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introduction

- Business information systems are technological frameworks designed to collect, store, process, and analyze data. They are fundamental to modern business operations, driving operational efficiency, empowering data-driven decision-making, and securing a sustainable competitive advantage by allowing companies to streamline workflows and respond quickly to market change
- <https://www.researchgate.net/publication/386385015>

5 Business information systems

- **Transaction Processing Systems (TPS)**
- **What they do:** These are the foundational operational systems that handle routine, day-to-day business transactions like sales, payroll, and order processing
- **Business Impact:** They ensure that frontline and daily operations run smoothly, accurately, and at high speeds, which is essential for data integrity
- **Management Information Systems (MIS)**
- **What they do:** MIS takes raw data from TPS and aggregates it into structured, standardized reports for middle management
- **Business Impact:** They help managers monitor performance, allocate resources properly, and ensure operational goals are being met.
- **Best for** Routine decision-making and performance tracking

- **Decision Support Systems (DSS)**

- What they do: DSS tools utilize complex analytical models, predictive simulations, and historical trends to help managers address unstructured or semi-structured problems
- **Business Impact:** They enhance strategic planning and give managers the predictive insights necessary to solve complex business challenges
- **Best for:** Complex problem-solving and forecasting.

- **Executive Support Systems (ESS)**

- What they do: Also known as Executive Information Systems (EIS), these are high-level dashboards that summarize critical data from both inside and outside the company.
- **Business Impact:** They provide senior executives with easily digestible visual data to drive long-term, strategic corporate direction .
- **Best for:** Strategic leadership and executive oversight

- **Enterprise-Wide Systems (ERP, CRM, & SCM)**

- What they do: These are comprehensive, integrated software packages. ERP integrates all departmental functions (finance, HR, manufacturing), CRM manages customer data to boost customer experience, and SCM optimizes logistics and inventory
- Business Impact: They break down data silos, improve cross-departmental collaboration, and directly elevate customer service and fulfillment speeds
- Best for: Scalability, breaking down departmental silos, and improving the end-to-end customer experience

How Are Information Systems Classified?

- To fully understand information systems, it's helpful to focus on the organizational level they support. In most companies or institutions, there are different layers of management, though they are often grouped into three broad categories: operational, tactical, and strategic. Because each of these levels operates differently, it means that they also rely on different types of information systems that cater to their specific need.
- (Bocij, P., Greasley, A. and Hickie, S. 2019)

- **At the operational level**, employees primarily handle routine tasks like entering data, completing transactions, assisting customers, and updating records. Therefore, the systems they use need to be fast and focused on detailed input.
- Middle managers at the tactical level are responsible for overseeing teams, coordinating resources, handling short-term planning, resolving issues, and ensuring daily operations stay on track. The systems they use go beyond simply tracking activity. They help identify inefficiencies, simulate outcomes, prioritize where attention is needed,
- **At the strategic level**, senior executives focus on long-term goals, major risks, market positioning, and organizational growth. The systems they rely on are built to deliver overviews across departments and support big-picture planning
- (Clute Institute for Academic Research 1997)

The 3 Key Types of Information Systems

- 1. **Transaction processing systems (TPS)**
- Transaction processing systems, or TPS, form the foundation of many businesses. These systems handle routine, day-to-day activities like billing, order processing, payroll, or reservations.
- Their main strengths are speed and accuracy, making it possible to process high volumes of simple transactions without errors. For instance, when you buy groceries and the system logs each item, updates the inventory, and records your payment, all in seconds, that's a TPS at work
- (Hunter, M.G. and Hunter, M.G. (2015) *Strategic*)

2. Management information systems (MIS)

- Management information systems (MIS) take the raw data from TPS and organize it. Instead of showing every single sale, for example, an MIS might provide a daily sales report broken down by region or product type.
- These systems support mid-level managers who need to monitor performance, track progress, and make routine decisions about staffing, supply, or budgeting. MIS is not designed for long-term planning or predicting the future but rather for keeping current operations on track.
- (Lakshman, B. and Abellera, R. (2020) *AI Meets BI*)

3. Decision support systems (DSS)

- When decisions are unclear or involve many moving parts, organizations use decision support systems (DSS) to help them think through the possibilities. Rather than offering a final answer, these systems bring together different types of data and offer tools to run comparisons, highlight risks, simulate changes, and identify potential advantages or setbacks.
- They often combine internal data with external sources, including market trends, competitor activity, regulatory updates, and economic forecasts. A transportation company, for instance, might use a DSS to find the most cost-effective delivery strategy by factoring in fuel prices, road conditions, delivery windows, and vehicle availability.
- <https://ischool.syracuse.edu/types-of-information-systems/>

Key Ethical & Privacy Concerns

- **Employee Monitoring & Privacy:** Using AI to constantly track keystrokes, emails, and physical location can violate the UK GDPR principles of data minimization and fairness. Constant surveillance damages trust and causes severe workplace stress
- **AI Decision-Making & Accountability:** Relying on algorithms for critical HR tasks—such as hiring, firing, or performance assessment—risks "automation bias," where managers blindly trust machine outputs without critical thought.
- **Algorithmic Bias:** If historical datasets contain biases against certain demographics, AI models will learn and amplify these discriminatory patterns. This can result in unfair hiring or unequal treatment of marginalized groups
- **Data Security:** AI systems require vast amounts of personal and sensitive performance data, making them major targets for cyberattacks and data breaches
- (Lakshman, B. and Abellera, R. (2020))

Mitigation Strategies & Responsible Use

- 1. Align with UK Data Protection Law You must comply with the UK GDPR and the Data Protection Act 2018. Ensure all monitoring has a clearly defined lawful basis and that employees are comprehensively informed of what data is collected and why.
- **. Implement 'Human-in-the-Loop' (HITL)**
Never let AI act as the sole, autonomous decision-maker for high-stakes employment actions. Ensure that human managers retain the final authority and accountability for all significant personnel decisions
- **3. Conduct Algorithmic & Bias Audits**
Before deploying AI HR tools, perform rigorous data audits. Ensure your training datasets are highly representative and that the outputs do not indirectly discriminate against protected characteristics

Real-World Case Studies

- Google DeepMind (Data Center Energy Efficiency)
- The Challenge: Cooling massive hyperscale data centers requires vast amounts of electrical power, generating large carbon footprints.
- **The Solution:** DeepMind deployed a machine-learning recommendation system that continuously analyzes data center telemetry to optimize cooling infrastructure operations.
- **Ethical Issue:** Centralizing control of critical infrastructure to an automated black-box system. Google mitigates this by requiring human operators to approve recommendations before implementation.
- Impact: Reduced data center cooling energy consumption by up to 40%, heavily slashing overhead costs and aligning with global climate goals.
- (Mordue, S., Swaddle, P. and Philp, D. 2017)

2. Snowfox AI (Invoice Processing & Finance)

- The Challenge: Manual invoice processing is labor-intensive, slow, and prone to human data-entry errors
- The Solution: Snowfox AI uses AI to automate invoice routing and data parsing. When a customer mistakenly sent highly inappropriate personal data, the system instantly flagged, ceased processing, and deleted the sensitive information
- **Ethical Issue:** Privacy risks and potential employee displacement
- **Impact:** Drastically reduced invoice processing times. Furthermore, employee satisfaction improved as staff were transitioned from repetitive, tedious data-entry tasks to more valuable, creative work
- (Gouigoux, J.-P. and Tamzalit, D. (2024) *Enterprise Architecture*)

Assess Impact on Business Performance

Key Takeaways

- AI implementation drastically improves business efficiency, scalability, and forecast accuracy. However, the business impact cannot be measured purely through technical uptime or cost savings.
- **Implement Ethical Frameworks Early:** Establish an AI Ethics Impact Assessment or an accountable AI governance matrix to address algorithmic bias, privacy, and transparency before deployment
- **Balance Automation and Oversight:** Maintain a human-in-the-loop dynamic where AI handles up to 70% of repetitive workflows and humans retain the remaining 30% for strategic judgment and review
- **Prioritize Continuous Learning:** Proactively train employees to understand AI, turning the challenge of job displacement into an opportunity for workforce upskilling
- (Laursen, G.H.N. and Thorlund, J. 2018)

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