Review Article

World Journal of Engineering Research and Technology
WJERT

BUSINESS SYSTEMS ANALYSIS AND DESIGN: CONCEPTS, METHODOLOGIES, AND APPLICATIONS

Mohammad Abdul Wasey*

VS Materials Executive, General Motors, Factory Zero, MI.

*Corresponding Author

Mohammad Abdul Wasey

VS Materials Executive,

General Motors, Factory

Zero, MI.

ABSTRACT

In the digital age, organizations rely heavily on well-structured information systems to achieve strategic objectives. Business Systems Analysis and Design (BSAD) is a critical discipline that ensures systems align with business needs and support organizational goals. This article explores the core principles, methodologies, tools, and real-world applications of BSAD. It also highlights challenges and best practices in analyzing and designing systems effectively. A case study demonstrates the practical value of these processes in enhancing enterprise performance.

1. INTRODUCTION

Business Systems Analysis and Design (BSAD) encompasses the identification of organizational needs, definition of system requirements, and the formulation of structured solutions. These processes are essential for creating efficient, user-centric, and cost-effective information systems that deliver value to stakeholders.

Modern enterprises operate in dynamic environments that demand agility, innovation, and integration. BSAD plays a crucial role in addressing these needs by ensuring that systems are technically sound and strategically aligned.

Figure 1: System Development Lifecycle (SDLC).

2. Theoretical Framework and Methodologies

BSAD relies on several theoretical and methodological foundations:

2.1 System Development Life Cycle (SDLC)

The SDLC is the most widely used approach to guide system development. Each phase serves a unique purpose:

Planning: Define objectives and scope.

Analysis: Gather requirements and model current systems.

Design: Develop architecture, UI, and data models.

Implementation: Translate designs into code.

Testing: Validate system behavior.

Maintenance: Address post-deployment issues.

2.2 Agile and Iterative approaches

Agile methodologies (Scrum, XP) promote adaptive planning, iterative development, and early delivery. These are particularly useful in environments where requirements evolve rapidly.

2.3 Object-Oriented and Structured analysis

While structured analysis uses data flow diagrams and process models, object-oriented analysis focuses on modeling real-world entities through classes and interactions.

Table 1: Comparison of BSAD Methodologies.

Methodology	Focus	Tools	Suitability
SDLC	Phase-driven	DFDs, ERDs	Large, stable systems
Agile	Iterative	User Stories, Backlogs	Dynamic, user-driven projects
Object-Oriented	Abstraction	UML, Class Diagrams	Complex, modular systems

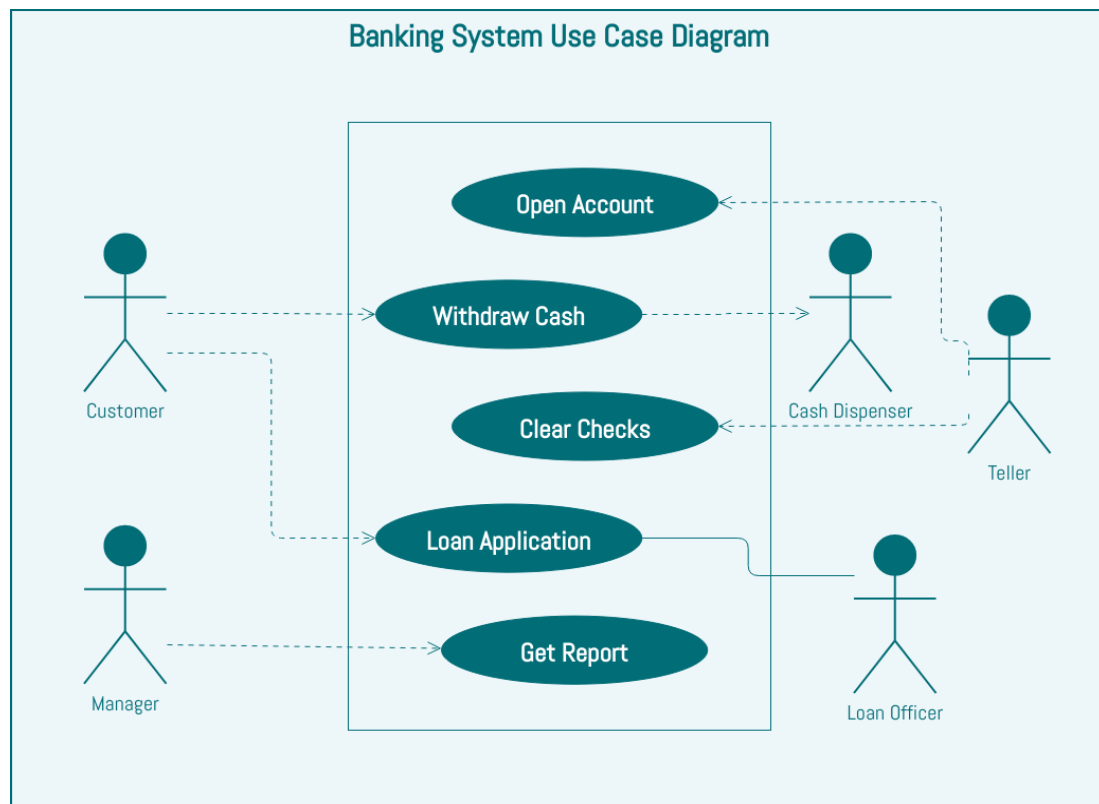3. **Tools and Techniques for Analysis and Design**

A wide range of tools and modeling techniques support BSAD

Data Flow Diagrams (DFDs): Visualize data movement within systems.

Entity-Relationship Diagrams (ERDs): Model data structure.

Unified Modeling Language (UML): Standard notation for software modeling.

Use Case Diagrams: Define user-system interactions.

Figure 2: Example use case diagram for online banking system.

Table 2: Modeling Tools and Their Uses.

Tool	Purpose	Common Software
DFD	Process flow visualization	Lucidchart, Draw.io
ERD	Database design	MySQL Workbench, ER/Studio
UML	System behavior modeling	Enterprise Architect
Wireframes	UI/UX design	Balsamiq, Figma

4. Requirements Gathering and Stakeholder Analysis

Requirements elicitation is central to system success. Techniques include:

Interviews and surveys Document analysis Prototyping

Joint Application Design (JAD) sessions

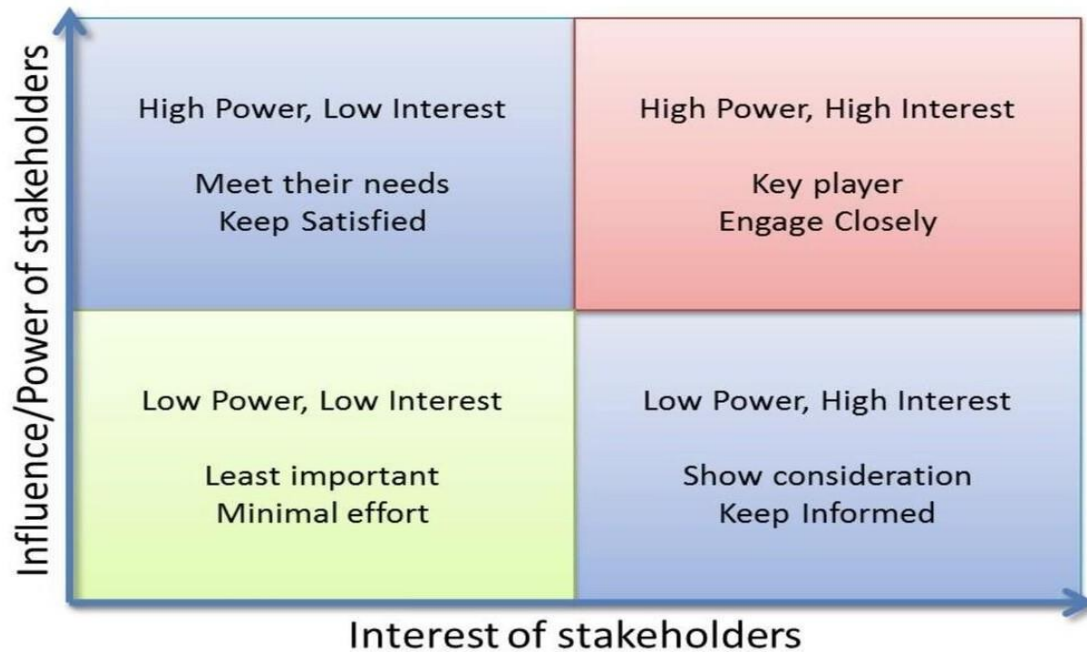Understanding stakeholder needs is critical to avoid scope creep and misalignment.

Figure 3: Stakeholder Influence vs. Interest Matrix.

5. Case study: Inventory management system for retail chain

A national retail chain implemented a new inventory management system using a hybrid Agile- SDLC approach. The old system suffered from poor integration and delayed restocking.

Key steps

**Requirement analysis:** Interviews with store managers and warehouse staff.

System modeling: Created ERDs, use cases, and workflows.

Design: Developed UI wireframes and API schemas.

Implementation: Built in modules and tested iteratively.

Table 3: Pre- and Post-Implementation Metrics.

Metric	Before	After	Improvement
Restocking Delay (hrs)	36	12	66%
Inventory Accuracy (%)	78	95	+17%
User Satisfaction (1–10)	5.2	8.7	+3.5
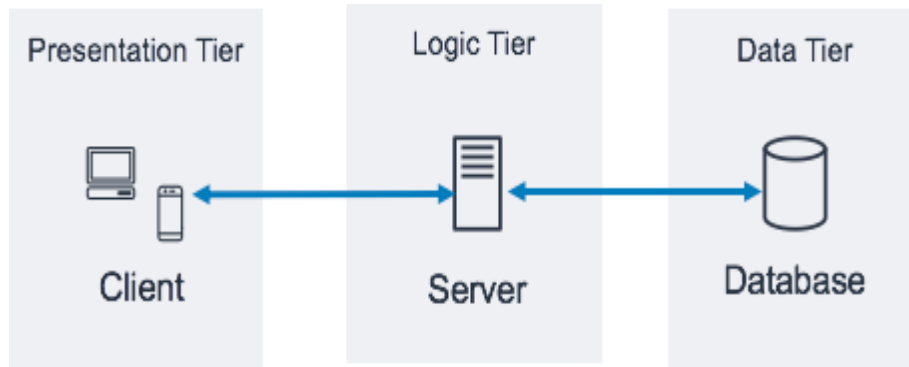
Figure 4: System Architecture Diagram (3-tier).

6. Challenges and Best Practices

Common challenges include

Ambiguous requirements

Stakeholder conflicts

Scope creep

Resistance to change

Best Practices

Early and Continuous stakeholder engagement

Using visual models to clarify expectations

Iterative prototyping

Comprehensive documentation

7. CONCLUSION

Business Systems Analysis and Design is foundational to creating robust, scalable, and user-aligned systems. As enterprises adopt emerging technologies like AI and cloud computing, the role of BSAD becomes even more vital. Future research should focus on integrating BSAD with digital transformation, cybersecurity, and sustainable IT practices.

8. REFERENCES

1. Kendall, K. E., & Kendall, J. E. Systems Analysis and Design. Pearson, 2019.
2. Dennis, A., Wixom, B. H., & Roth, R. M. Systems Analysis and Design. Wiley, 2020.
3. Pressman, R. S., & Maxim, B. R. Software Engineering. McGraw-Hill, 2014.
4. Sommerville, I. Software Engineering. Pearson, 2015.
5. Satzinger, J. W., Jackson, R. B., & Burd, S. D. Systems Analysis and Design in a Changing World. Cengage, 2015.
6. Yourdon, E. Modern Structured Analysis. Prentice Hall, 1989.

7. Booch, G., Rumbaugh, J., & Jacobson, I. The Unified Modeling Language User Guide. Addison-Wesley, 2005.

8. Ambler, S. W. Agile Modeling. John Wiley & Sons, 2002.

9. Fowler, M. UML Distilled. Addison-Wesley, 2003.

10. McConnell, S. Rapid Development. Microsoft Press, 1996.

11. Cockburn, A. Agile Software Development. Addison-Wesley, 2001.

12. Larman, C. Applying UML and Patterns. Prentice Hall, 2005.

13. Hoffer, J. A., George, J. F., & Valacich, J. S. Modern Systems Analysis and Design. Pearson, 2016.

14. Sommerville, I., & Sawyer, P. Requirements Engineering. Wiley, 1997.

15. Robertson, S., & Robertson, J. Mastering the Requirements Process. Addison- Wesley, 2012.

16. Leffingwell, D. Agile Software Requirements. Addison-Wesley, 2010.

17. Turban, E., Volonino, L., & Wood, G. Information Technology for Management. Wiley, 2013.

18. Laudon, K. C., & Laudon, J. P. Management Information Systems. Pearson, 2020.

19. Valacich, J. S., & George, J. F. Essentials of Systems Analysis and Design. Pearson, 2021.

20. Beck, K. Extreme Programming Explained. Addison-Wesley, 2004.