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CREATING A FOUNDATION FOR BUSINESS PROCESS AUTOMATION: A METHODOLOGICAL APPROACH TO STRUCTURING

СТВОРЕННЯ ОСНОВИ ДЛЯ АВТОМАТИЗАЦІЇ БІЗНЕС-ПРОЦЕСІВ: МЕТОДОЛОГІЧНИЙ ПІДХІД ДО СТРУКТУРУВАННЯ

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Business process automation requires a thoroughly structured foundation to ensure operational efficiency, accuracy, and long-term adaptability. This article introduces a comprehensive methodology for business process declaration, viewed as an essential preparatory phase prior to automation. The approach incorporates detailed modeling of workflows using BPMN, UML, and EPC notations, enabling standardization, visualization, and documentation of business logic. Furthermore, it includes the development of technical documentation defining roles, inputs, outputs, decision points, and system integration parameters. The methodology also covers the selection of appropriate automation software based on scalability, compatibility, and flexibility. Results demonstrate that a well-structured declaration significantly reduces inefficiencies, streamlines manual operations, and enhances automation performance. The proposed approach offers organizations a reliable framework for optimizing workflows in advance, ensuring that digital transformation initiatives are implemented smoothly, with reduced risk and greater strategic alignment with business goals.

Keywords: business process automation, process modeling, BPMN, UML, EPC, workflow optimization, software selection.

Автоматизація бізнес-процесів є важливим чинником підвищення ефективності компаній, однак її успішність значною мірою залежить від підготовчого етапу, що включає декларацію бізнес-процесів. Без чітко визначених робочих процесів та їх структурованого опису автоматизація може призвести до неузгодженості між системами, дублювання операцій та втрати контролю над ключовими функціями. У цій статті представлено методологію декларації бізнес-процесів, що дозволяє усунути ці проблеми та створити надійну основу для ефективної автоматизації. Методологія, запропонована у дослідженні, базується на комплексному аналізі робочих процесів, їх структурному моделюванні та розробці технічної документації. Основними методами дослідження є використання нотацій BPMN, UML та EPC для візуалізації бізнес-процесів, структурний та функціональний аналіз для ідентифікації неефективних ділянок, а також метод порівняльного оцінювання для вибору оптимального програмного забезпечення. У процесі аналізу особлива увага приділяється точкам прийняття рішень, ролям учасників та інтеграції з існуючими інформаційними системами. Результати дослідження підтверджують, що формалізація бізнес-процесів перед автоматизацією дозволяє усунути дублювання операцій, зменшити кількість помилок та підвищити загальну продуктивність організації. Запропонований підхід забезпечує ефективне використання технологій автоматизації, що сприяє покращенню якості обслуговування клієнтів, зменшенню витрат на ручну обробку даних та покращенню прозорості бізнес-операцій. Розробка технічної документації відіграє ключову роль у забезпеченні сумісності між автоматизованими системами, дозволяючи адаптувати процеси до змін бізнес-середовища. Практична цінність статті полягає у створенні універсального підходу до підготовки бізнес-процесів до автоматизації. Представлена методологія

може бути використана підприємствами різних галузей для покращення внутрішньої організації роботи, оптимізації використання ресурсів та підвищення загальної ефективності операційної діяльності. Впровадження структурованого підходу до декларації бізнес-процесів дозволяє забезпечити довгострокову адаптивність бізнес-моделі та підвищити конкурентоспроможність компаній в умовах цифрової трансформації.

Ключові слова: автоматизація бізнес-процесів, моделювання процесів, BPMN, UML, EPC, технічна документація, оптимізація робочих процесів, вибір програмного забезпечення.

Problem Statement. Automation is a key factor in improving business efficiency, reducing manual workloads, and ensuring process consistency. However, many organizations struggle with poorly documented or entirely undocumented workflows, leading to inefficiencies, process inconsistencies, and operational bottlenecks. Without clear process descriptions, businesses face difficulties in optimizing workflows, aligning teams, and effectively implementing automation technologies. These challenges often result in fragmented automation efforts, increased error rates, and resistance to change.

A lack of structured business process declaration complicates integration with automation tools, making it harder to achieve scalability and long-term adaptability. Unclear process boundaries and redundant steps further hinder automation, causing organizations to invest in technology without achieving the expected improvements. Addressing these issues requires a structured methodology for process declaration that ensures automation aligns with business objectives and operational requirements.

Analysis of the Last Research and Publications. Recent research on business process automation (BPA) highlights a growing diversity of approaches, tools, and technologies aimed at improving process efficiency, transparency, and adaptability. Scholars such as Abdelwahab and Helal (2023) [1] emphasize the importance of prioritizing processes for automation and integrating artificial intelligence (AI) and machine learning (ML) to support decision-making in complex and dynamic environments. Other works, like that of Aysolmaz et al. (2023) [3], focus on comparing success factors in Business Process Management (BPM) and BPA initiatives, identifying differing needs in terms of project methodologies and management involvement.

Methodological contributions are also significant. Ubaid and Dweiri (2023) [13] propose an enhanced business process improvement methodology by combining elements of DMAIC and CBPM models, illustrating the value of integrating structured improvement cycles. Similarly, Aleksandrovich-Adamenko et al. (2022) [2] analyze optimization techniques for business processes using logical and statistical methods, paying special attention to the role of business analysts and practical tools such as 1C:Enterprise.

Recent technological developments have also been reflected in studies such as those by Grohs et al. (2023) [7], who explore the potential of large language models (LLMs) for handling a variety of BPM tasks, and D. et al. (2023) [6], who investigate AI/ML applications in BPM optimization. Meanwhile, Menezes (2023) [10] identifies gaps in requirement elicitation methods specific to BPA software, underlining a lack of unified frameworks in this area.

Despite this progress, several unresolved issues remain. First, much of the existing literature focuses on either high-level conceptual models or very specific technological implementations, often without a clear bridge between process declaration and automation readiness. Secondly, the role of structured process documentation as a prerequisite for successful automation remains underrepresented, with many works prioritizing execution and implementation phases over preparation.

The current article addresses these gaps by proposing a unified methodology for business process declaration, which includes structured modeling, development of technical documentation, and criteria-based software selection. It shifts the focus toward the pre-automation phase, arguing that well-structured and documented processes are fundamental for ensuring automation success, minimizing risks, and supporting long-term adaptability.

Identification of Previously Unresolved Aspects of the General Problem. While many approaches exist for business process modeling and automation, there is often a gap in defining a structured methodology for process declaration as a prerequisite for automation. Most automation initiatives focus on selecting and implementing technology rather than establishing a clear foundation through process analysis and documentation. As a result, organizations frequently automate inefficient workflows without optimizing them first, leading to suboptimal performance and wasted resources.

Existing research and methodologies primarily address process modeling techniques such as BPMN and UML, yet they often overlook the importance of systematically collecting, structuring, and validating process information before automation. Furthermore, there is limited emphasis on integrating process documentation with automation tool selection and implementation. This study aims to bridge these gaps by developing a structured framework for business process declaration, ensuring that automation efforts are built on a solid and well-documented foundation.

Formulation of the Article's Objectives (Statement of the Task). This article aims to develop a structured methodology for business process declaration to support automation. The proposed approach focuses on systematic process analysis, modeling, and documentation to ensure seamless integration with automation tools. By addressing gaps in existing methodologies, this study provides a framework for optimizing workflows before automation, enhancing efficiency, and reducing implementation risks.

Presentation of the Main Research Material. A structured approach to business process declaration is essential for ensuring effective automation and long-term scalability. This study follows a step-by-step methodology that includes process identification, modeling, documentation, and integration with automation tools.

The first stage involves analyzing existing business processes through empirical observation and comparative evaluation of methodologies such as BPMN, UML, and EPC. This helps identify inefficiencies, redundancies, and inconsistencies within workflows. Structural and functional analysis allows for the decomposition of processes into key components, highlighting critical decision points and dependencies [8].

Next, process modeling is conducted using standardized notations like BPMN, UML, and EPC to provide a clear and interpretable workflow structure [2; 3]. Each process is documented with defined inputs, outputs, and role assignments, ensuring alignment with organizational objectives. This step enhances process transparency and serves as a foundation for automation planning.

The third stage focuses on developing technical documentation, which includes system requirements, role-based access levels, and integration points with existing software. This documentation acts as a guideline for selecting the most suitable automation tools, ensuring compatibility with business needs and technical infrastructure.

Following the documentation phase, a comparative evaluation of automation tools is performed. Various solutions, including BPM platforms, workflow automation tools, and ERP/CRM systems, are assessed based on scalability, integration capabilities, and cost efficiency. The selected software is then implemented in a pilot environment to test functionality, reliability, and user adaptability before full deployment.

Initial results demonstrate significant efficiency improvements, with automated workflows reducing processing time, minimizing manual intervention, and enhancing data accuracy. Standardized documentation ensures long-term process sustainability, while the structured approach allows for continuous refinement and optimization.

This methodology provides a comprehensive framework for business process declaration, ensuring that automation efforts are built on a solid, well-documented foundation. By addressing inefficiencies before implementation, organizations can achieve seamless automation and long-term operational success [7].

Business Process Analysis and Documentation. Effective automation begins with a comprehensive analysis of existing business processes to identify inefficiencies, redundancies, and structural inconsistencies. Without a clear understanding of how workflows operate, automation efforts can lead to fragmented implementations, errors, and increased operational complexity. This phase ensures that all processes are systematically documented and structured before automation is introduced, minimizing risks and improving efficiency.

The business process analysis stage involves gathering data from multiple sources, including internal documentation, workflow observations, and expert insights from key stakeholders. Direct observation allows businesses to assess real-time workflow execution, uncovering areas where delays, unnecessary steps, and decision-making bottlenecks occur. Additionally, a comparative evaluation of existing process modeling methodologies such as BPMN (Business Process Model and Notation), UML (Unified Modeling Language), and EPC (Event-driven Process Chain) is conducted to determine the most suitable approach for structuring workflows [13].

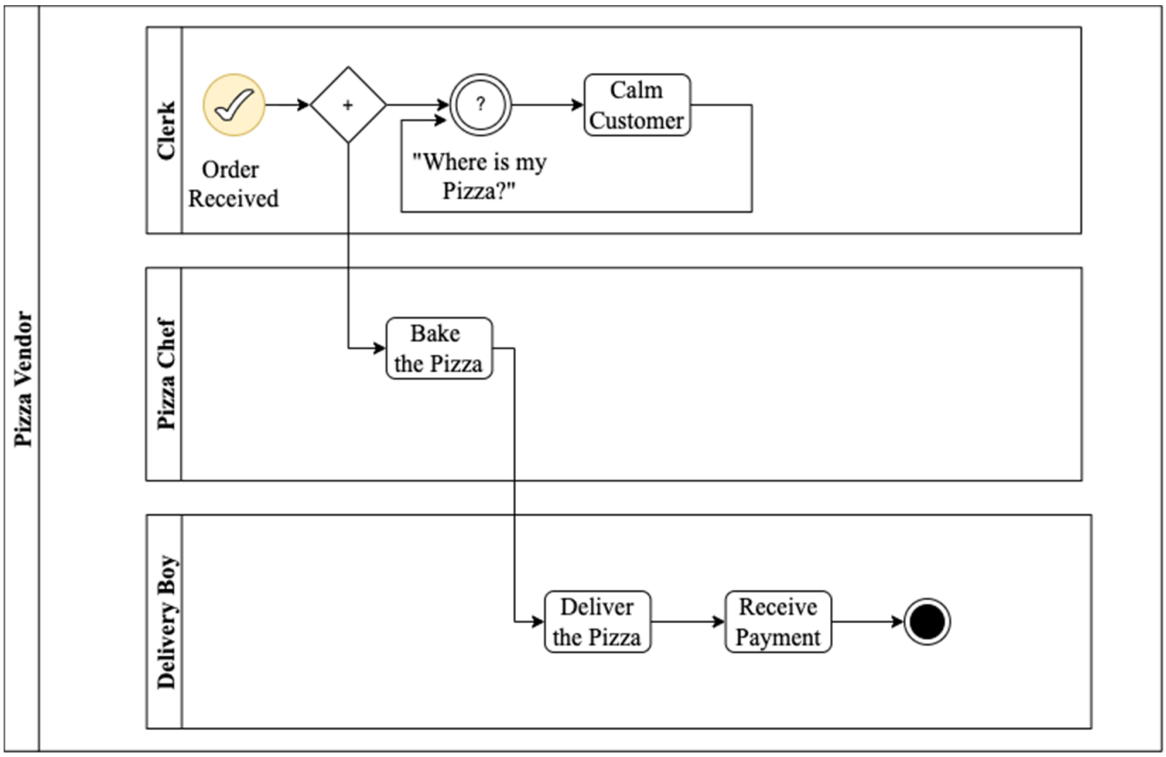

Figure 1. Example of using BPMN notation to describe the pizza ordering process

Source: formed based on [4]

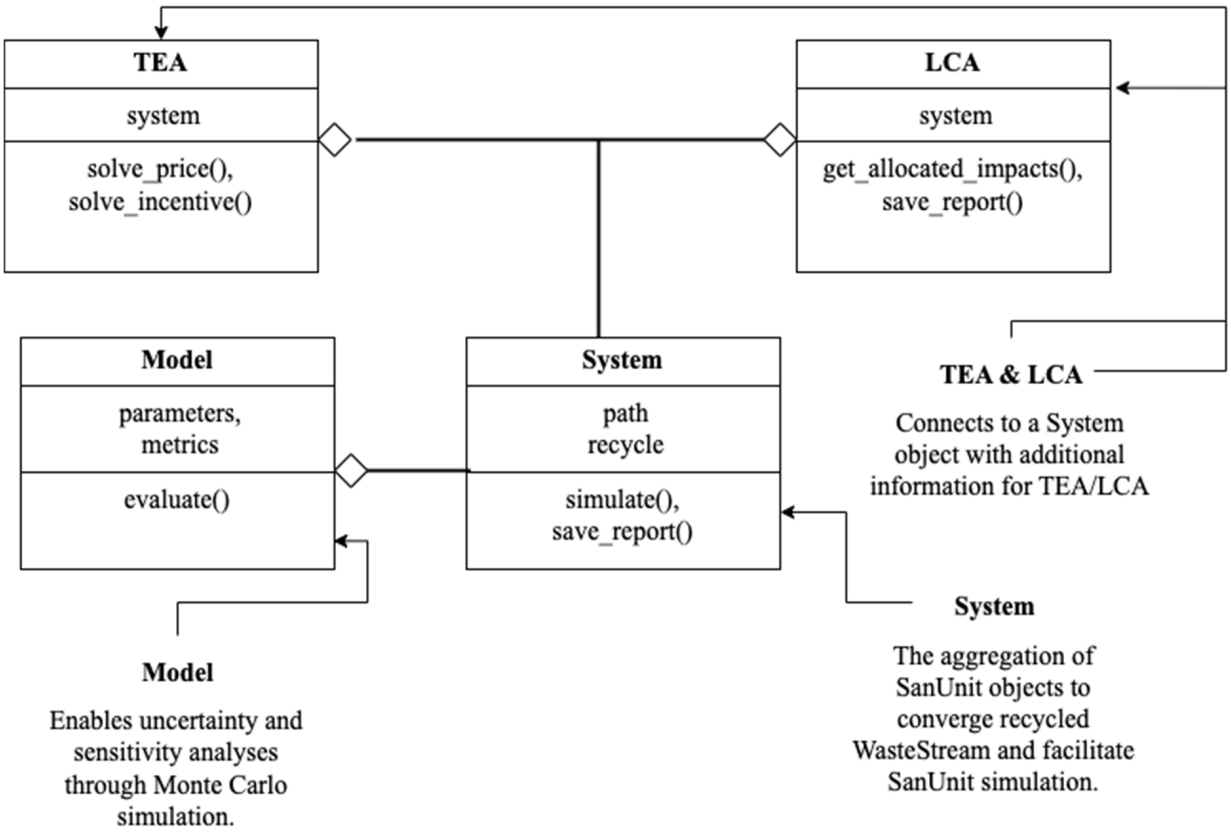

Figure 2. Example of using UML notation for Sanitation and Resource Recovery Systems

Source: formed based on [9]

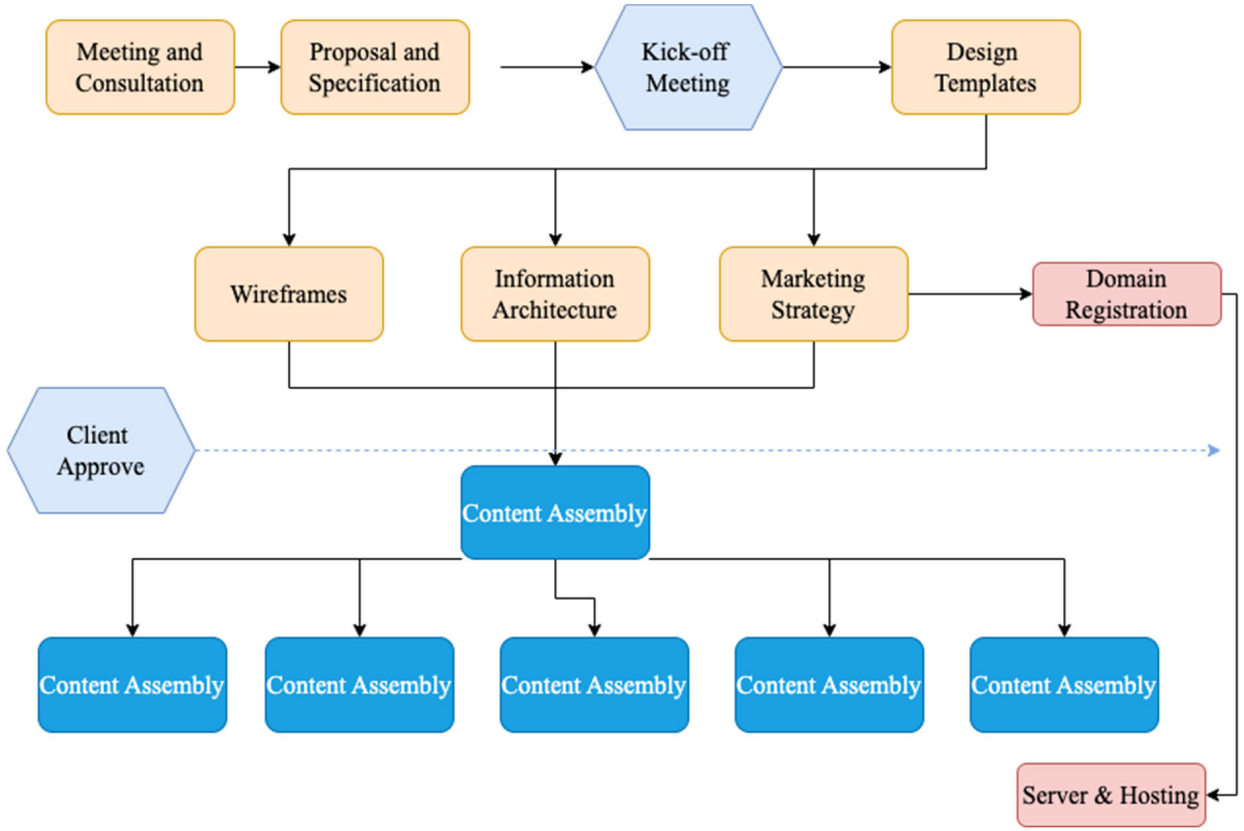

Figure 3. Example of using EPC notation to describe the software sales process

Source: formed based on [5]

Once the initial analysis is complete, the structural and functional analysis phase begins, breaking down processes into smaller components. Each process is dissected into its essential elements, including inputs, outputs, process triggers, decision points, and roles involved. This level of granularity enables organizations to pinpoint inefficiencies and dependencies, ensuring that automation efforts focus on optimizing core business functions rather than reinforcing inefficient workflows. By using structured decomposition techniques, organizations can eliminate redundant steps and streamline interactions between different departments.

The next critical step is formalizing business process documentation in a structured and standardized format [1]. Each documented process includes the following key elements:

– Process objectives – A clear definition of the process's purpose and expected outcomes.

– Roles and responsibilities – Identification of all stakeholders and their specific tasks within the workflow.

– Input and output data – Specification of the information required at each stage and the expected results.

– Decision-making points – Defining key moments where business rules apply and decisions must be made.

– Dependencies and interactions – Mapping the connections between different processes and ensuring seamless integration.

– Performance indicators – Establishing measurable KPIs to evaluate process efficiency before and after automation.

Process documentation serves multiple essential functions [11]. It enhances transparency by providing a clear, standardized representation of workflows, making it easier for employees and managers to understand operational structures. Additionally, well-documented processes act as a foundation for automation planning, allowing for seamless integration with automation tools while reducing the risks of errors or misconfigurations. Finally, structured process documentation supports ongoing optimization efforts, as organizations can continuously refine and improve workflows based on performance data and automation feedback.

By thoroughly analyzing and documenting business processes, organizations create a stable foundation for automation. This structured approach ensures that workflows are

optimized before being automated, preventing unnecessary digitalization of inefficient practices and maximizing the benefits of automation. This methodology not only improves operational efficiency but also enhances business agility by making processes more adaptable to future changes and technological advancements.

Development of Technical Documentation. Following process analysis and documentation, the next phase involves developing technical documentation that serves as the foundation for automation implementation [6]. This documentation defines the essential requirements for system integration, ensuring that automated workflows align with business needs.

The technical documentation includes:

1. System Requirements – Specification of the hardware and software infrastructure required for automation.
2. Access Control and Role Management – Definition of role-based access levels to ensure data security and process integrity.
3. Integration Points – Identification of key touchpoints between automated workflows and existing business systems (CRM, ERP, databases, etc. [10]).
4. Automation Objectives – A detailed description of expected automation outcomes, including efficiency improvements and error reduction.

A structured guideline for selecting automation tools is also developed at this stage. This involves comparing various automation solutions based on their flexibility, scalability, security, and ease of integration. The goal is to choose a system that aligns with the company's process structure while allowing for future modifications and expansions.

Once the technical documentation is finalized, it serves as a roadmap for automation implementation, ensuring that each step is clearly defined and aligned with the organization's strategic goals. This structured approach minimizes implementation risks, reduces operational disruptions, and ensures a smooth transition from manual to automated processes.

Selection and Evaluation of Automation Tools. Once business processes have been analyzed and documented, the next step is selecting the most suitable automation tools. This phase involves a detailed assessment of various software solutions to determine their compatibility with the organization's needs. The evaluation considers key factors such as scalability, integration capabilities, ease of implementation, security, and cost-effectiveness. An effective automation tool must be able to accommodate business growth, seamlessly integrate with existing systems such as CRM and ERP platforms, and require minimal technical effort for deployment [15]. Additionally, security and compliance considerations play a critical role, ensuring that data protection standards and industry regulations are met.

To make an informed decision, the study conducts a comparative analysis of Business Process Management (BPM) platforms [12], workflow automation tools, and ERP/CRM systems. Each solution is examined in terms of its ability to automate workflows, assign tasks based on roles, and provide real-time process monitoring. The research involves reviewing software documentation, analyzing case studies, and testing selected tools in controlled environments.

A well-structured selection process ensures that the chosen automation tool enhances operational efficiency without introducing unnecessary complexity. By aligning technology with business needs, organizations can establish a strong foundation for automation, allowing workflows to be optimized while maintaining adaptability for future improvements [14].

Pilot Implementation and Testing. Before full-scale deployment, the selected automation tools undergo pilot implementation to test their functionality, performance, and adaptability within the organization's workflows. This phase allows for identifying potential issues and making necessary adjustments before automation is rolled out company-wide.

The pilot implementation follows these key steps:

1. Configuring Automated Workflows – Setting up process logic, defining task sequences, and implementing business rules.
2. Testing System Performance – Evaluating system response times, accuracy of automated actions, and integration with existing tools.
3. User Training and Feedback Collection – Ensuring that employees understand how to interact with the automated system and gathering feedback for improvements.
4. Performance Monitoring – Tracking key performance metrics such as processing time reduction, error rate improvement, and workload optimization.

Based on pilot results, necessary refinements are made to the automation setup before full deployment. This ensures that automation aligns with real-world business operations, delivering

Figure 4. The pilot implementation key steps

Source: author's own work

efficiency improvements, increased process accuracy, and reduced manual workload.

By implementing a structured pilot phase, organizations can mitigate risks, optimize automation processes, and ensure a smooth transition from manual to fully automated workflows.

Conclusions. A structured approach to business process declaration is essential for successful automation. Without clear documentation and process analysis, automation efforts often fail to deliver expected efficiency improvements. This study demonstrates that systematic process modeling, technical documentation, and careful software selection create a solid foundation for automation, reducing inefficiencies and ensuring long-term adaptability.

The proposed methodology integrates business process analysis, structured modeling using BPMN and UML, and the development of comprehensive technical documentation to guide automation implementation. A detailed evaluation of automation tools ensures that selected solutions align with business requirements and existing system infrastructure. The pilot testing phase further refines automated workflows, minimizing risks before full-scale deployment.

The results confirm that businesses can achieve significant efficiency gains by first optimizing and documenting their processes before automating them. Standardized workflows reduce manual effort, improve data accuracy, and enhance decision-making. Future research can explore the long-term impact of process automation on organizational performance, as well as the role of artificial intelligence and machine learning in further optimizing business workflows.

REFERENCES:

1. Abdelwahab, M., & Helal, I. (2023). Advanced techniques for business process automation: Insights and challenges. *2023 Intelligent Methods, Systems, and Applications (IMSA)*, 303–308. Available at: https://doi.org/10.1109/IMSA58542.2023.10217440 (accessed March 17, 2025)

2. Aleksandrovich-Adamenko, A., Evgenievna-Khorolskaya, T., & Viktorovna-Koneva, M. (2022). Technologies and methods of business processes analysis and optimization. *Revista de Investigaciones Universidad del Quindío*. Available at: https://doi.org/10.33975/riuq.vol34ns3.940 (accessed March 17, 2025)

3. Aysolmaz, B., Joshi, A., & Stubhan, M. (2023). Examining and comparing the critical success factors between business process management and business process automation. *Journal of Global Information Management,* 31, 1–27. Available at: https://doi.org/10.4018/jgim.318476 (accessed March 17, 2025)

4. Camunda. (n.d.). What is BPMN? Business process model and notation. *Camunda Website*. Available at: https://camunda.com/bpmn/ (accessed March 17, 2025)

5. Conceptdraw. (n.d.). Functional block diagram. *Conceptdraw Website*. Available at: https://www.conceptdraw.com/examples/what-is-function-diagram (accessed March 17, 2025)

6. D., D., Pazhani, J., Singh, R., Sree, S., & Raju, H. (2023). AIML: The approach of optimization to support the company organizing the automated business technique. *2023 International Conference on New Frontiers in Communication, Automation, Management and Security (ICCAMS)*, 1, 1–5. Available at: https://doi.org/10.1109/ICCAMS60113.2023.10525897 (accessed March 17, 2025)

7. Grohs, M., Abb, L., Elsayed, N., & Rehse, J. (2023). Large language models can accomplish business process management tasks. *ArXiv*, abs/2307.09923. Available at: https://doi.org/10.48550/arXiv.2307.09923 (accessed March 17, 2025)

8. Jessen, U., & Fahland, D. (2024). WISE: Unraveling business process metrics with domain knowledge.

9. Li, Y., Zhang, X., Morgan, V. L., Lohman, H. A. C., Rowles, L. S., Mittal, S., Kogler, A., Cusick, R. D., Tarpeh, W. A., & Guest, J. S. (n.d.). QSDsan: An integrated platform for quantitative sustainable design of san-

itation and resource recovery systems. *ArXiv*. Available at: https://doi.org/10.48550/arXiv.2203.06243 (accessed March 17, 2025)

10. Menezes, T. (2023). A review to find elicitation methods for business process automation software. *Software*. Available at: https://doi.org/10.3390/software2020008 (accessed March 17, 2025)

11. Pavlov, P., & Gladchenko, V. (2024). Proving optimization by comparison of business processes. Environment. Technologies. Resources. *Proceedings of the International Scientific and Practical Conference*. Available at: https://doi.org/10.17770/etr2024vol1.7968 (accessed March 16, 2025)

12. Sotomayor, J., Yucra, D., & Mayhuasca, J. (2022). Evaluation of free technologies as tools for business process management (BPM). *International Journal of Engineering Sciences.* Available at: https://doi.org/10.36224/ijes.140402 (accessed March 16, 2025)

13. Ubaid, A., & Dweiri, F. (2023). Developing an enhanced business process improvement methodology (EBPIM). *International Journal of Lean Six Sigma.* Available at: https://doi.org/10.1108/ijlss-07-2022-0154 (accessed March 16, 2025)

14. Voropaev, A., Ershova, U., & Zaripova, R. (2024). Methodology for automation of business processes for equipment maintenance and repair in an energy company. *Ekonomika i Upravlenie: Problemy, Resheniya*. Available at: https://api.semanticscholar.org/CorpusID:272589792 (accessed March 17, 2025)

15. Vu, H., Leopold, H., & Van Der Aa, H. (2023). What is business process automation anyway? HICSS Proceedings, 5462–5471. Available at: https://doi.org/10.24251/hicss.2023.666 (accessed March 17, 2025)

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ:

1. Abdelwahab, M., & Helal, I. (2023). Advanced techniques for business process automation: Insights and challenges. *2023 Intelligent Methods, Systems, and Applications (IMSA)*, 303–308. URL: https://doi.org/10.1109/IMSA58542.2023.10217440 (дата звернення: 17.03.2025)

2. Aleksandrovich-Adamenko, A., Evgenievna-Khorolskaya, T., & Viktorovna-Koneva, M. (2022). Technologies and methods of business processes analysis and optimization. *Revista de Investigaciones Universidad del Quindío*. URL: https://doi.org/10.33975/riuq.vol34ns3.940 (дата звернення: 17.03.2025)

3. Aysolmaz, B., Joshi, A., & Stubhan, M. (2023). Examining and comparing the critical success factors between business process management and business process automation. *Journal of Global Information Management,* 31, 1–27. URL: https://doi.org/10.4018/jgim.318476 (дата звернення: 17.03.2025)

4. Camunda. (n.d.). What is BPMN? Business process model and notation. *Сайт сервісу Camunda*. URL: https://camunda.com/bpmn/ (дата звернення: 17.03.2025)

5. Conceptdraw. (n.d.). Functional block diagram. *Сайт сервісу Conceptdraw*. URL: https://www.conceptdraw.com/examples/what-is-function-diagram (дата звернення: 17.03.2025)

6. D., D., Pazhani, J., Singh, R., Sree, S., & Raju, H. (2023). AIML: The approach of optimization to support the company organizing the automated business technique. *2023 International Conference on New Frontiers in Communication, Automation, Management and Security (ICCAMS)*, 1, 1–5. URL: https://doi.org/10.1109/ICCAMS60113.2023.10525897 (дата звернення: 17.03.2025)

7. Grohs, M., Abb, L., Elsayed, N., & Rehse, J. (2023). Large language models can accomplish business process management tasks. *ArXiv*, abs/2307.09923. URL: https://doi.org/10.48550/arXiv.2307.09923 (дата звернення: 17.03.2025)

8. Jessen, U., & Fahland, D. (2024). WISE: Unraveling business process metrics with domain knowledge.

9. Li, Y., Zhang, X., Morgan, V. L., Lohman, H. A. C., Rowles, L. S., Mittal, S., Kogler, A., Cusick, R. D., Tarpeh, W. A., & Guest, J. S. (n.d.). QSDsan: An integrated platform for quantitative sustainable design of sanitation and resource recovery systems. *ArXiv*. URL: https://doi.org/10.48550/arXiv.2203.06243 (дата звернення 17.03.2025)

10. Menezes, T. (2023). A review to find elicitation methods for business process automation software. *Software*. URL: https://doi.org/10.3390/software2020008 (дата звернення: 17.03.2025)

11. Pavlov, P., & Gladchenko, V. (2024). Proving optimization by comparison of business processes. Environment. Technologies. Resources. *Proceedings of the International Scientific and Practical Conference*. URL: https://doi.org/10.17770/etr2024vol1.7968 (дата звернення: 16.03.2025)

12. Sotomayor, J., Yucra, D., & Mayhuasca, J. (2022). Evaluation of free technologies as tools for business process management (BPM). *International Journal of Engineering Sciences.* URL: https://doi.org/10.36224/ijes.140402 (дата звернення: 16.03.2025)

13. Ubaid, A., & Dweiri, F. (2023). Developing an enhanced business process improvement methodology (EBPIM). *International Journal of Lean Six Sigma.* URL: https://doi.org/10.1108/ijlss-07-2022-0154 (дата звернення: 16.03.2025)

14. Voropaev, A., Ershova, U., & Zaripova, R. (2024). Methodology for automation of business processes for equipment maintenance and repair in an energy company. *Ekonomika i Upravlenie: Problemy, Resheniya*. URL: https://api.semanticscholar.org/CorpusID:272589792 (дата звернення: 17.03.2025)

15. Vu, H., Leopold, H., & Van Der Aa, H. (2023). What is business process automation anyway? HICSS Proceedings, 5462–5471. URL: https://doi.org/10.24251/hicss.2023.666 (дата звернення: 17.03.2025)