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Data Science for Managerial Decisions (MB 511)
A Short Course in Data Science using Python

Instructor
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Data Science for Managerial Decisions (MB 511)

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Program Overview

- Introduction to Data Science
- Information Technology An Overview
- Applications of Data Science in various fields
- MIS and Control Systems
- Data Collection and Data Pre-Processing
- Building Information Systems
- Support Systems for Management Decisions

MIS and Control Systems

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- Introduction to MIS and Control Systems
- Design and Implementation of MIS
- Control Systems in Action
- Challenges and Future Trends

MIS and Control Systems

Introduction to Control Systems

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Definition

- In the context of business management, a control system refers to a set of processes, tools, and mechanisms put in place to regulate, monitor, and influence the activities and performance of an organization. The primary goal of a control system is to ensure that the organization's objectives are achieved efficiently and effectively. It involves the establishment of standards, measurement of actual performance, comparison of performance against standards, and the implementation of corrective actions as necessary.

Key components

- A business management control system consists of essential components: standards, setting performance benchmarks; measurement, collecting data through metrics and KPIs; comparison, analyzing actual performance against established standards; feedback, utilizing reporting systems and loops for continuous improvement; corrective actions, adjusting operations based on identified deviations; and adaptability, ensuring flexibility and scalability to accommodate changing business dynamics. These components collectively enable proactive management, efficient decision-making, and the achievement of organizational objectives.

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Designing Control Systems

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Designing a control system involves a systematic process to regulate and optimize organizational performance. Key steps are outlined below:

- Define Objectives: Clearly articulate organizational goals to align control mechanisms with strategic objectives.
- Establish Standards: Set performance standards and benchmarks, defining expected outcomes in various areas.
- Select Metrics: Identify key performance indicators (KPIs) for measuring actual performance against standards.
- Data Collection: Implement systems for collecting relevant data through regular monitoring and reporting.
- Deviation Analysis: Regularly compare actual performance with standards, conducting root cause analysis for deviations.
- Feedback Mechanisms: Create effective communication channels to provide timely feedback on performance.
- Corrective Actions: Develop protocols for adjusting strategies and operations based on performance analysis.
- Adaptability: Design the control system to be flexible and scalable, capable of evolving with changing business dynamics.
- Ethical Considerations: Ensure that control mechanisms comply with ethical standards and legal requirements.
- Continuous Improvement: Establish feedback loops for ongoing evaluation and improvement of the control system.

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Designing Control Systems – Best Practices

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Designing an effective control system in business management involves implementing best practices to ensure it aligns with organizational objectives, promotes efficiency, and facilitates continuous improvement.

By incorporating best practices, organizations can design and implement control systems that not only monitor performance but also contribute to strategic success, employee engagement, and continuous organizational improvement.

- Clear Objectives and Standards: Define precise organizational objectives and establish clear performance standards.
- Strategic Alignment: Ensure that the control system is closely aligned with the overall strategic goals of the organization.
- Selecting Appropriate Metrics: Choose relevant Key Performance Indicators (KPIs) that directly reflect organizational performance and goals.
- Real-time Monitoring: Implement real-time monitoring tools for prompt identification of deviations and immediate corrective actions.
- Regular Reporting: Establish regular reporting mechanisms to keep stakeholders informed and promote transparency.

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Designing Control Systems – Best Practices

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- Data Accuracy and Quality: Ensure data accuracy and quality through rigorous validation processes and data governance.
- Employee Involvement: Involve employees in the control process, fostering a sense of ownership and responsibility for performance outcomes.
- Balanced Approach: Utilize a balanced mix of feedforward, concurrent, and feedback controls for comprehensive management.
- Adaptability and Flexibility: Design control systems that can adapt to changing business environments and requirements.
- Continuous Improvement: Foster a culture of continuous improvement by using feedback loops to make incremental adjustments.

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Designing Control Systems – Best Practices

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- Ethical Considerations: Ensure that control practices adhere to ethical standards and comply with legal requirements.
- Clear Communication Channels: Establish clear communication channels for disseminating control-related information to relevant stakeholders.
- Risk Management: Integrate risk management practices to identify and mitigate potential risks in a proactive manner.
- Employee Training: Provide comprehensive training to employees on control processes and systems to enhance effectiveness.
- Regular Audits: Conduct regular audits to assess the effectiveness of the control system and identify areas for improvement.

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Control Systems – Types

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Management control systems are tools and processes that organizations use to guide, monitor, and evaluate their activities to ensure that they align with organizational goals. There are various types of control systems in management, each serving a specific purpose. Organizations often use a combination of these control systems to create a comprehensive approach to managing and optimizing their operations. The selection of control systems depends on the nature of the organization, its goals, and the specific challenges it faces.

- Feedforward Control System
- Concurrent Control System
- Feedback Control System
- Financial Control System
- Strategic Control System
- Operational Control System
- Behavioral Control System
- Cybernetic Control System
- Cultural Control System
- Market Control System

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Control Systems – Types

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Feedforward Control:

- Purpose: Anticipates and prevents problems before they occur.
- Implementation: Establishes controls in advance based on forecasts and planning.
- Example: Pre-employment background checks to prevent potential issues.

Concurrent Control:

- Purpose: Monitors activities as they occur to ensure adherence to standards.
- Implementation: Involves real-time monitoring and adjustment during ongoing processes.
- Example: Supervisors overseeing production lines to ensure quality standards are maintained.

Feedback Control:

- Purpose: Assesses performance after the fact and makes adjustments based on results.
- Implementation: Involves reviewing outcomes and taking corrective actions.
- Example: Financial audits conducted after the close of a fiscal year to identify and rectify discrepancies.

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Control Systems – Types

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Financial Control:

- Purpose: Focuses on financial aspects, such as budgets, expenses, and revenue.
- Implementation: Involves budgetary controls, financial reporting, and variance analysis.
- Example: Monthly financial reviews to ensure spending aligns with budgetary constraints.

Strategic Control:

- Purpose: Evaluates the alignment of activities with the organization's long-term strategy.
- Implementation: Involves assessing performance in relation to strategic objectives.
- Example: Regularly reviewing and adjusting business strategies based on market trends.

Operational Control:

- Purpose: Focuses on day-to-day activities to ensure efficiency and effectiveness.
- Implementation: Involves setting operational standards and monitoring processes.
- Example: Quality control checks on production lines to maintain product standards.

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Control Systems – Types

Behavioral Control:

- Purpose: Regulates employee behavior and performance through policies and guidelines.
- Implementation: Involves setting expectations and providing incentives or consequences.
- Example: Employee performance appraisals and incentive programs.

Cybernetic Control:

- Purpose: Uses feedback mechanisms to maintain stability and correct deviations.
- Implementation: Involves comparing actual performance to standards and making adjustments.
- Example: A thermostat maintaining a set temperature in a room through feedback loops.

Cultural Control:

- Purpose: Influences behavior through organizational culture, values, and norms.
- Implementation: Involves fostering a culture that aligns with desired behaviors.
- Example: Companies promoting a culture of innovation to drive creativity among employees.

Market Control:

- Purpose: Relies on competition and market forces to regulate performance.
- Implementation: Involves market-driven mechanisms, such as customer feedback and competitive analysis.
- Example: Adjusting product prices based on market demand and competition.

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Challenges in MIS and Control Systems - Cybersecurity and Data Privacy Concerns

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Cybersecurity and data privacy concerns pose significant challenges in Management Information Systems (MIS) and control systems. These challenges have become increasingly complex with the rise of interconnected technologies, cloud computing, and the growing reliance on data for decision-making.

Data Breaches and Unauthorized Access:

- MIS and control systems store and process vast amounts of sensitive information. A breach in these systems can result in unauthorized access to critical data, leading to financial losses, reputational damage, and legal consequences.
- Implementing robust access controls, encryption, and regular security audits are essential to mitigate the risk of unauthorized access.

Interconnected Systems and IoT Devices:

- The integration of various systems and Internet of Things (IoT) devices enhances efficiency but also increases the attack surface. Each connected device becomes a potential entry point for cybercriminals.
- Proper segmentation, network monitoring, and regular updates to IoT devices can help mitigate risks associated with interconnected systems.

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Challenges in MIS and Control Systems - Cybersecurity and Data Privacy Concerns

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Phishing and Social Engineering Attacks:

- Employees in organizations using MIS and control systems may be targeted through phishing or social engineering attacks. If successful, these attacks can compromise sensitive data or provide unauthorized access.
- Regular cybersecurity training and awareness programs for employees are crucial to prevent falling victim to such attacks.

Insider Threats:

- Insiders with malicious intent or unintentional mistakes by employees can lead to data breaches. This includes employees, contractors, or third-party vendors with access to the systems.
- Implementing least privilege access, monitoring user activities, and conducting background checks can help in reducing the risk of insider threats.

Compliance and Regulatory Requirements:

- Many industries have specific regulations and compliance standards governing the protection of sensitive data. Failure to comply with these regulations can result in severe penalties.
- Regular audits and compliance assessments should be conducted to ensure that MIS and control systems meet the necessary legal and regulatory requirements.

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Challenges in MIS and Control Systems - Cybersecurity and Data Privacy Concerns

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Data Encryption and Privacy:

- Encryption is essential for protecting data both in transit and at rest. Implementing strong encryption protocols ensures that even if data is intercepted, it remains unreadable.
- Organizations must also prioritize user privacy, ensuring that collected data is handled responsibly and in compliance with privacy regulations.

Incident Response and Recovery:

- Despite preventive measures, security incidents may still occur. Having a well-defined incident response plan and a robust backup and recovery strategy is crucial for minimizing the impact of cyber attacks.

Supply Chain Security:

- Organizations often rely on third-party vendors and suppliers for various components of their systems. Ensuring the security of the entire supply chain is vital to prevent vulnerabilities from entering the ecosystem.
- Conducting thorough security assessments of third-party vendors and implementing contractual obligations for security measures are critical steps.

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Challenges in MIS and Control Systems - Managing the increasing volume of data

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- Managing the increasing volume of data is a significant challenge for Management Information Systems (MIS) and control systems due to the rapid growth of data sources and the complexity of information generated. Effectively addressing this challenge involves implementing robust strategies and technologies to handle, process, and derive meaningful insights from the ever-expanding datasets.
- Successfully managing the increasing volume of data in MIS and control systems requires a holistic approach that combines technology, governance, and user awareness. By implementing these strategies, organizations can effectively handle the challenges posed by the exponential growth of data and derive meaningful insights to support informed decision-making.

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Challenges in MIS and Control Systems - Overcoming resistance to change within organizations

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- Overcoming resistance to change within organizations, especially in the context of Management Information Systems (MIS) and control systems, presents a unique set of challenges. MIS and control systems are critical components that help organizations adapt to technological advancements, improve decision-making processes, and enhance overall efficiency. However, employees may resist these changes due to various reasons such as fear of the unknown, disruption to routine, or concerns about job security.
- Overcoming resistance to change in MIS and control systems requires a combination of effective communication, employee involvement, training, and a supportive organizational culture. By addressing concerns, providing reassurance, and showcasing the benefits, organizations can increase the likelihood of successful adoption and integration of new technologies.

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Have a question?

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