

USE OF INFORMATION SYSTEM IN MANAGEMENT

Management is the process of planning, organizing, leading and controlling the effort of organization members and of using all other organization resources to achieve organizational goals.

Functions of management

1. **Planning:** Planning involves setting organizational goals, developing strategies, and outlining the actions needed to achieve those goals. It includes assessing the current situation, anticipating future developments, and making decisions about the allocation of resources to accomplish objectives effectively. Planning provides a roadmap for the organization, helping managers anticipate challenges, identify opportunities, and make informed decisions.
2. **Organizing:** Organizing involves designing the structure of the organization and allocating resources to carry out planned activities. It includes establishing roles, responsibilities, and relationships among individuals and departments to ensure coordination and collaboration. Organizing also involves establishing systems, procedures, and processes to facilitate the flow of information and resources within the organization.
3. **Staffing:** Staffing involves acquiring, developing, and retaining a capable workforce to accomplish organizational goals. It includes activities such as recruitment, selection, training, development, and performance management to ensure that the organization has the right people with the right skills in the right positions. Staffing is essential for building a competent and motivated workforce that can contribute effectively to organizational success.
4. **Directing:** Directing involves guiding and motivating employees to achieve organizational objectives. It includes providing leadership, communicating goals and expectations, and empowering employees to perform their roles effectively. Directing also involves providing feedback, coaching, and support to help employees improve their performance and contribute to the overall success of the organization.
5. **Controlling:** Controlling involves monitoring, measuring, and evaluating organizational performance to ensure that plans are being implemented effectively and objectives are being achieved. It includes setting performance standards, comparing actual performance against standards, and taking corrective action when necessary to address deviations or discrepancies. Controlling helps managers identify problems, make adjustments, and ensure that the organization stays on track toward its goals.

How information systems support management as a function

o Information access

Management information systems simplify and speed up information retrieval by storing data in a central location that is accessed via network. This enables quick and accurate decision making.

o Data collection

Information systems bring together data from inside and outside the organization by setting up a network that links a central database to retail outlets, distributors and members of the supply chain

companies can collect and send production data daily and decisions based on the latest information.

o Collaboration

Information systems make it easy managers to make collaborative decisions.

o Interpretation

Information systems help decision makers to understand the implication of their decisions. E.g. a sales manager can make predictions about the effect of a price change on sales by running simulations within the system.

o Presentation

The reporting tools within information system enable decision makers to tailor reports to the information needs of other parties.

Functions of an information system

1. **Data Collection:** Information systems collect data from various sources, including internal databases, external sources, sensors, and manual inputs. They capture raw data related to business transactions, operations, and activities, ensuring that relevant information is available for processing and analysis.
2. **Data Storage:** Information systems store and organize data in databases, data warehouses, and other storage systems. They ensure data integrity, security, and accessibility, allowing users to retrieve and access information as needed for decision-making and operational activities.
3. **Data Processing:** Information systems process and transform raw data into meaningful information through activities such as data validation, cleaning, integration, and analysis. They apply algorithms, statistical techniques, and data manipulation procedures to convert data into actionable insights for users.
4. **Information Retrieval:** Information systems retrieve relevant information and reports from the stored data to support decision-making and operational activities. They provide users with access to predefined reports, ad-hoc queries, dashboards, and other tools for retrieving and analyzing information based on their needs.
5. **Information Dissemination:** Information systems disseminate information to various stakeholders within the organization, including managers, employees, and external partners. They distribute reports, dashboards, alerts, and notifications via email, web portals, mobile apps, and other communication channels to keep stakeholders informed about relevant developments and insights.
6. **Decision Support:** Information systems provide decision support to users by presenting relevant information, analysis, and insights for decision-making. They offer tools and techniques for data visualization, trend analysis, forecasting, and performance monitoring to help users make informed decisions and take appropriate actions.
7. **Collaboration and Communication:** Information systems facilitate collaboration and communication among users and stakeholders involved in business processes and activities. They provide platforms for sharing information, exchanging ideas, and collaborating on projects, improving coordination and teamwork across different organizational levels and functions.
8. **Automation of Processes:** Information systems automate routine tasks and processes to improve efficiency and productivity within organizations. They streamline workflows, eliminate manual interventions, and reduce errors and delays in executing tasks, allowing organizations to operate more efficiently and effectively.
9. **Security and Compliance:** Information systems ensure data security and compliance with regulatory requirements, internal policies, and industry standards. They implement security

measures such as access controls, encryption, and audit trails to protect sensitive information and mitigate risks of unauthorized access, data breaches, and compliance violations.

10. **Strategic Planning and Analysis:** Information systems support strategic planning processes by providing insights into market trends, competitive intelligence, and organizational capabilities. They facilitate strategic analysis, scenario planning, and long-term forecasting, helping organizations formulate strategies and make informed decisions about future initiatives and investments.

Uses of Information Systems

1. Transaction Processing Systems (TPS):

- Function: TPS capture, process, and record transactions that occur within an organization. They handle routine and repetitive tasks such as order processing, inventory management, payroll processing, and billing.
- Example: Point-of-sale systems in retail stores, online reservation systems, and automated teller machines (ATMs).

2. Management Information Systems (MIS):

- Function: MIS generate regular reports and summaries of operational data collected from various sources within the organization. They provide managers with information to support decision-making, performance monitoring, and control.
- Example: Sales reports, inventory status reports, financial statements, and operational performance dashboards.

3. Decision Support Systems (DSS):

- Function: DSS provide decision-makers with tools and capabilities to analyze data, evaluate alternatives, and make informed decisions. They support unstructured and semi-structured decision-making processes by offering what-if analysis, scenario planning, and predictive modeling.
- Example: Executive dashboards, business intelligence tools, and financial modeling software.

4. Executive Support Systems (ESS):

- Function: ESS provide top-level executives with access to strategic information from both internal and external sources. They support strategic decision-making by offering insights into long-term trends, competitive analysis, and strategic opportunities.
- Example: Strategic planning software, market intelligence systems, and competitive analysis tools.

5. Enterprise Resource Planning (ERP) Systems:

- Function: ERP systems integrate and automate core business processes across various functions and departments within an organization. They manage resources, streamline workflows, and improve coordination and communication.
- Example: SAP, Oracle, and Microsoft Dynamics ERP systems.

6. Customer Relationship Management (CRM) Systems:

- Function: CRM systems manage interactions and relationships with customers throughout the customer lifecycle. They store customer information, track sales activities, and support marketing, sales, and service processes.
- Example: Salesforce, HubSpot, and Microsoft Dynamics CRM.

7. Supply Chain Management (SCM) Systems:

- Function: SCM systems optimize the flow of goods, services, and information across the supply chain, from raw material suppliers to end customers. They improve supply chain visibility, coordination, and efficiency.

- Example: SAP SCM, Oracle SCM, and IBM Supply Chain Insights.

8. Knowledge Management Systems (KMS):

- **Function:** KMS capture, store, and share organizational knowledge and expertise to support learning and decision-making processes. They facilitate knowledge creation, sharing, and collaboration among employees.
- **Example:** Intranet portals, wikis, and document management systems.

Batch transaction and Real-time transaction

1. Batch Processing:

- **Definition:** Batch processing involves collecting and processing transactions in groups or batches at scheduled intervals.
- **Processing Method:** Transactions are accumulated over a period of time and then processed together as a batch. This typically occurs during off-peak hours when system usage is low.
- **Characteristics:**
 - Transactions are queued and processed sequentially.
 - Processing occurs in a batch mode, without immediate response or interaction with users.
 - Suitable for large volumes of transactions that do not require immediate processing.
 - Examples include overnight processing of payroll, batch updates of inventory records, and generation of monthly financial reports.
- **Advantages:**
 - Efficient for processing large volumes of transactions.
 - Reduces system overhead and resource utilization during peak hours.
 - Provides consistency and control over data processing.
- **Disadvantages:**
 - Transactions may not be processed in real-time, leading to delays in data availability.
 - Limited responsiveness to real-time events or changes in data.
 - Increased processing time for time-sensitive transactions.

2. Real-Time Processing:

- **Definition:** Real-time processing involves processing transactions immediately as they occur, providing instant response and feedback.
- **Processing Method:** Transactions are processed as soon as they are received by the system, without delay.
- **Characteristics:**
 - Transactions are processed in real-time, with immediate updates to system data.
 - Provides instant response and feedback to users.
 - Suitable for time-sensitive transactions that require immediate processing.
 - Examples include online banking transactions, point-of-sale transactions, and real-time monitoring of sensor data.
- **Advantages:**
 - Provides instant response and feedback to users, enhancing user experience.
 - Supports time-sensitive applications and services.

- Enables real-time monitoring and control of processes.
- **Disadvantages:**
 - Requires higher system resources and processing power to handle real-time processing.
 - May be less efficient for processing large volumes of transactions compared to batch processing.
 - Increased complexity in system design and implementation.

Types of Decision

1. Structured Decisions:

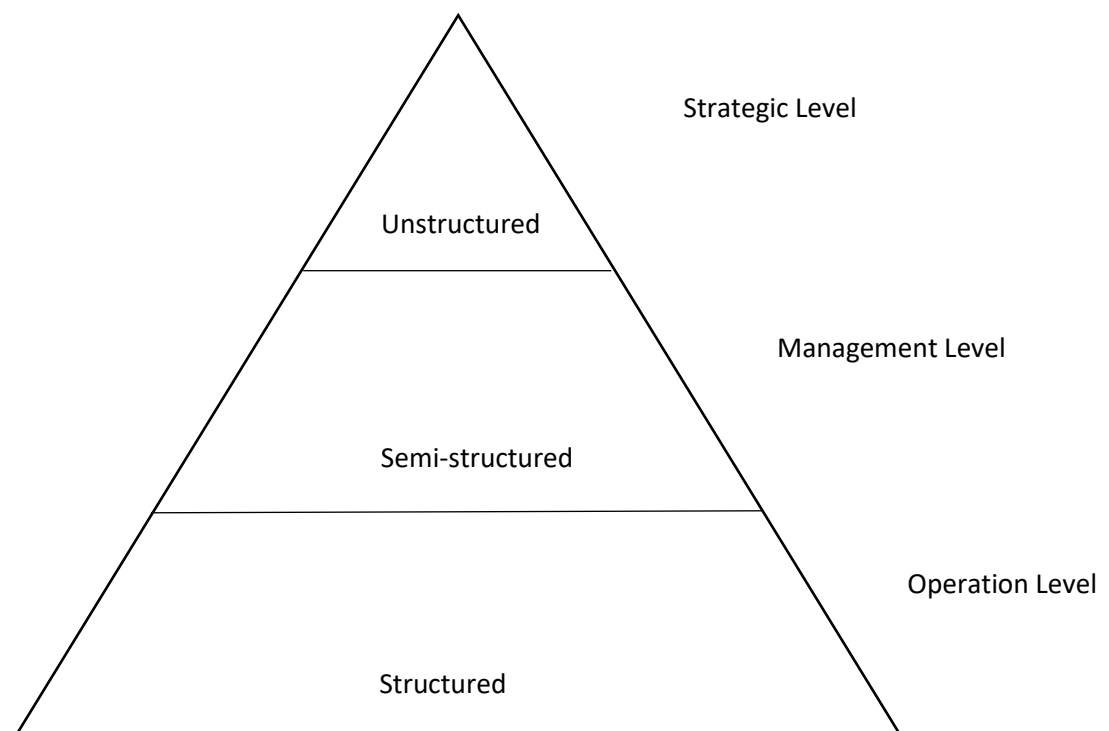
- Structured decisions are routine and repetitive decisions that are well-defined and follow a set of established procedures or rules.
- They typically have a clear and predefined decision-making process, with little uncertainty or ambiguity.
- Examples include processing routine transactions, approving employee leave requests, and placing orders for inventory replenishment.

2. Unstructured Decisions:

- Unstructured decisions are complex and non-routine decisions that do not have a predefined decision-making process.
- They often involve high levels of uncertainty, ambiguity, and subjective judgment.
- Examples include strategic planning, launching a new product, and entering new markets.

3. Semi-Structured Decisions:

- Semi-structured decisions lie between structured and unstructured decisions in terms of complexity and level of certainty.
- They have some degree of structure but also require some level of judgment and analysis to reach a decision.
- Examples include hiring decisions, selecting a vendor, and evaluating investment opportunities.



Circumstances for each type of decision:

1. Structured Decisions:	<ul style="list-style-type: none">• Routine and Repetitive Tasks: Structured decisions are suitable for routine and repetitive tasks that follow established procedures or guidelines. These decisions have clear and predefined steps, inputs, and outputs.• Well-Defined Problems: Structured decisions are made when the problem is well-defined, and the information needed to make the decision is readily available and easily quantifiable.• Operational and Tactical Levels: Structured decisions are common at the operational and tactical levels of an organization, where standardized procedures and protocols govern day-to-day activities.
2. Semi-Structured Decisions:	<ul style="list-style-type: none">• Moderately Complex Problems: Semi-structured decisions are appropriate for moderately complex problems that do not have predetermined solutions but still have some degree of structure or guidelines.• Multiple Alternatives: Semi-structured decisions involve evaluating multiple alternatives or courses of action, where the outcomes are not entirely predictable, and there may be trade-offs between different options.• Tactical and Managerial Levels: Semi-structured decisions are often made at the tactical and managerial levels of an organization, where decision-makers have more discretion and autonomy but still operate within established frameworks and constraints.
3. Unstructured Decisions:	<ul style="list-style-type: none">• Novel and Unpredictable Situations: Unstructured decisions are made in novel and unpredictable situations where the problem is not well-defined, and there are no clear guidelines or procedures to follow.• Ambiguous Information: Unstructured decisions involve dealing with ambiguous or incomplete information, where the available data may be uncertain, subjective, or open to interpretation.• Strategic and Executive Levels: Unstructured decisions are typically made at the strategic and executive levels of an organization, where decision-makers have broad authority and responsibility for setting long-term goals, formulating strategies, and addressing complex and uncertain challenges.

Decision Making Cycle

1. Identify the Decision:	The first step is to clearly define the decision that needs to be made. This involves identifying the problem, opportunity, or issue that requires a resolution.
2. Gather Information:	Once the decision is identified, relevant information needs to be gathered. This may involve collecting data, conducting research, seeking input from stakeholders, and analyzing available information.
3. Identify Alternatives:	Based on the information gathered, generate a list of possible alternatives or courses of action that could address the problem or capitalize on the opportunity.

4. **Evaluate Alternatives:** Assess the potential outcomes and consequences of each alternative. Consider factors such as feasibility, risks, costs, benefits, and alignment with organizational goals and values.
5. **Make the Decision:** After evaluating the alternatives, choose the best course of action. This may involve selecting one alternative or a combination of alternatives, depending on the complexity of the decision.
6. **Implement the Decision:** Once the decision is made, put it into action. Allocate resources, assign responsibilities, and develop a plan for implementation.
7. **Monitor and Evaluate:** Continuously monitor the implementation of the decision and evaluate its effectiveness. This involves tracking progress, gathering feedback, and measuring outcomes against established criteria.
8. **Adjust and Learn:** Based on the monitoring and evaluation, make adjustments as needed. Learn from both successes and failures to improve future decision-making processes.

Factors that affect decision making while using information systems

1. **Quality of Information:** The accuracy, relevance, completeness, and timeliness of the information available in the information systems significantly influence decision-making. Poor-quality data can lead to incorrect decisions or undermine confidence in the decision-making process.
2. **System Reliability and Availability:** The reliability and availability of the information systems play a crucial role in decision-making. System downtime, technical glitches, or data loss can disrupt the decision-making process and delay or impair decision outcomes.
3. **System Integration and Compatibility:** The degree to which information systems are integrated with other systems and compatible with existing technologies can impact decision-making. Seamless integration enables access to comprehensive data and facilitates collaboration across departments, enhancing decision-making capabilities.
4. **User Interface Design:** The design and usability of the information systems interface influence how effectively users can interact with the system to access, analyze, and interpret data. Intuitive and user-friendly interfaces can improve decision-making efficiency and effectiveness.
5. **Data Security and Privacy:** Concerns about data security and privacy can affect decision-making when using information systems. Users may hesitate to share sensitive information or rely on data if they perceive risks related to security breaches or unauthorized access.
6. **Organizational Culture and Structure:** The organizational culture, norms, values, and structure can influence decision-making processes and practices related to information systems. Resistance to change, hierarchy, communication channels, and decision-making authority allocation may impact how information systems are utilized and decisions are made.
7. **Decision Support Systems (DSS):** The availability and effectiveness of decision support systems, including tools such as data analytics, business intelligence, and predictive modeling, can enhance decision-making by providing insights, recommendations, and scenario analysis capabilities.
8. **User Skills and Training:** The knowledge, skills, and training of users interacting with information systems influence decision-making effectiveness. Adequate training and ongoing skill development programs can empower users to leverage information systems optimally for decision-making purposes.
9. **Regulatory and Legal Compliance:** Regulatory requirements, industry standards, and legal constraints can shape decision-making practices when using information systems.

Compliance with regulations related to data protection, industry standards, and ethical considerations may impact decision-making criteria and processes.

10. **External Environment:** Economic conditions, market trends, competitive dynamics, technological advancements, and other external factors can influence decision-making contexts and priorities. Information systems should be capable of capturing, analyzing, and interpreting relevant external data to support informed decision-making in dynamic environments.

Effective decision-making is characterized by the following attribute

1. **Clarity of Objectives:** Effective decision-making begins with clearly defined objectives or goals that guide the decision-making process. Decision-makers should have a clear understanding of what they aim to achieve and how their decisions align with organizational priorities and strategic objectives.
2. **Data-Driven:** Effective decision-making relies on accurate, relevant, and timely information. Decision-makers gather and analyze data from various sources to assess the situation, identify alternatives, and evaluate potential outcomes. Data-driven decision-making minimizes uncertainty and enables informed choices based on evidence rather than intuition or guesswork.
3. **Systematic Approach:** Effective decision-making follows a systematic and structured approach, involving a series of logical steps such as problem identification, analysis, evaluation of alternatives, and implementation. A systematic approach helps ensure thorough consideration of relevant factors and minimizes the risk of overlooking critical information or biases.
4. **Consideration of Alternatives:** Effective decision-making involves generating and evaluating multiple alternatives or courses of action. Decision-makers explore different options, weigh their advantages and disadvantages, and consider potential risks and trade-offs before making a choice. Considering alternatives allows decision-makers to identify the best possible solution to the problem at hand.
5. **Risk Management:** Effective decision-making involves assessing and managing risks associated with different alternatives. Decision-makers identify potential risks, uncertainties, and potential consequences of their decisions and develop strategies to mitigate or minimize these risks. Risk-aware decision-making helps organizations anticipate and prepare for potential challenges and uncertainties.
6. **Collaboration and Consultation:** Effective decision-making often involves collaboration and consultation with relevant stakeholders, including subject matter experts, team members, and key stakeholders. Involving diverse perspectives and expertise fosters creativity, enhances problem-solving, and increases buy-in and support for decision outcomes.
7. **Flexibility and Adaptability:** Effective decision-making is flexible and adaptable to changing circumstances and evolving information. Decision-makers remain open to new information, feedback, and insights, and are willing to adjust their decisions as needed in response to changing conditions or unexpected developments.
8. **Accountability and Responsibility:** Effective decision-making involves clear accountability and responsibility for decision outcomes. Decision-makers take ownership of their decisions and accept accountability for the consequences, whether positive or negative. Establishing clear accountability promotes transparency, fosters trust, and encourages responsible decision-making.
9. **Ethical Considerations:** Effective decision-making takes into account ethical considerations and values, ensuring that decisions are aligned with organizational ethics, integrity, and social

responsibility. Decision-makers consider the potential ethical implications of their choices and strive to make decisions that uphold ethical standards and principles.

10. **Continuous Improvement**: Effective decision-making is an ongoing process of learning and improvement. Decision-makers reflect on past decisions, evaluate outcomes, and identify lessons learned to inform future decision-making. Embracing a culture of continuous improvement enables organizations to adapt and evolve in response to changing environments and challenges.
11. **Timeliness** – making decision in timely manner

Challenges faced by managers while making decision

1. **Incomplete or Inaccurate Information**: Managers often make decisions based on imperfect or incomplete information. Lack of access to relevant data, inaccurate data, or uncertainty about future events can hinder decision-making.
2. **Time Constraints**: Managers frequently operate under tight deadlines, which can lead to rushed decisions or limited consideration of alternatives. Time pressure can compromise the quality of decision-making and increase the likelihood of errors.
3. **Complexity of Decisions**: Many decisions faced by managers are complex and multifaceted, involving numerous variables, stakeholders, and potential outcomes. Managing complexity requires careful analysis, consideration of interdependencies, and balancing competing priorities.
4. **Risk and Uncertainty**: Decision-making inherently involves risk and uncertainty. Managers must assess and mitigate risks associated with different options while navigating uncertain environments characterized by factors such as market volatility, technological disruptions, and regulatory changes.
5. **Cognitive Biases**: Human decision-makers are susceptible to cognitive biases, such as confirmation bias, anchoring bias, and overconfidence, which can distort judgment and lead to suboptimal decisions. Recognizing and mitigating these biases is crucial for effective decision-making.
6. **Resistance to Change**: Implementing decisions often requires overcoming resistance from stakeholders who may be impacted by the change. Resistance can arise due to fear of the unknown, perceived loss of control, or conflicting interests, posing challenges for decision implementation.
7. **Resource Constraints**: Managers must make decisions within the constraints of limited resources, including financial, human, and technological resources. Allocating resources effectively to achieve desired outcomes while optimizing efficiency and productivity is a key challenge.
8. **Decision-Making Paralysis**: Faced with a multitude of options or conflicting information, managers may experience decision-making paralysis, leading to indecision or delayed action. Overcoming decision-making paralysis requires clarity of goals, prioritization, and a structured approach to decision-making.
9. **Group Dynamics and Consensus Building**: In collaborative decision-making settings, managers must navigate group dynamics, conflicting viewpoints, and the challenge of reaching consensus. Balancing diverse perspectives, managing conflicts, and fostering constructive dialogue are essential for effective group decision-making.

10. **Ethical Considerations:** Managers must consider ethical implications when making decisions, balancing organizational objectives with moral principles and social responsibility. Ethical dilemmas, conflicts of interest, and pressures to compromise ethical standards can complicate decision-making processes.

Challenges stakeholders faces while making decision

1. **Conflicting Interests:** Stakeholders may have divergent interests, priorities, and objectives, leading to conflicts during decision-making. Balancing competing interests and finding common ground among stakeholders can be challenging, particularly when there are conflicting agendas or power dynamics at play.
2. **Limited Information:** Stakeholders may lack access to relevant, accurate, or timely information needed to make informed decisions. Incomplete or insufficient information can lead to uncertainty, hesitation, and suboptimal decision outcomes.
3. **Uncertainty and Risk:** Decision-making often involves uncertainty and risk, with unpredictable outcomes and potential consequences. Stakeholders may face challenges in assessing and managing risks effectively, particularly in complex and dynamic environments where outcomes are uncertain.
4. **Resource Constraints:** Stakeholders may encounter limitations in terms of financial resources, human capital, time, and other resources available for decision-making. Resource constraints can restrict the range of options available and influence decision outcomes.
5. **Complexity and Ambiguity:** Decision-making processes may be complex and ambiguous, involving multiple factors, variables, and stakeholders with conflicting perspectives. Stakeholders may struggle to navigate complexity and ambiguity, leading to confusion and indecision.
6. **Resistance to Change:** Stakeholders may resist change due to fear of the unknown, loss of control, or perceived risks associated with change. Resistance to change can impede decision-making processes and hinder the implementation of decisions, particularly when stakeholders are not adequately engaged or involved in the decision-making process.
7. **Cognitive Biases:** Stakeholders may be influenced by cognitive biases, such as confirmation bias, anchoring bias, and overconfidence, which can distort judgment and decision-making. Recognizing and mitigating cognitive biases is essential for promoting rational and objective decision-making.
8. **Communication Barriers:** Effective communication is essential for successful decision-making, but stakeholders may encounter barriers such as language differences, cultural differences, and poor communication channels. Miscommunication can lead to misunderstandings, conflicts, and breakdowns in the decision-making process.
9. **Power Dynamics:** Power dynamics within organizations and stakeholder groups can influence decision-making processes, with certain stakeholders exerting more influence or control than others. Unequal power dynamics can lead to imbalances in decision-making and undermine the legitimacy and fairness of decisions.
10. **Ethical Dilemmas:** Stakeholders may face ethical dilemmas and moral considerations that complicate decision-making. Ethical dilemmas arise when there are conflicting ethical principles or values at stake, requiring stakeholders to make difficult trade-offs between competing interests.

Ways in which IS help in decision making

1. **Data Collection and Aggregation:** IS collect and aggregate data from various sources, including internal databases, external sources, and IoT devices. By gathering data on key metrics, trends, and performance indicators, IS provide decision-makers with a comprehensive view of the organization's operations and environment.
2. **Data Analysis and Reporting:** IS analyze data using advanced analytics techniques such as data mining, predictive modeling, and statistical analysis. Decision support tools and reporting features enable decision-makers to extract actionable insights, identify patterns, and visualize data in meaningful ways, facilitating informed decision-making.
3. **Real-Time Information Access:** IS provide decision-makers with real-time access to critical information, allowing them to monitor operations, track progress, and respond quickly to changing conditions. Dashboards, alerts, and notifications enable decision-makers to stay informed and make timely decisions based on the latest information available.
4. **Scenario Planning and What-If Analysis:** IS enable decision-makers to simulate different scenarios and conduct what-if analysis to evaluate the potential impact of alternative courses of action. By modeling various scenarios and assessing their outcomes, decision-makers can make more informed decisions and anticipate potential risks and opportunities.
5. **Forecasting and Prediction:** IS leverage historical data and predictive analytics to forecast future trends, demand patterns, and market dynamics. Decision-makers use forecasting models and predictive algorithms to anticipate future events, make projections, and develop strategies to capitalize on emerging opportunities or mitigate potential risks.
6. **Risk Management and Mitigation:** IS support decision-making by identifying, assessing, and managing risks associated with different options. Risk management tools and techniques help decision-makers evaluate the likelihood and severity of risks, prioritize risk mitigation strategies, and monitor risk exposure over time.
7. **Decision Automation and Workflow Integration:** IS automate routine decision-making tasks and integrate decision processes into organizational workflows. Decision support systems, workflow automation tools, and intelligent agents streamline decision-making processes, reduce manual effort, and ensure consistency and compliance with organizational policies and procedures.
8. **Collaboration and Knowledge Sharing:** IS facilitate collaboration and knowledge sharing among decision-makers, enabling them to share information, insights, and expertise across departments and teams. Collaboration platforms, document management systems, and social networking tools foster communication, collaboration, and collective decision-making, leveraging the collective intelligence of the organization.
9. **Performance Monitoring and Evaluation:** IS track and monitor key performance indicators (KPIs) to assess the effectiveness of decisions and measure their impact on organizational performance. Performance dashboards, scorecards, and analytics tools enable decision-makers to evaluate outcomes, identify areas for improvement, and adjust strategies accordingly.
10. **Compliance and Governance:** IS help ensure compliance with regulatory requirements, industry standards, and organizational policies. Compliance management systems, audit trails, and governance frameworks provide decision-makers with visibility and control over decision processes, ensuring transparency, accountability, and adherence to established standards and regulations.

Criteria used to measure system performance

1. **Throughput**: Throughput refers to the rate at which a system can process tasks or transactions within a given time period. It measures the system's processing capacity and is often expressed in terms of transactions per second (TPS) or operations per second (OPS).
2. **Response Time**: Response time is the time it takes for the system to respond to a user request or input. It measures the speed and efficiency of the system's interactions with users and can affect user satisfaction and productivity.
3. **Availability**: Availability measures the percentage of time that the system is operational and accessible to users. It reflects the system's reliability and uptime and is typically expressed as a percentage of total time.
4. **Reliability**: Reliability refers to the system's ability to perform consistently and predictably over time, without unexpected failures or errors. It measures the system's stability and dependability in delivering desired outcomes.
5. **Scalability**: Scalability assesses the system's ability to accommodate increasing workloads or user demands without significant degradation in performance. It measures the system's flexibility and capacity to adapt to changing needs.
6. **Resource Utilization**: Resource utilization evaluates how efficiently the system utilizes its hardware, software, network, and other resources. It measures factors such as CPU usage, memory consumption, disk I/O, and network bandwidth utilization.
7. **Error Rate**: Error rate quantifies the frequency of errors, faults, or failures encountered by the system during operation. It measures the system's reliability and quality of output, with lower error rates indicating higher performance.
8. **Security Metrics**: Security metrics evaluate the effectiveness of the system's security measures in protecting data, resources, and infrastructure from unauthorized access, breaches, or cyber threats. They include measures such as the number of security incidents, vulnerability assessments, and compliance with security standards.

Decision made on different levels of management

1. Strategic Level:

- Long-term investment decisions: Decisions related to major investments in technology, infrastructure, or strategic initiatives that align with the organization's long-term goals.
- Market expansion strategies: Decisions regarding entering new markets, expanding product lines, or forming strategic partnerships to achieve growth objectives.
- Organizational restructuring: Decisions concerning changes in organizational structure, mergers, acquisitions, or divestitures to enhance competitiveness or achieve synergies.

2. Tactical Level:

- Budget allocation: Decisions regarding the allocation of resources, such as budgetary funds, personnel, and equipment, to support departmental or project-specific objectives.
- Inventory management: Decisions related to inventory levels, ordering quantities, and replenishment strategies to optimize inventory turnover and minimize holding costs.

- Marketing campaign planning: Decisions concerning the design, timing, and targeting of marketing campaigns to promote products or services and attract customers.

3. **Operational Level:**

- Production scheduling: Decisions regarding the scheduling of production activities, machine utilization, and workforce allocation to meet production targets and customer demand.
- Customer service management: Decisions related to handling customer inquiries, resolving issues, and managing service levels to ensure customer satisfaction and retention.
- Employee scheduling: Decisions concerning employee work schedules, shifts, and assignments to optimize staffing levels and meet operational requirements.

Criteria for information system acquisition

1. **Alignment with Business Goals and Objectives:** The IS should align with the organization's overall strategic goals and objectives. It should support the organization's mission, vision, and core business processes, helping to enhance competitiveness and achieve desired outcomes.
2. **Functionality and Features:** The IS should have the necessary functionality and features to support the specific requirements of the organization. This includes features such as data management, reporting and analytics, workflow automation, integration capabilities, and user interface design.
3. **Scalability and Flexibility:** The IS should be scalable and flexible to accommodate future growth and changing business needs. It should be able to adapt to evolving technology trends, organizational requirements, and industry standards without significant disruptions or additional costs.
4. **Interoperability and Integration:** The IS should be compatible with existing systems, applications, and infrastructure within the organization. It should support seamless data exchange and integration with other systems to facilitate information flow and workflow automation across departments and functions.
5. **Ease of Use and User Experience:** The IS should be intuitive and user-friendly, with a well-designed interface that enhances usability and productivity. It should minimize the need for extensive training and support, allowing users to quickly learn and adopt the system.
6. **Reliability and Performance:** The IS should be reliable, stable, and performant, with minimal downtime and disruptions. It should be able to handle the expected workload and transaction volumes without compromising performance or response times.
7. **Security and Compliance:** The IS should have robust security features and compliance mechanisms to protect sensitive data, ensure confidentiality, integrity, and availability, and comply with relevant regulations, industry standards, and best practices.

Causes leading to IS maintenance

1. **Technological Obsolescence:** Rapid advancements in technology can render existing systems obsolete or outdated. As new hardware, software, and development methodologies emerge, organizations may need to upgrade or replace components of their IS to keep pace with technological trends and remain competitive.
2. **Changing Business Requirements:** Evolving business needs, market dynamics, regulatory requirements, and organizational goals may necessitate modifications to existing IS. Changes

in business processes, expansion into new markets, mergers, acquisitions, or diversification of products and services may require adjustments to IS functionality and configuration.

3. **Software Bugs and Errors:** Software bugs, glitches, and errors can disrupt system functionality, compromise data integrity, and impede user productivity. Routine maintenance activities such as debugging, patching, and software updates are necessary to address these issues and ensure the stability and reliability of the IS.
4. **Data Management Challenges:** Over time, data volumes may grow, data structures may become outdated, and data quality may deteriorate. Maintenance activities such as data cleansing, data migration, database optimization, and data archiving are essential for managing data effectively and ensuring its accuracy, consistency, and accessibility.
5. **Performance Degradation:** Performance issues such as slow response times, system crashes, and bottlenecks can arise due to factors such as increased user load, hardware limitations, inefficient software design, or network congestion. Performance tuning, optimization, and capacity planning are necessary to maintain system performance and scalability.
6. **Security Vulnerabilities:** Cyber threats, malware, hacking attempts, and security breaches pose significant risks to IS integrity, confidentiality, and availability. Regular security audits, vulnerability assessments, and updates to security measures are essential for mitigating security risks and safeguarding sensitive information.
7. **User Feedback and Requirements:** Feedback from system users, stakeholders, and customers may reveal usability issues, feature requests, or enhancements needed to improve the IS's functionality, usability, and user experience. Maintenance activities should address these feedback and requirements to enhance user satisfaction and adoption.
8. **Regulatory Compliance:** Changes in regulatory requirements, industry standards, and legal frameworks may necessitate updates to IS configurations, data management practices, and security controls. Compliance audits, risk assessments, and policy updates are essential for ensuring adherence to applicable regulations and standards.
9. **Hardware Failure and Degradation:** Hardware components such as servers, storage devices, networking equipment, and peripherals may experience wear and tear over time, leading to failures or performance degradation. Regular hardware maintenance, upgrades, and replacements are necessary to prevent downtime and ensure system reliability.
10. **Documentation and Knowledge Management:** Inadequate documentation, lack of knowledge transfer, and personnel turnover can hinder effective IS maintenance. Establishing comprehensive documentation, training programs, and knowledge sharing practices are essential for maintaining system integrity and continuity.

Impacts of Information System in organisation

1. **Increased Efficiency and Productivity:** IS automate routine tasks, streamline workflows, and enable faster processing of information, leading to improved efficiency and productivity. Automated processes reduce manual errors, minimize redundant work, and free up time for employees to focus on more value-added activities.

2. **Enhanced Decision-Making:** IS provide access to timely, accurate, and relevant information, enabling managers to make more informed decisions. Decision support tools, data analytics, and reporting capabilities help analyze trends, identify opportunities, and assess risks, leading to better decision outcomes.
3. **Improved Communication and Collaboration:** IS facilitate communication and collaboration among employees, teams, and stakeholders across different locations and time zones. Email, instant messaging, video conferencing, and collaborative platforms enable real-time communication, knowledge sharing, and teamwork, fostering innovation and creativity.
4. **Better Customer Service and Satisfaction:** IS enable organizations to deliver superior customer service by providing faster response times, personalized interactions, and seamless omnichannel experiences. Customer relationship management (CRM) systems, help desks, and self-service portals enhance customer engagement and satisfaction, leading to increased loyalty and retention.
5. **Strategic Planning and Execution:** IS support strategic planning by providing data-driven insights, scenario analysis, and predictive modeling capabilities. Enterprise resource planning (ERP) systems, business intelligence (BI) tools, and strategic planning software facilitate strategic alignment, resource allocation, and performance monitoring, enabling organizations to execute their strategies effectively.
6. **Competitive Advantage:** IS can confer a competitive advantage by enabling organizations to innovate, differentiate, and adapt to changing market conditions. Digital transformation initiatives, such as e-commerce platforms, mobile applications, and IoT-enabled solutions, help organizations create unique value propositions, enter new markets, and disrupt traditional business models.
7. **Cost Reduction and Efficiency Gains:** IS help organizations reduce costs through automation, optimization, and resource allocation. Cloud computing, virtualization, and outsourcing enable cost-effective IT infrastructure management, while digitalization and process optimization reduce operational expenses and overheads.
8. **Risk Management and Compliance:** IS facilitate risk identification, assessment, and mitigation by providing tools for monitoring, auditing, and regulatory compliance. Risk management systems, cybersecurity measures, and compliance frameworks help organizations identify and address potential threats, vulnerabilities, and regulatory requirements.
9. **Organizational Learning and Innovation:** IS promote organizational learning and innovation by capturing, sharing, and leveraging knowledge across the organization. Knowledge management systems, collaboration platforms, and innovation hubs facilitate idea generation, knowledge transfer, and continuous improvement, driving organizational agility and adaptability.

Information system ideal for transportation

1. **Transportation Management Systems (TMS):** TMS are software solutions designed to streamline and optimize transportation operations, including route planning, vehicle scheduling, freight management, and shipment tracking. TMS help transportation companies reduce costs, improve asset utilization, and enhance customer service by providing real-time visibility into transportation activities.
2. **Fleet Management Systems (FMS):** FMS are used to monitor and manage fleets of vehicles, including trucks, buses, taxis, and delivery vans. These systems track vehicle location, fuel consumption, maintenance schedules, and driver performance, allowing transportation

companies to optimize fleet operations, reduce fuel costs, and ensure compliance with regulations.

3. **Intelligent Transportation Systems (ITS):** ITS leverage advanced technologies such as sensors, cameras, and communication networks to improve traffic management, reduce congestion, and enhance road safety. ITS solutions include traffic signal control systems, electronic toll collection systems, traffic surveillance cameras, and dynamic message signs.
4. **Navigation and Route Planning Applications:** Navigation and route planning applications, such as GPS navigation systems and route optimization software, help drivers and logistics companies find the most efficient routes to their destinations. These applications consider factors such as traffic conditions, road closures, and vehicle restrictions to minimize travel time and fuel consumption.
5. **Passenger Information Systems (PIS):** PIS provide real-time information to passengers about public transportation services, including bus and train schedules, arrival times, and service disruptions. PIS are typically available through mobile apps, websites, and digital displays at transportation hubs, helping passengers plan their journeys and reduce wait times.
6. **Ticketing and Fare Collection Systems:** Ticketing and fare collection systems automate the process of selling tickets and collecting fares for public transportation services. These systems include electronic ticketing machines, contactless payment systems, and mobile ticketing apps, making it easier for passengers to pay for their rides and reducing the need for cash transactions.
7. **Supply Chain Management Systems (SCM):** SCM systems help transportation companies manage the flow of goods and materials across the supply chain, from suppliers to manufacturers to customers. These systems optimize inventory levels, coordinate logistics activities, and track shipments in real time, improving supply chain visibility and responsiveness.
8. **Telematics Solutions:** Telematics solutions combine telecommunications and informatics technologies to monitor and track vehicles' performance and location. These systems provide valuable data on vehicle usage, driver behavior, and maintenance needs, helping transportation companies optimize fleet operations, reduce fuel costs, and enhance safety.
9. **Safety and Compliance Management Systems:** Safety and compliance management systems help transportation companies comply with regulatory requirements and safety standards. These systems track driver qualifications, vehicle inspections, and compliance with hours-of-service regulations, reducing the risk of accidents and regulatory violations.
10. **Customer Relationship Management (CRM) Systems:** CRM systems help transportation companies manage customer interactions and relationships effectively. These systems store customer data, track inquiries and complaints, and personalize communication with customers, improving customer satisfaction and loyalty.

Challenges of modern MIS to organisation

1. **Data Overload and Complexity:** Modern MIS generate vast amounts of data from various sources, including internal systems, external sources, and IoT devices. Managing and analyzing this data can be overwhelming, leading to data overload and complexity. Organizations may struggle to extract actionable insights from the data and may require advanced analytics tools and expertise to process and interpret the data effectively.
2. **Integration and Compatibility Issues:** Organizations often use a diverse range of software applications and systems, leading to challenges in integrating and interoperating these systems with modern MIS. Integration issues can result in data silos, inconsistent data

formats, and interoperability problems, hindering the seamless flow of information across the organization.

3. **Cybersecurity Risks:** With the increasing reliance on digital technologies and interconnected systems, modern MIS are vulnerable to cybersecurity threats such as data breaches, ransomware attacks, and phishing scams. Protecting sensitive data and ensuring the security of MIS infrastructure and networks is a significant challenge for organizations, requiring robust cybersecurity measures, employee training, and proactive threat detection and response capabilities.
4. **Privacy Concerns and Compliance:** Modern MIS collect and process large amounts of personal and sensitive information, raising concerns about data privacy and regulatory compliance. Organizations must comply with regulations such as GDPR, HIPAA, and CCPA, which require stringent data protection measures, transparency in data handling practices, and user consent mechanisms. Ensuring compliance with these regulations while leveraging the benefits of modern MIS poses a significant challenge for organizations.
5. **Skill Shortages and Talent Gap:** Implementing and managing modern MIS requires specialized skills and expertise in areas such as data analytics, cybersecurity, cloud computing, and emerging technologies. However, many organizations face challenges in finding and retaining qualified IT professionals with the necessary skills and experience, leading to a talent gap and resource constraints.
6. **Cost and Budget Constraints:** Investing in modern MIS can be costly, requiring significant upfront investments in software licenses, hardware infrastructure, and ongoing maintenance and support. Organizations may face budget constraints and competing priorities when allocating resources for MIS implementation, leading to challenges in securing adequate funding and ROI justification for MIS projects.
7. **Resistance to Change and Organizational Culture:** Introducing new MIS technologies and processes often requires organizational change and adaptation, which can be met with resistance from employees and stakeholders. Organizational culture, legacy systems, and entrenched workflows may impede the adoption of modern MIS, requiring change management efforts, training programs, and stakeholder engagement to overcome resistance and foster a culture of innovation and collaboration.
8. **Scalability and Performance:** As organizations grow and evolve, modern MIS must be scalable and capable of handling increasing data volumes, user traffic, and transaction loads. Scalability and performance issues, such as system slowdowns, latency, and downtime, can arise if MIS infrastructure and architecture are not designed to accommodate growth and scalability requirements, leading to disruptions in operations and user experience.