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INTEGRATING MODERN TECHNOLOGIES WITH BPM: WAYS TO ACHIEVE EFFICIENCY AND SUSTAINABILITY

Khazar NAJIMBAYLI^{*,} Said JAMALOV¹

¹Baku Engineering University,
Khirdalan city, Azerbaijan

ARTICLE INFO	ABSTRACT
Article history: Received:2025-08-29 Received in revised form:2025-09-18 Accepted :2025-10-19 Available online:2026-06-26 Keywords: BPM; Technology integration; Process optimization; Risk management. JEL classification M15, L23, O33	<i>This article explores integrating modern technologies with BPM and how it can be a game changer for organizations. Tools such as Power BI and Python are shown to be effective in optimizing processes, minimizing time loss, and aligning workflows with organizational goals. The study analyzes the stages of BPM in detail - process discovery, analysis, redesign, and implementation - and shows how this approach creates effective decision-making, operational agility, and long-term sustainability. Furthermore, it demonstrates how data-driven automation reduces human error and provides real-time visibility into performance bottlenecks. The results highlight the importance of BPM in the modern business environment and the strategic role that technology plays in these processes.</i>

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* Corresponding author.

E-mail address: xanacimbayli@beu.edu.az (Khazar Najimbayli).

1. INTRODUCTION

A process is fundamentally understood as a series of interrelated activities to achieve a specific goal. This concept transcends various domains, from everyday tasks to complex scientific and industrial systems. A process follows a structured sequence, progressing from an initial phase toward a desired outcome through deliberate, organized actions. The management and continuous optimization of processes are pivotal in enhancing operational efficiency, ensuring that objectives are reached effectively, within a defined time frame, and often, with minimal resources. [9]

Business Process

A business process is a structured sequence of activities to achieve specific objectives within an organization. These processes involve the efficient use of resources to transform inputs into outputs that deliver value to customers or contribute to organizational goals. Each process is defined by clear boundaries, measurable outcomes, and a systematic workflow that ensures consistency and effectiveness.

The proper management of business processes plays a vital role in enhancing organizational performance. By streamlining activities, minimizing inefficiencies, and focusing on continuous

improvement, organizations can achieve greater productivity, reduce operational costs, and maintain a competitive edge in a dynamic market environment [1], [5].

2. BPM: THE HIDDEN POWER OF MODERN BUSINESS

What is Business Process Management (BPM)?

Business Process Management (BPM) is a systematic approach used to optimize, automate, and improve the efficiency of organizational workflows. Its main goal is to ensure that every step in a process adds value, helping organizations achieve their objectives more effectively. By utilizing various methodologies, tools, and practices, BPM enhances processes, aligns them with organizational goals, and addresses inefficiencies and bottlenecks [2].

In simpler terms, BPM acts as the foundation for modern business operations. For example, by incorporating advanced technologies such as workflow automation and data analytics, BPM helps organizations establish standardized procedures across departments. This not only enables smoother workflows but also ensures efficient resource utilization and improved overall performance.

Why is BPM Crucial in Modern Times?

In today's fast-paced and ever-changing business landscape, BPM plays a vital role in helping organizations stay agile and competitive. For instance, during the COVID-19 pandemic, companies with robust BPM frameworks quickly adapted by restructuring workflows to accommodate remote work and address supply chain disruptions. This adaptability highlights the importance of BPM in ensuring operational resilience during uncertain times [8].

Additionally, BPM integrates modern technologies such as artificial intelligence (AI) and robotic process automation (RPA) into traditional business models. These technologies help organizations identify inefficiencies, optimize workflows, and create opportunities for continuous improvement.

BPM also incorporates performance metrics into workflows, allowing organizations to measure progress and prioritize areas for development or investment [2].

In summary, BPM has become an indispensable tool for businesses, enabling them to adapt to change, embrace innovation, and achieve their strategic goals more effectively.

3. A GENERAL OVERVIEW OF RISK AND RISK MANAGEMENT

Risk - Risk is the result of uncertainties that have the potential to negatively or positively affect an organization's objectives [6]. This concept includes not only negative consequences but also the creation of new opportunities [6], [3].

Identifying and analyzing risks helps organizations anticipate future problems and build defense mechanisms [7]. Once a risk is identified, it is no longer a threat but rather a manageable process. This case ensures that organizations are prepared for potential problems and develop sustainably [7].

Risk Management

Risk management is a systematic approach that aims to minimize the impact of potential threats by identifying them in advance [6]. Through this process, organizations maintain their stability and create new opportunities for development by using resources more effectively [4].

Risk management generally consists of four main stages:

- ❖ **Risk identification:** identifying and recording potential threats [6].
- ❖ **Risk analysis:** assessing the likelihood and consequences of risks [4].
- ❖ **Risk Classification:** making appropriate decisions to reduce, avoid, transfer, or accept risks [7]
- ❖ **Monitoring and control:** continuous monitoring of the effectiveness of adopted strategies and revising them as necessary [6].

Table 1. Risk Management Strategies [11]

RISK MGMT. STRATEGY	DEFINITION	EXAMPLES
Mitigation	To reduce the probability of a risk and/or the impact that an occurrence of the risk may bear. Risk limitation aims at the implementation of controls that dampen the effects of risk occurrences, while not completely alleviating them	• Standardized process routing • Formalized exception handling • Complete kit processing • Collaboration, checks & balances
Avoidance	To eliminate the probability of a specific risk before its occurrence. This strategy is normally realized by trading the risk for other risks that are less threatening or easier to deal with.	• Process redesign
Transfer	To shift risk or the consequences caused by the risk from one party to another. Also called “risk sharing”. Risk transfer may involve the purchase of an insurance policy, or the outsourcing of risky project parts.	• Process Outsourcing • Insurance Policies
Acceptance/ Assumption	To adapt to the risk when it becomes a problem. The enactment of a risk contingency plan is required in this strategy.	• Adaptation to regulatory requirements

Each stage allows the organization to maintain control and proactively approach potential threats in the risk management process [4]. Risk management is not only about solving problems but also helps maintain long-term stability and evaluate potential opportunities [7].

4. RISK AND RISK MANAGEMENT IN BPM PROJECTS

Business Process Management (BPM) involves a lifecycle that spans multiple phases, from analysis to control, each presenting its unique challenges and risks. Managing these risks effectively is crucial to ensure the success of BPM initiatives.

Risks in BPM

BPM, as a methodology to optimize, automate, and manage processes, is inherently exposed to various risks. These risks are as follows:

1. **Human-related Risks:**
 - Skill gaps among employees and resistance to adopting new processes [11].
 - Ineffective communication and collaboration among stakeholders, leading to misunderstandings and delays [11].
2. **Management-related Risks:**
 - Poorly defined process objectives or lack of alignment with organizational goals [11].

- Weak leadership or inadequate engagement of stakeholders [11].
- 3. **Technology-related Risks:**
 - Misalignment between chosen technologies and organizational infrastructure [11]
 - Dependence on unstable or incompatible systems.

Table 2. Lifecycle-specific Risks in BPM Projects

Lifecycle Phase	Specific Risks
Analysis	❖ Lack of alignment between process goals and organizational strategy [11]. ❖ Overemphasis on technical aspects, neglecting organizational risks [12]. ❖ Failure to account for cross-departmental interdependencies [11].
Design	❖ Inaccurate mapping of analysis results into process models [12]. ❖ Exclusion of stakeholder feedback during design phases [12]. ❖ Inadequate preparation for future contingencies in design [12].
Implementation	❖ Poor integration with existing systems and infrastructure [11]. ❖ Ambiguity in stakeholder role assignments [11]. ❖ Overemphasis on technical elements, leading to gaps in organizational readiness [12].
Execution	❖ Resistance from employees to adopt new workflows [11]. ❖ Lack of clear communication during process changes [11]. ❖ Difficulties in cross-functional collaboration [12].
Monitoring	❖ Lack of a clear monitoring framework [12]. ❖ Mismatched performance metrics with process goals [12]. ❖ Delays in detecting performance deviations [12].
Control	❖ Absence of standardized evaluation policies [12]. ❖ Misinterpretation of control data due to inconsistent formats [11]. ❖ Failure to use audit results for continuous improvement [12]

Managing Risks in the BPM Lifecycle

1. **Risk Identification:** Identifying potential risks early through structured techniques ensures proactive management [12]. For instance, brainstorming and root-cause analysis can help uncover hidden vulnerabilities.
 2. **Risk Analysis and Prioritization:** Assessing risks based on impact and likelihood allows resource allocation to high-priority risks [11].
 3. **Risk Mitigation Strategies:**
 - Avoidance:** Redesigning processes to eliminate specific risks [11].
 - Mitigation:** Implementing stricter controls and monitoring mechanisms to reduce risk impacts [12].
 - Transfer:** Leveraging outsourcing to delegate certain risks to external vendors [11]
 4. **Acceptance:** Preparing contingency plans for residual risks that cannot be eliminated [12]
 5. **Monitoring and Adjustment:** Continuous monitoring ensures risk management strategies remain effective. Frameworks such as COBIT help align process monitoring with organizational goals [11].
- By addressing risks at every phase, organizations can ensure their BPM initiatives remain resilient, adaptable, and goal-oriented.

5. THE STRATEGIC ROLE OF TECHNOLOGY IN OPTIMIZING BUSINESS PROCESSES

Risk management in business processes is a crucial tool for enhancing organizational sustainability and achieving strategic objectives. However, alongside the effective management of risks, the role of technology in these processes is also of critical importance.

Technology provides significant capabilities at every stage of risk identification, analysis, monitoring, mitigation, and resolution. Therefore, the role of technology in business processes should be examined in greater depth.[10]

The Role and Benefits of Technology in Business Processes

Technology plays a fundamental role in optimizing business processes and achieving strategic goals. Modern technologies enhance the speed of business processes, ensure accuracy in operations, and enable more efficient utilization of resources. For instance, artificial intelligence (AI) and robotic process automation (RPA) streamline repetitive tasks, allowing human resources to focus on more strategic objectives [10].

The most prominent aspect highlighting the significance of technology in business processes is its ability to strengthen data-driven decision-making. Through data analytics, organizations can identify weak points in their processes, optimize resource management, and respond promptly to customer demands. Additionally, cloud technologies and digital collaboration platforms facilitate effective communication and coordination among work teams, ensuring the seamless flow of processes.

These technologies not only make business processes more agile and resilient but also play a vital role in risk management and ensuring long-term development. Ultimately, integrating technology into business processes is an indispensable requirement for achieving a competitive advantage. [10]

6. APPLYING TECHNOLOGY IN BPM: EXTENDING THE ANALYSIS

In the previous section, we explored the fundamentals of Business Process Management (BPM) and the strategic advantages its integration with technology can provide to organizations. At this stage, we shift our focus to a practical case study, evaluating the specific outcomes derived from BPM implementation. This study, centered on optimizing market analysis processes, investigates how BPM methodologies were applied, the challenges encountered, and the effectiveness of technology in resolving these issues. This practical approach provides a deeper understanding of BPM's efficiency and the role of technology in enhancing process performance [9].

Core Applications of BPM

During the study, BPM was implemented through the following key phases:

- **Process Discovery:** Mapping the current state ("AS-IS" model) revealed critical inefficiencies, such as coordination gaps in data flow, redundancy in processes, and unnecessary data entry. These issues contributed to resource wastage and decision-making delays. [9]
- **Process Analysis:** The analysis identified major problems, including time loss due to manual data handling tasks, inconsistencies caused by data presented in various formats, and a lack of standardization. These shortcomings amplified inefficiencies in workflows. [9]

- **Process Redesign:** A “TO-BE” model was developed, proposing the automation of repetitive tasks, data standardization, and the integration of data flows into a unified structure.[9]
- **Implementation:** The newly designed processes were successfully integrated into the work environment and optimized with the support of technology. [9]

These phases allowed for the identification and resolution of pre-existing inefficiencies, demonstrating the practical benefits of BPM. [9]

Addressing Key Challenges with Power BI and Python

a. Power BI: Enhancing Data Visualization and Decision-Making

The need for Power BI became evident as traditional methods led to time losses, inadequate data analysis, and unstructured data presentations. Power BI emerged as an indispensable solution to these issues.[9]

The application of Power BI provided the following benefits:

- **Interactive Dashboards:** Data was presented visually and interactively, accelerating decision-making processes for users.[9]

Automated Reporting: Automatically generated reports ensured data was presented more efficiently and accurately. [9]

- **Data Integration:** Integration of diverse data sources into a single platform improved the quality of analysis and transparency of processes. [9]

b. Python: Automating Processes and Ensuring Consistency

Python was crucial for automating repetitive and time-consuming tasks. Manual data collection and processing caused delays and errors, making Python’s application essential for resolving these challenges.[9]

The application of Python achieved the following:

- **Data Collection:** Data from various sources was collected accurately and efficiently.
- **Transformation:** Collected data was standardized and made suitable for analysis.
- **Error Reduction:** Automation minimized human intervention, leading to more reliable and accurate.[9]

7. RESULTS

This study highlights the advantages of combining BPM and technology for organizational improvement. The key outcomes are as follows:

- **Increased Efficiency:** Automated processes accelerated workflows and enabled more efficient resource utilization.[9]
- **Improved Decision-Making:** Structured and accurate visual data presentations facilitated higher quality and faster decision-making.[9]
- **Sustainable Development:** Processes became more flexible and adaptive, laying a strong foundation for continuous optimization in the future.[9]

This research demonstrates how integrating BPM with technology is not only effective for addressing current challenges but also instrumental in achieving long-term strategic goals.

8. CONCLUSION

This study confirms the important role that combining Business Process Management (BPM) with modern technologies plays in the successful operation of organizations. The results obtained show that the implementation of BPM creates conditions for more efficient, agile, and strategic process management.

The article highlights the impact of technologies such as Power BI and Python and demonstrates that these tools effectively automate repetitive tasks, standardize data, and accelerate decision-making. The main conclusion from this study is that BPM is not limited to technical and operational benefits.

It also enables organizations to better manage risks, use resources more efficiently, and maintain long-term competitiveness. Thus, BPM emerges as an important tool not only for solving current problems but also for achieving sustainable development and strategic goals. The widespread adoption of this approach by organizations in the future will play a crucial role in shaping a sustainable and agile work environment.

REFERENCE LIST

- [1] Anand, A., Fosso Wamba, S., & Gnanzou, D. (2013). "A Literature Review on Business Process Management, Business Process Reengineering, and Business Process Innovation." University of Wollongong, Australia. Available at <https://www.researchgate.net/publication/256062412>.
- [2] Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2018). "Fundamentals of BPM."
- [3] ISO 31000:2018. "International Standards Organizations website." Available at <https://www.iso.org/iso-31000-risk-management.html>.
- [4] Jamalov, S., & Najimbayli, K. (2024). "Analysing Risk Factors in HEIs: Application in Baku Engineering University (BEU)." *Journal of Baku Engineering University*.
- [5] Kaniški, I., & Vincek, I. (2018). "Business Processes as Business Systems." *Technical Journal*, 12(1), 55-61. Available at <https://doi.org/10.31803/tg-20170808183458>.
- [6] Polak, M. (2018). "Risk Management in Internationalisation of Higher Education." Volume No. 2, ID: 13689403-0-1.
- [7] Raanan, Y. (2017). "Risk Management in Higher Education - Do We Need It?"
- [8] Reijers, H. A. (2021). "Business Process Management: The Evolution of a Discipline." *Computers in Industry*, 126, April 2021. Available at <https://doi.org/10.1016/j.compind.2021.103404>.
- [9] Teixeira, A. R., Ferreira, J. V., & Ramos, A. L. (2024). "Optimization of Business Processes Through BPM Methodology." Available at <https://doi.org/10.3390/info15110724>.
- [10] Trivedi, P., Akhter, F., Khan, A., Shajrawi, A. A. I., Ratkovic, N., & Kausar, F. N. "The Role of Technology in Enhancing Business Processes." *Journal of Management & Educational Research Innovation*. DOI: 10.5281/zenodo.10055077.
- [11] Zur Muehlen, M., & Ho, D. T.-Y. (2005). "Risk Management in the BPM Lifecycle." *Lecture Notes in Computer Science (LNISA, volume 3812)*. DOI: 10.1007/11678564_42.
- [12] Zur Muehlen, M., & Rosemann, M. (2005). "Integrating Risks in Business Process Models." In *Proceedings of the 2005 Australasian Conference on Information Systems*