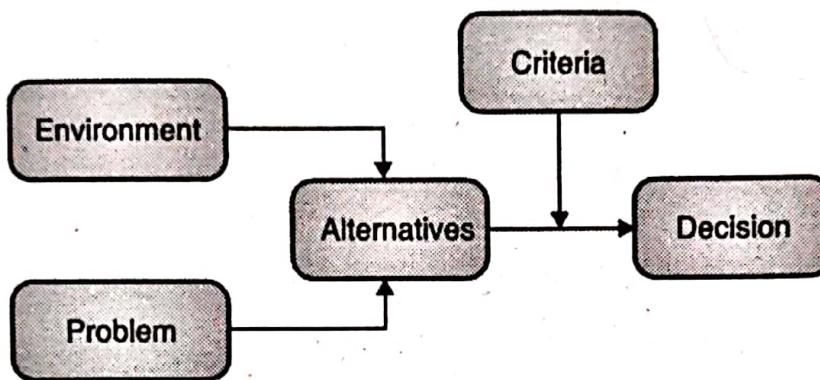


Fig. 1.9.1 : Process of problem-solving

- Criteria are used to measure effectiveness of the various options and correspond to the different kinds of system performance shown in Fig. 1.9.1 shows rational approach to decision making where best alternative is selected among all other alternative.
- Apart from economic criteria, which tend to prevail in the decision-making process within companies, it is however possible to identify other factors influencing a rational choice.

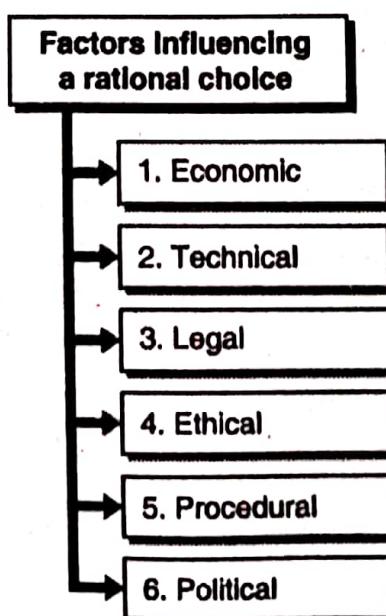


Fig. 1.9.2 : Factors influencing a rational choice

→ **1. Economic**

- Economic is the most important and influential factors for making decisions. It is also used for reducing expenses and increasing profits.
- For example, an annual logistic plan can be used rather than other alternative plans to reduce cost and increase profit.

→ **2. Technical**

- Alternatives which are technically not reasonable should be rejected.
- For instance, a production plan which exceeds the maximum capacity of a plant cannot be referred as a feasible option.

→ **3. Legal**

In this means decision maker should verify whether it is compatible with the legislation in force within the application domain.

→ **4. Ethical**

In this decision maker should follow certain principles and social rules related to the system.

→ **5. Procedural**

A decision can be considered ideal from an economic, legal and social standpoint, but it can be unworkable due to cultural limitations of the organization in terms of prevailing procedures and common practice.

→ **6. Political**

- The decision maker can access the political consequences of a specific decision from individuals, departments and organizations.
- The process of evaluating the alternatives can be divided into two main phases as shown in Fig. 1.9.3, Exclusion and Evaluation.
- In first phase i.e. exclusion it checks rules and restriction of the alternative. In this process, some alternatives can be rejected from consideration; others represent feasible options which represent evaluation. In second phase best alternatives are compared based on their performance.

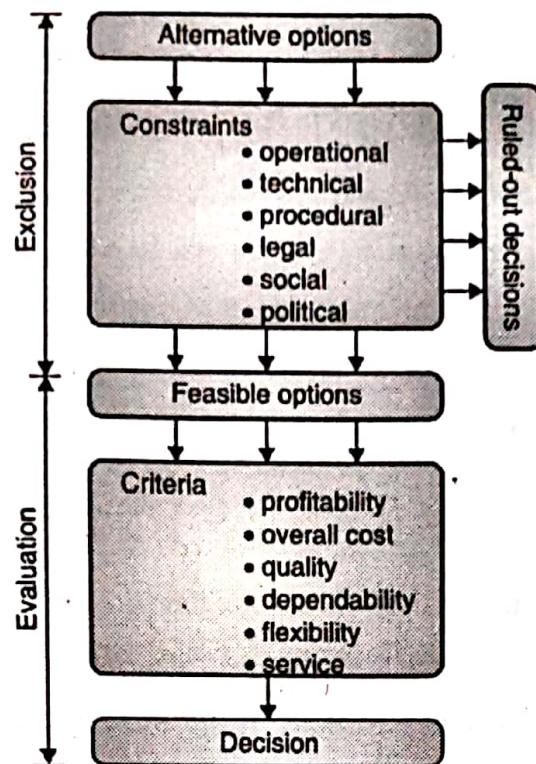


Fig. 1.9.3 : Structure of decision -making process

1.9.2 The Decision-Making Process

Q. 1.9.2 Explain phases of decision-making process. (Ref. Sec. 1.9.2)

(5 Marks)

- A compelling representation of the decision-making process was proposed in the early 1960s and remains today a major methodological reference. The model consist of three stages they are intelligence, design and choice.
- Fig. 1.9.4 shows an enhanced version of the original scheme, It has additional two stages they are implementation and control.

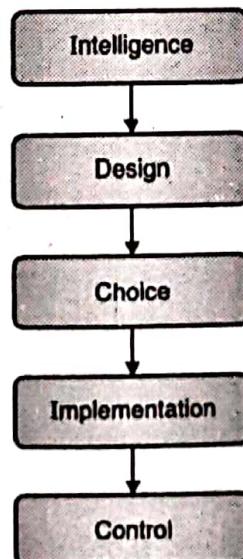


Fig. 1.9.4 : Phases of the decision-making process

→ **1. Intelligence Phase**

- First phase of the decision-making process is Intelligence Phase. In this phase, decision makers examine reality and then identify problems or opportunities correctly.
- This phase is very important in decision making process as we are trying to identify problems.
- For example, we like to practice Lean Startup methodology which emphasizes importance of right problem definition before building anything that can be product or business.
- Additionally, one of the Digital Transformation pillars is the data. Organizations should become data-driven.
- That means proper usage and implementation of Business Intelligence (BI) systems. Business Intelligence implementations are considered successful only if you have clear business needs and see real benefits from it.
- Business Intelligence is not just about data. It should be connected with organizational goals and objectives.
- The intelligence phase can really remain for long time. But, since decision-making process starts with this phase, it should be long as it has to be done properly.

→ **2. Design Phase**

- The main aim of this phase is to define and construct a model which represent a system. It is done by properly defining relationships between all collected variables.
- Once we validate the model, we define the criteria of choice and search for several possible solutions for defined problem (opportunity). In this phase we need to predict the future outcomes for each alternative.

→ **3. Choice Phase**

- In this phase we are actually making decisions by selecting best alternative. The end product of this phase is a decision.
- Decision is made by selecting and evaluating alternatives as described in previous step. If we are sure that the decision we made can actually be achieved and then we can move towards next phase i.e. implementation phase.

→ **4. Implementation Phase**

- All the previous steps we've made (intelligence, design and choice) are now implemented.



- It is not necessary that implementation will be always successful. Successful implementation will provide solution of defined problem but failure returns us to an earlier phase.
- We described Simon's model which, even today, serves as the basis of most models of decision-making process. The process describes series of events that precede final decisions.
- It is important to say that, at any point, the decision maker may choose to return to the previous step for additional validation. This model is a concept, a framework of how organizations and managers make decisions.

→ 5. Control Phase

- Once we are done with all the phases it is very important to check whether everything is working fine or not.
- This is the final stage of rational decision-making process, wherein, the outcomes of the decision are measured and compared with the predetermined, desired goals.
- If there is a discrepancy between the two, the decision-maker may restart the process of decision-making by setting new goals.

1.9.3 Types of Decisions

Q. 1.9.3 What are the types of decision? (Ref. Sec. 1.9.3)

(5 Marks)

- Decision supports systems can be group of are group of manual or computer-based tools which helps in some decision-making.
- Decision Support Systems (DSS) are commonly understood to be computerized management information systems designed to help business owners, executives, and managers resolve complicated business problems and questions.
- Good decision support systems will help us perform a wide variety of functions, including cash flow analysis, concept ranking, multistage forecasting, product performance improvement, and resource allocation analysis.
- Previously regarded as primarily a tool for big companies, DSS has in recent years come to be recognized as a potentially valuable tool for small business also.
- There are various types of decisions they are described as follows :

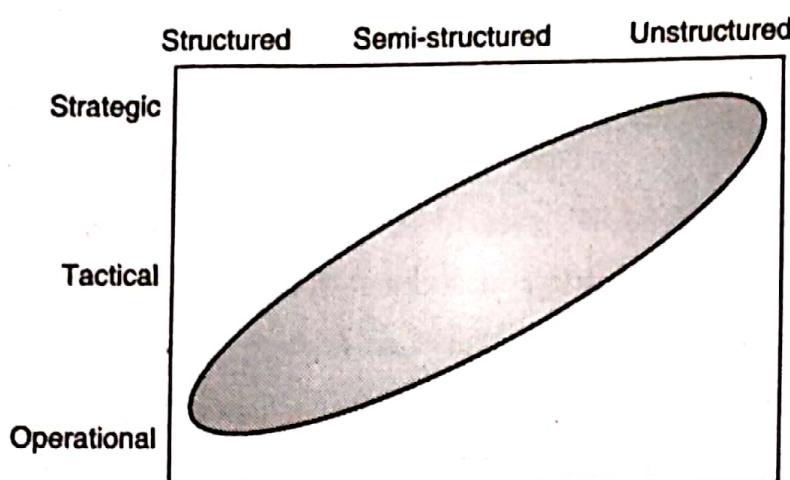


Fig. 1.9.5 : A taxonomy of decisions

→ 1. Structured Decisions

- Many analysts categorize decisions according to the degree of structure involved in the decision-making activity. Business analysts describe a structured decision as one in which all three components of a decision the data, process, and evaluation are determined.
- Since structured decisions are made regularly in business environments, it makes sense to place a comparatively rigid framework around the decision and the people making it.
- Structured decision support systems are easy to use a checklist or form to so that we can ensure that all necessary data are collected and that the decision making process there is no data missing.
- If the choice is also to support the procedural or process component of the decision, then it is quite possible to develop a program either as part of the checklist or form. It is also important to develop computer programs which will collect and combine all data.
- When there is a need to make a decision more structured, the support system for that decision is designed to ensure consistency.
- Many firms who hire individuals without a great deal of experience provide them with detailed guidelines on their decision making activities and support them by giving them little flexibility.
- One interesting consequence of making a decision more structured is that the liability for inappropriate decisions is shifted from individual decision makers to the larger company or organization.

→ 2. Unstructured Decisions

- It has same components like structured decision they are data, process, and evaluation. Unstructured decisions are made when all elements of the business environment

i.e. customer expectations, competitor response, cost of securing raw materials, etc. are not understood completely.

- Unstructured decision systems typically focus on the individual who or the team that will make the decision. These decision makers are usually entrusted with decisions that are unstructured because of their experience or expertise; it is their individual ability that is of value.
- One approach to support systems in this area is to construct a program that simulates the process used by a particular individual. The main aim of unstructured decisions is to understand the role that individuals experience or expertise plays in the decision and to allow for individual approaches.

→ 3. Semi-Structured Decisions

- Decisions of this type are characterized as having some agreement on the data, process, and evaluation to be used.
- Unstructured and semi-structured can be particularly problematic for small businesses, which often have limited technological or work force resources. This unstructured or semi-structured nature of these decisions situations can create the problem of limited resources and staff expertise available to a small business executive to analyze important decisions appropriately.

→ 4. Strategic decisions

- Strategic decisions are used for taking action or a major part of business enterprise. They help to achieve common goals of the enterprise. They have long-term implications on the business enterprise.
- They may involve major departures from practices and procedures being followed earlier. Usually, strategic decision is unstructured therefore a manager has to apply his business judgement, evaluation and intuition into the definition of the problem.
- These decisions are based on partial knowledge of the environmental factors which can be uncertain or dynamic. These types of decisions are taken at the higher level of management.

→ 5. Tactical decisions

- This type of decision relate to the implementation of strategic decisions.
- They are directed towards developing divisional plans, structuring workflows, establishing distribution channels, acquisition of resources such as men, materials and money. These decisions are taken at the middle level of management.

→ 6. Operational decisions

- These decisions relate to day-to-day operations of the enterprise. They have a short-term horizon as they are taken repetitively. It does not require business judgements and it is based on facts of events.
- Operational decisions are taken at lower levels of management. As the information is needed for helping the manager to take rational, well informed decisions, information systems need to focus on the process of managerial decision making.

	Operational	Tactical	Strategic
Accuracy	High	↔	Low
Level of detail	Detailed	↔	Aggregate
Time horizon	Present	↔	Future
Frequency of use	High	↔	Low
Source	Internal	↔	External
Scope of information	Quantitative	↔	Qualitative
Nature of information	Narrow	↔	Wide
Age of information	Present	↔	Past

Fig. 1.9.6 : Characteristics of the information in terms of the scope of decisions

- The characteristics of the information very useful in a decision-making process which will change depending upon the scope of the decisions to be supported, and consequently also the orientation of a DSS will vary accordingly.
- Fig. 1.9.6 shows variations in the characteristics of the information as the scope of the decisions changes. The scheme may be used as an assessment tool while designing a DSS.

1.9.4 Approaches to the Decision-Making Process

Q. 1.9.4 What are the approaches of decision making process? (Ref. Sec. 1.9.4) (5 Marks)

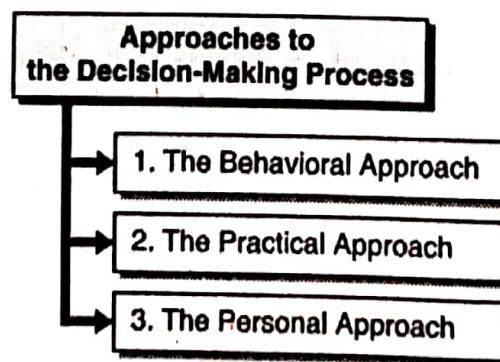


Fig. 1.9.7 : Approaches to the Decision-Making Process

→ 1. The Behavioral Approach

- This approach assumes that decision-makers operate with bounded rationality instead of perfect rationality assumed by the rational approach.
- Bounded rationality is the idea which decision makers cannot deal with information about all the aspects and alternatives pertaining to a problem and therefore choose to tackle some meaningful subset of it.
- Thus, this process is not exhaustive and completely rational solutions are not entirely ideal.
- Decision-makers operating with bounded rationality restrict the inputs to the decision-making process, focus their attention on two or three most favorable alternatives, process these in great detail and base their decisions on judgment and personal biases as well as logic.

→ 2. The Practical Approach

- This approach combines the steps of the rational approach with the worthwhile features and conditions in the behavioural approach to make more realistic process for making decisions in institutions.
- This approach states that decision-maker should try to go beyond rules of thumb and satisfying limitations and generate as many alternatives as possible within the given time, money and other Practicalities of the situation.
- Here, the rational approach provides an analytical framework for making decisions while the behavioural approach provides a moderating influence.

→ 3. The Personal Approach

- The preceding three approaches explicitly explain the processes involved into decision-making.
- However, they do not throw light on how people take decisions when they are nervous, anxious, worried or agitated-whether in organizations or in personal matters.

Syllabus Topic : Evolution of Information Systems

1.10 Evolution of Information Systems

Q. 1.10.1 Write short note on evolution of Information Systems. (Ref. Sec. 1.10) (5 Marks)

- An information system is a combination of processes, hardware, trained personnel, software, infrastructure and standards that are designed to create, modify, store, manage and distribute information to suggest new business strategies and new products.
- It leads to efficient work practices and effective communication to make better decisions in an organization. There has been a significant evolution of Information System function over the past few decades.
- The evolution of Information System function can be summarized as follows :

1950 – 1960	1960 – 1970	1970 – 1980	1980 – 1990	1990 – 2000	2000 – Present
Electronic Data Processing, Transaction Processing System	Management Information Systems	Decision Support Systems	Executive Information Systems	Knowledge Management Systems	E-Business
Collects, stores, modifies and retrieves day-to-day transactions of an organization	Pre-specified reports and displays to support business decision-making	Interactive ad-hoc support for the decision-making process	Provide both internal and external information relevant to the strategic goals of the organization	Supports the creation, organization and dissemination of business knowledge	Greater connectivity, higher level of integration across applications
Help workers	Helps middle managers	Helps senior managers	Helps Executives	Help available enterprise wide	Helps global e-business

Syllabus Topic : Definition of Decision Support System

1.11 Definition of Decision Support System

Q. 1.11.1 Draw structure of DSS and explain. (Ref. Sec. 1.11)

(5 Marks)

- A **Decision Support System (DSS)** is a computer-based application which collects, organizes and analyzes business data to facilitate quality business decision-making for management, operations and planning.

- A well-designed DSS aids decision makers in compiling a variety of data from many sources: raw data, documents, personal knowledge from employees, management, executives and business models. DSS analysis helps companies to identify and solve problems, and make decisions.

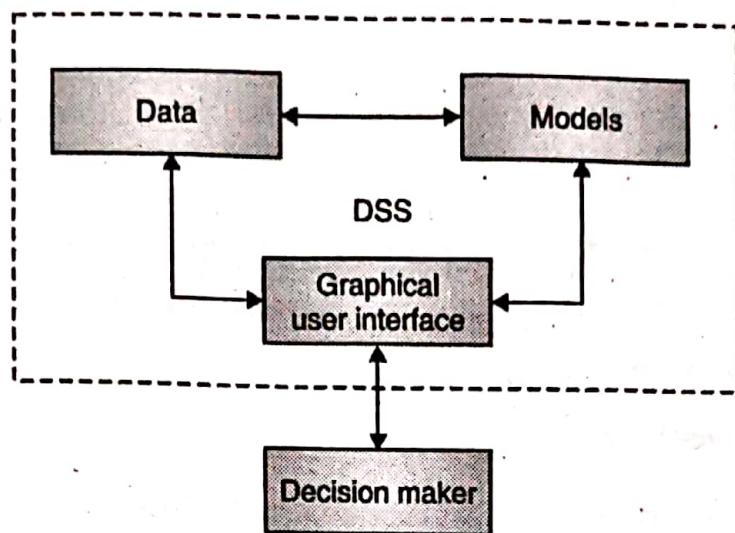


Fig. 1.11.1 : Structure of a decision support system

- The Decision Support System consists of following four components:
 1. The database and the management of the database.
 2. The model base and the management of the model base.
 3. The hardware.
 4. The user system interface.

1.11.1 Different Components of the Decision Support System

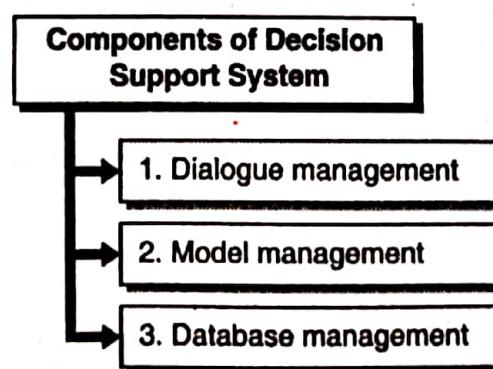


Fig. 1.11.2 : Components of decision support system

- **1. Dialogue management**
- Consists of the three sub systems; known as the user interface, the dialogue control, the request translator.

- The user interface sub system controls the physical user interface.
- It also manages the appearance of the screen and also accepts the input from the user and then displays the results.
- The user interface sub system is also responsible for checking the user commands for the correct syntax.
- The dialogue control sub system is responsible for the maintenance of the processing context with the user.
- The request translator helps in the translation of the user command into the actions for the model management or the data management components into such a pattern that can be easily understood by the user.

→ **2. Model management**

The command processor delivers those commands from the dialogue management components to either the model base management system or the mode execution system after receiving the commands from the dialogue management components.

→ **3. Database management**

- Helps in the storage of the database.
- Also helps in the manipulation of the database.
- Works under the guidance of either the model management component or the dialogue management component.
- Helps in the maintenance of the interface with the data sources that are generally external to the Decision Support System.

**Syllabus Topic : Development of a Decision Support System,
Development of a Model**

1.12 Development of a Decision Support System

Q. 1.12.1 What are the phases of DSS ? (Ref. Sec. 1.12)

(5 Marks)

Q. 1.12.2 Explain development of model. (Ref. Sec. 1.12)

(5 Marks)

- DSSs are usually not available as standard programs like software applications, such as information systems and office automation tools,

- Multidimensional analysis environments have facilitated and standardized the access to passive business intelligence functions. However, in order to develop most DSSs a specific project is still required.
- Fig. 1.12.1 shows the major steps involved in the development of a DSS.

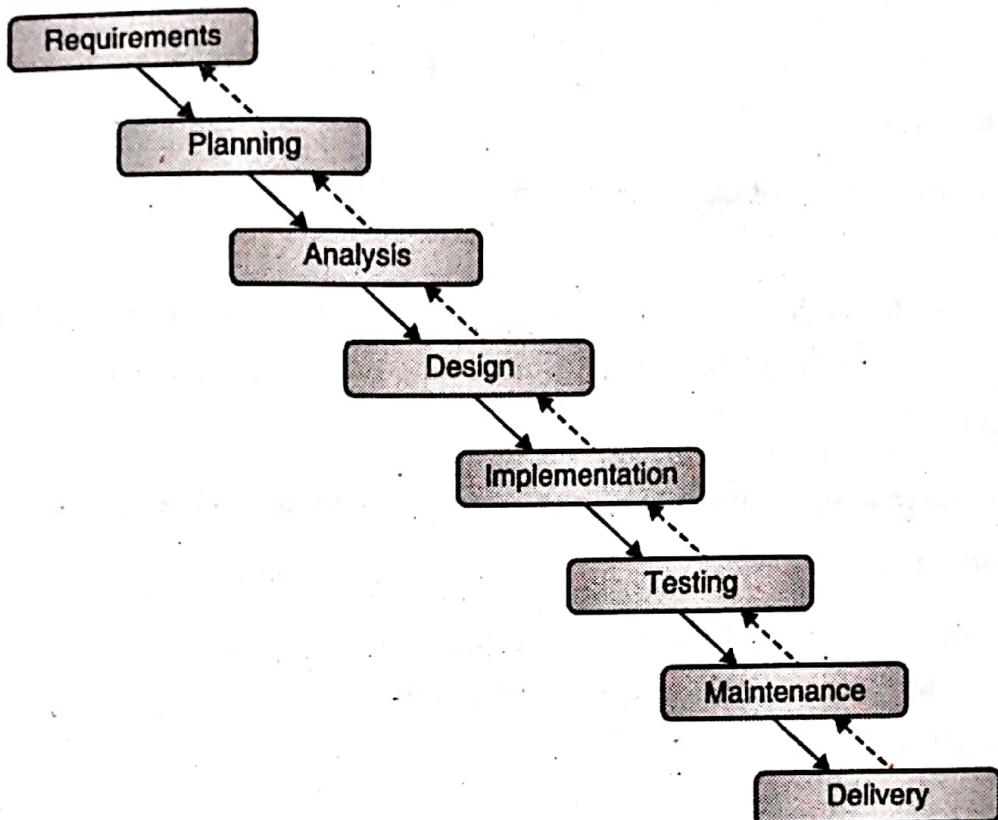


Fig. 1.12.1 : Phases in the development of a decision support system

→ 1. Requirement

In this phases gather information and make report of the entire requirement

→ 2. Planning

- The main purpose of the planning phase is to know the requirement and understand opportunities. In this we need to find out cost, time, and benefits of the system. What is the scope of the system?
- What will be the problem and solution for it? Without the perfect plan, calculating the strengths and weaknesses of the project, development of software is meaningless. Planning kicks off a project flawlessly and affects its progress positively.

→ 3. Analysis

- This step is about analyzing the performance of the software at various stages and making notes on additional requirements.

- Analysis is very important to proceed further to the next step.

→ **4. Design**

- Once the analysis is complete, the step of designing takes over, which is basically building the architecture of the project.

- This step helps remove possible flaws by setting a standard and attempting to stick to it.

→ **5. Implementation**

- The actual task of developing the software starts here with data recording going on in the background.

- Once the software is developed, the stage of implementation comes in where the product goes through a pilot study to see if it's functioning properly.

→ **6. Testing**

The testing stage assesses the software for errors and documents bugs if there are any.

→ **7. Maintenance**

Once the software passes through all the stages without any issues, it is to undergo a maintenance process wherein it will be maintained and upgraded from time to time to adapt to changes.

→ **8. Delivery**

- Successful project delivery requires the implementation of management systems that will control changes in the key factors of scope, schedule, budget, resources, and risk to optimize quality and, therefore, the investment.

- This section offers guidance for the entire team to successfully and effectively optimize the quality of a high-performance building project.

1.13 Exam Pack (Review Questions)

☛ **Syllabus Topic : Business Intelligence**

Q. 1 What do you mean by business intelligence ? Write its advantages.
(Refer Section 1.1) (5 Marks)

☛ **Syllabus Topic : Effective and Timely Decisions**

Q. 2 Write short note on Effective and Timely decisions. (Refer Section 1.2) (5 Marks)

☛ **Syllabus Topic : Data, Information and Knowledge**

Q. 3 What do mean by data, knowledge and information ? (Refer Section 1.3) (5 Marks)

**☛ Syllabus Topic : The Role of Mathematical Models**

Q. 4 Write short note on the role of mathematical models. (Refer Section 1.4) **(5 Marks)**

☛ Syllabus Topic : Business Intelligence Architectures

Q. 5 Draw and explain architecture of Business Intelligence. (Refer Section 1.5) **(5 Marks)**

Q. 6 Draw and explain Cycle of Business Intelligence Analysis.
(Refer Section 1.5.1) **(5 Marks)**

Q. 7 Draw and explain phases of Business Intelligence. (Refer Section 1.5.2) **(5 Marks)**

☛ Syllabus Topic : Ethics and Business Intelligence

Q. 8 What are the ethics of Business Intelligence ? (Refer Section 1.6) **(5 Marks)**

☛ Syllabus Topic : Decision Support Systems

Q. 9 Write short note on Decision Support System. (Refer Section 1.7) **(5 Marks)**

☛ Syllabus Topic : Definition of System

Q. 10 Explain system with neat diagram. (Refer Section 1.8) **(5 Marks)**

☛ Syllabus Topic : Representation of the Decision-Making Process

Q. 11 Explain process of problem solving. (Refer Section 1.9.1) **(5 Marks)**

Q. 12 Explain phases of decision making process. (Refer Section 1.9.2) **(5 Marks)**

Q. 13 What are the types of decision? (Refer Section 1.9.3) **(5 Marks)**

Q. 14 What are the approaches of decision making process ?
(Refer Section 1.9.4) **(5 Marks)**

☛ Syllabus Topic : Evolution of Information Systems

Q. 15 Write short not on evolution of Information Systems. (Refer Section 1.10) **(5 Marks)**

☛ Syllabus Topic : Definition of Decision Support System

Q. 16 Draw structure of DSS and explain. (Refer Section 1.11) **(5 Marks)**

☛ Syllabus Topic : Development of a Decision Support System

Q. 17 What are the phases of DSS ? (Refer Section 1.12) **(5 Marks)**

Q. 18 Explain development of model. (Refer Section 1.12) **(5 Marks)**

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Chapter Ends...