

# Improving Operational Efficiency with an Automated Invoicing System

FILIP MILOSHESKI, ALEKSANDAR KARADIMCE

Faculty of Information and Communication Sciences,  
University for Information Science and Technology "St. Paul the Apostle",  
Partizanska bb, 6000 Ohrid,  
REPUBLIC OF NORTH MACEDONIA

**Abstract:** - In today's fast-paced business environment, operational efficiency is crucial for maintaining competitiveness and sustainable growth. This paper will examine the impact of implementing an automated invoicing system within a global employer of record (EOR) company. The company's previously used manual invoicing system was quite time-consuming, prone to errors, and inefficient, requiring 5 to 10 minutes per invoice generation. The newly developed automated invoicing system streamlined the client input management, payroll calculation and invoice generation, among other things. The transformation led the company to significant cost savings, improved cash flow, and enhanced client satisfaction while allowing the invoicing team to focus on more strategic initiatives. Additionally, this paper highlights the broader benefits of automation in operational processes and discusses potential future enhancements, such as utilising machine learning and AI to optimise efficiency further. The case study outlined in this paper provides valuable insights for companies that would like to automate and optimise their operational processes, especially invoicing.

**Key-Words:** - operational efficiency, automated invoicing, process automation, cost reduction, business process improvement, digital transformation, financial workflow optimisation, cash flow management

Received: May 19, 2024. Revised: December 11, 2024. Accepted: January 17, 2025. Published: May 20, 2025.

## 1 Introduction

Operational processes are a crucial part of any company, such as all the activities that are needed for goods to be produced or services to be delivered effectively. Activities such as production, procurement, inventory management, invoicing and others are examples of the operational processes in question. If the operational workflows are working smoothly, the cross-collaboration between multiple departments within a company will work in a well-organised and optimised way. Having the processes function smoothly will give the company the ability to respond to market changes, meet client demands, and manage the internal company smoothly, effectively, and efficiently.

The efficiency of the operational processes plays a crucial role in the overall performance of the company. Having inefficient workflows can easily lead to delays, increased operational costs, a decline in quality and other less-than-favourable outcomes. On the other hand, having them organised and working efficiently can lead to increased productivity, better customer satisfaction and a competitive edge over the competitors. Companies prioritising operational efficiency can more easily adapt to market changes and allocate their resources for long-term scalability and success.

In order to improve operational efficiency, companies usually implement strategies for process automation and integration of digital technologies. Automation can reduce the need for repetitive manual work, thus minimising the occurrence of human errors and speeding up the whole process itself. This can be taken even further by utilising data analytics, machine learning and artificial intelligence (AI) to enhance the decision-making process and lead to further optimisation of the processes.

Based on the previously mentioned operational processes, in some cases, invoicing plays a crucial part in a company that deals with many clients who need to be invoiced regularly. If a company needs to generate and manage thousands of invoices on a monthly basis, it needs to ensure that the process is working accurately and efficiently to keep the operational costs to a minimum and utilise human resources for more strategic things. Traditionally speaking, manual invoicing is quite time-consuming and prone to human error, which can lead to delays in payments, dissatisfied customers, and issues with the company's cash flow. This can be avoided if the company decides to implement an automated invoicing system, with which the processing time and accuracy of the invoicing process can be significantly

improved and lead to a better cash flow and efficient operational process, incurring minimal costs.

## 2 Related Work

Proper invoicing systems are of great importance for companies mainly working in B2B markets, and their automation is one of the most important things for driving operational efficiency. With automation, the manual intervention required will be lowered, the overall accuracy of the invoices will improve, and any human mistakes that might occur will have a significantly lower chance of happening. Studies have demonstrated that electronic invoicing streamlines the process of invoicing by eliminating repetitive tasks, minimising human error and accelerating the payment cycles [1]. With such automation implemented, the overall business efficiency of the company improves, as more resources can be focused on other strategic activities rather than the repetitive administrative process of invoicing.

Research on robotic process automation (RPA) in structured data processing identified significant potential improvements in efficiency, especially in financial operations such as invoicing [2]. By implementing RPA, companies can effectively streamline the data extraction and validation processes for invoicing. This approach not only enhances accuracy but also supports a consistent and timely invoicing cycle. With this approach, the scalability of the process is enhanced, which allows the company to handle an ever-increasing number of invoices without increasing its operational costs.

E-invoicing implementation has proven to be a key factor in enhancing competitiveness and financial transparency in the business environment. In their article [3], Anabela Fernandes and Isabel Ferreira discuss how implementing an electronic invoicing system can significantly enhance the efficiency and competitiveness of businesses. They provide a case study of a Portuguese company that improved its invoice processing time and compliance with tax regulations through automation. The authors note that companies adopting e-invoicing typically experience quicker turnaround times and a reduction in administrative workload, ultimately leading to greater operational efficiency.

Machine learning and artificial intelligence are the latest emerging technologies that can be crucial for further automating invoicing systems [4]. With these technologies, it is possible to enable intelligent data classification, fraud detection, and real-time invoice processing, thus reducing the risk of errors and discrepancies. Furthermore, these can improve the invoicing systems' adaptability and flexibility, allowing them to evolve based on the transactional patterns and any anomalies that might be detected.

The study conducted on the implementation of an AI-powered invoice automation system at Satherm GmbH examined how AI streamlined invoice processing by reducing manual workload and minimising errors [5]. The research demonstrated that AI-driven automation could significantly decrease invoice handling time and improve accuracy through intelligent data extraction and validation. This clearly illustrates the potential for AI to enhance efficiency in the invoicing process, which could also be extended to other operational processes.

There are also blockchain-based invoicing solutions which are gaining some traction by offering secure, transparent and secure invoice processing [6]. With this system, invoice management is decentralised, which leads to improved auditability and compliance with the various regulations and obligations. This can be of great importance to companies that handle a high number of invoices on a regular basis and struggle to adhere to all of the required regulations and obligations associated with them. Some case studies have shown that blockchain-based invoicing reduces the number of disputes and accelerates payment processing by providing an easily verifiable and secure transaction record.

A core component of operational efficiency strategies is the digital transformation of financial processes, including invoicing. Companies that adopt this approach have reduced operational costs, improved cash flow management, and happier clients. These advantages showcase how digital transformation minimises the need for paper-based invoicing, thus contributing to sustainability practices [7].

Research has demonstrated that automating tax auditing and compliance reporting through sequential algorithms has streamlined the invoice validation processes for the small and medium enterprises

(SMEs) studied [8]. By integrating automated invoicing with tax compliance systems, these companies could monitor their activities in real time and minimise delays in their tax audits. As a result, they achieved substantial cost savings by automating their fiscal audits, ensuring compliance with the regulatory frameworks that govern these processes.

Automating electronic invoice validation boosts efficiency, accuracy, and compliance in finance. Invoices are validated systematically by leveraging knowledge graph technologies with Electronic Data Interchange (EDI), decreasing manual effort and errors [9]. RDF (Resource Description Framework) knowledge graphs and OWL (Web Ontology Language) ontologies ensure semantic consistency, while SHACL (Shapes Constraint Language) constraints allow rule-based validation [9].

Automating invoice processing presents numerous advantages, including enhanced efficiency, reduced errors, and cost savings. Automation accelerates workflows and minimises human errors by eliminating manual data entry, resulting in more precise financial records. This streamlining of processes lowers operational costs and improves compliance and security through comprehensive audit trails [10]. Moreover, automation offers greater visibility and control over financial operations, facilitating better cash flow management and stronger vendor relationships due to timely payments.

### 3 Case Study

The company in this case study is a globally operating organisation offering employment that primarily records (EOR) services. It provides companies with an easy way of employing workers globally without them needing to worry about the bureaucratic, legal and payroll processes in the different countries where they are employed. The company uses its platform to better serve its clients, integrating various HR (Human Resources), financial, and legal functions. This platform allows clients to streamline the management of their employees through the Employer of Record (EOR) company. The client base of the EOR company spans multiple countries and industries, numbering thousands of clients, which means that the invoicing

process is crucial for the company to get right. Each month, invoices must be generated based on input from clients, which can include salary adjustments, bonuses, benefits, and days off, among other factors. These elements need to be considered when preparing the final invoice, which must be issued promptly to ensure timely payment. Since the invoicing process for the Employer of Record (EOR) company relies on the clients' changing requirements, it is complex, dynamic, and time-sensitive.

Before implementing an automated invoicing system, the company relied on a third-party invoicing system, which required extensive manual work. Clients send their payroll-related information via email to the customer experience team each month. This team cleans up the data and forwards it to the payroll team. The payroll team then calculates employee salaries and necessary contributions to determine the total amount the client needs to pay, including service fees. Subsequently, this information is manually entered into a third-party invoicing system. This intensive manual process is repeated for thousands of clients monthly, resulting in a highly inefficient invoicing system.

The manual way of invoicing had several critical inefficiencies associated with it. On average, only the generation of a single invoice on the third-party invoicing system took between 5 and 10 minutes, depending on the complexity of the payroll calculations and the client's requirements. The monthly invoicing process required hundreds of work hours each month, necessitating a dedicated team to handle it. Moreover, relying on email to gather input frequently resulted in miscommunication or incorrect data entry mistakes. Any errors that occurred had to be tracked manually and corrected in the invoicing system, making even minor mistakes costly and time-consuming. These issues highlighted the inefficiencies of the invoicing process. Given the company's scale, it was clear that this system was neither scalable nor sustainable, indicating that a new solution was needed.

The company developed and implemented an in-house automated invoicing system to address the previously stated inefficiency, fully integrating it within the existing platform. The newly implemented system streamlined the whole invoicing flow, as shown in Figure 1, enabling clients to input their

payroll directly through the platform, eliminating the need for email-based communication. Based on those inputs and the bulk uploaded data from previous payrolls, this new system had the capability for certain countries to calculate the payroll itself without any human assistance for the calculation. In countries not yet supported by the automatic payroll calculation system, payroll processing is done manually. However, the risk of errors has significantly decreased because the inputs are directly entered into the platform. This information is then automatically forwarded to the relevant personnel, ensuring a smooth collection and distribution of data.

A key feature that was introduced to this system was the two-step invoicing process. This meant that a preliminary invoice would automatically be sent to the client at the start of the month. This invoice only includes the total cost (excluding any payroll inputs) and the platform fee. After sending the preliminary invoice to the client, the client would then have 10 days to review it and submit any inputs or required adjustments to it via the platform. If no inputs were submitted or changes requested, the preliminary invoice would be automatically sent as a final and official invoice to the client, and if any inputs were added or changes requested, they would be taken into account and reflected in the final official invoice. The introduction of this process accelerated the entire invoicing procedure by minimising back-and-forth communication with clients, resulting in a quicker and more transparent invoicing experience.

Once the final official invoices were issued to all clients, the system introduced an automated credit control mechanism to manage the payments efficiently. This meant that once a payment was received, the invoice would be marked as paid, prompting a notification to be sent to the relevant team members to proceed with their standard operations for the client. When payments are not received on time, the credit-control system triggers automatic reminders and notifications at various stages for clients and the internal team. This ensures the timely collection of funds and helps reduce outstanding receivables.

After the invoicing is finished, the automated system also establishes an integration with the company's accounting platform via an API

connection. This means that once the invoicing finished, all financial data was exported directly to the accounting system, ensuring compliance with the financial regulations and maintenance of accurate financial records. This start-to-end automated system not only improved the accuracy and speed of the invoicing but also improved the company's financial reporting and transparency.

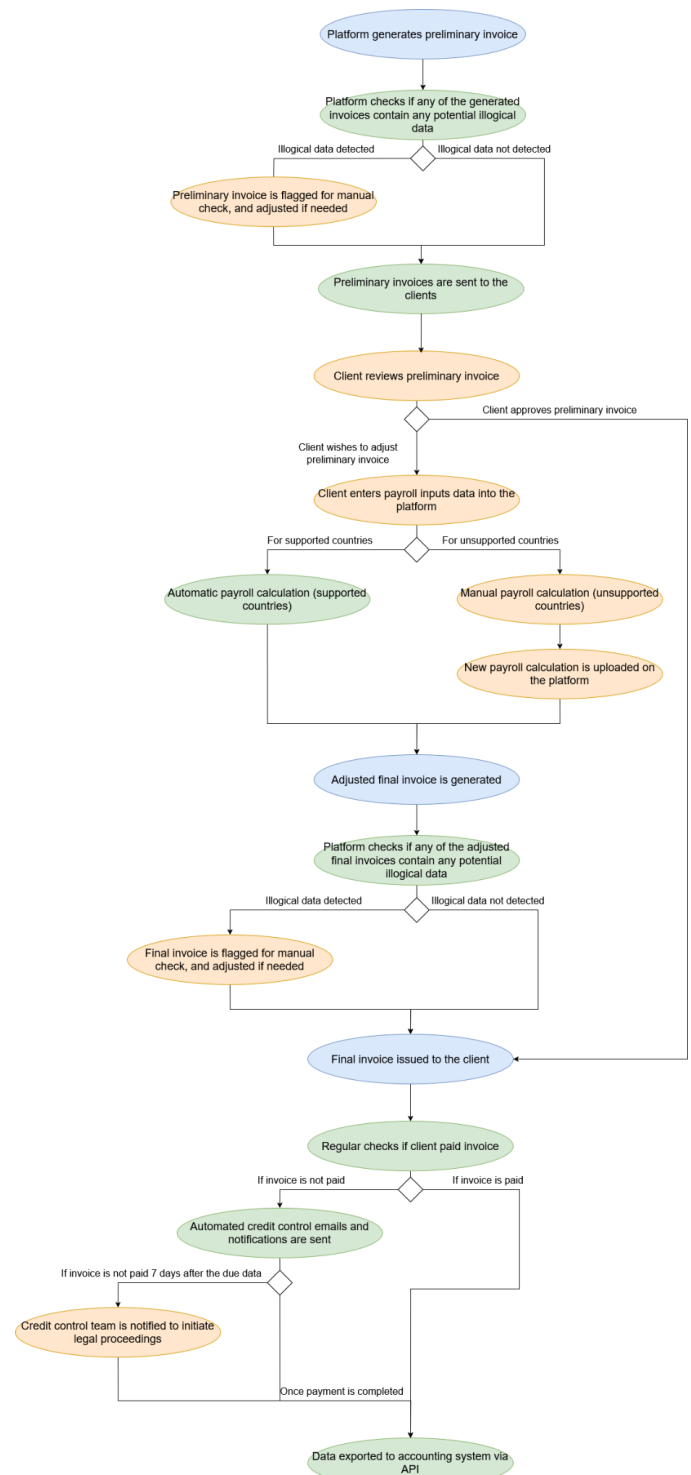


Fig 1. Automated Invoicing Process

The new invoicing system marks a significant improvement over the previous manual process, and further enhancements are planned to achieve even greater efficiency. One key area for future development is the integration of artificial intelligence (AI) for predictive invoicing. This will involve analysing historical data and client behaviour to forecast common payroll inputs and adjustments, allowing the system to pre-fill these details and reduce the need for manual client entries. By automating these aspects of the process, we can minimise the errors that might occur from manual input by clients.

Apart from the previously mentioned planned enhancement, the system one by one is expanding to automate the payroll calculation for the non-supported countries. This can be sped up by leveraging AI-driven data extraction and validation, automating even the most complex payroll calculations and thus lowering the need for manual intervention even further. Furthermore, real-time analytics and dashboards for the payroll and invoicing data can be implemented both for internal and client usage, providing deeper insights into the payroll and invoicing trends and assisting with the decision-making process.

## 4 Methodology & Implementation

The system uses the CRISP-DM (CRoss Industry Standard Process for Data Mining) framework. This framework merges the organised, iterative stages of CRISP-DM with the automated and collaborative features of CI/CD pipelines, guaranteeing effective, scalable, and flexible solutions for automated invoice processing [4]. The implementation of the automated invoicing system followed a structured and phased approach to ensure proper and effective execution. The whole process, as shown in Figure 2, began with several brainstorming workshops, where relevant stakeholders such as finance, payroll, customer experience, and IT were invited to identify the core functionalities of the system. Once a clear vision was established, the next step was the whole scoping process, where requirements were gathered, the key stakeholders were identified, and documentation was done.

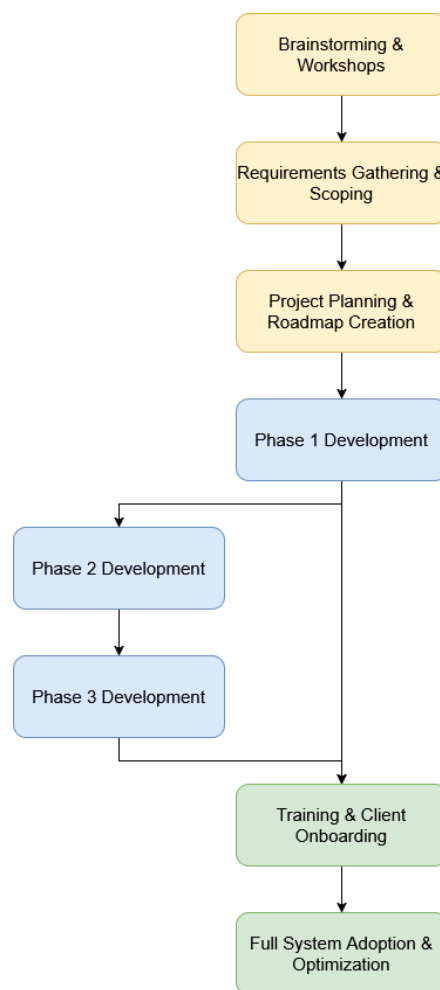


Fig 2. Implementation Steps

In order to ensure smooth development and implementation of the system, the whole project was divided into 3 phases. The first phase focused on the core invoicing functionality, such as invoice generation, clients adding the inputs and the approval workflows. The first phase was developed, tested and implemented within 3 months and included the following key activities:

- Developing the database architecture;
- Building the user interface and functionalities;
- Testing and improving the system.

The second phase also lasted for 3 months until it was entirely done, and this one focused on the introduction of automatic payroll calculations for the supported countries, thus further streamlining and automating the process. The main tasks during this phase were:

- Developing automatic payroll calculations for the supported countries;

- Developing data validation and error-checking mechanisms;
- Testing and improving the system.

The third and final phase was done considerably faster than the previous phases, taking one and a half months to fully implement. It focused on enhancing integration and financial controls. This phase included:

- Developing automated reminders for overdue invoices
- Establishing the API connection with the accounting software
- Testing and improving the system

The implementation team consisted of a multidisciplinary group, which consisted of the following team members:

- One project manager, who was in charge of the whole implementation of the project, communicated with stakeholders and aligned their requirements and expectations, reported to higher management and ensured a smooth implementation and adoption of the system;
- One technical product manager, who was in charge of managing the development team and translating the business needs into well-defined tasks for the development team, and coordinating and aligning the developers, designers and quality assurance specialists (QAs);
- One business analyst who was assisting the project and technical product manager in their activities, taking care of all the needed documentation, creating reports and assisting with the translation of more complex operations, such as the payroll calculations, to easily understandable tasks for the other team members;
- One designer who was in charge of creating the overall look and feel of the whole system, ensuring a good user experience with an intuitive approach and easy-to-follow and understand processes within the system;
- One frontend developer, who was bringing the created designs to life, working in Vue.js to make that happen, and being in constant communication with the QAs to fix bugs and with the backend developers to make sure all

functionalities are well connected with the frontend parts;

- 4 backend developers, who were the ones creating all the needed logic and functionalities for the system to work as expected in a well-optimised and efficient way;
- 2 quality assurance specialists, who were constantly testing all of the flows within the system, in a manual and automated way, in order to ensure that everything was working correctly in a bug-free environment and allowing only fully functional parts of the software to be pushed to production for the company to use.

Apart from this multidisciplinary group, the finance, payroll and customer experience teams were crucial for their constant assistance with testing and providing feedback about the system, thus ensuring a fully functional and well-optimised final system.

The initial deployment of the invoicing system was conducted in a controlled environment, where a select few countries and the clients within them were chosen based on factors such as the number of clients within the country, overall satisfaction of the clients within the country and whether the automatic payroll calculation was supported in the country. This controlled deployment mitigated the potential risks and issues that the implementation might bring and was quite valuable for real-world testing and feedback about the system's performance.

As stated, the transition from the old invoicing system to the new automated one was carefully done to minimise potential disruptions. The clients were onboarded gradually, with clear communication and support provided by the customer experience team. The customer experience team prepared training materials, such as instructional videos and live demonstrations, for clients, thus making the change smoother for them. The internal team, on the other hand, were trained by the project manager and the business analyst, ensuring that all the relevant employees within the company understood how the system functions and how they could assist clients or other colleagues where needed. All clients' full and final transition to the new automated invoicing system was finished

one month after the third phase was completed. This was possible because the first clients were introduced to the system after the finalisation of the first phase, and each month, more and more countries and clients transitioned to the system.

A comparison with the existing invoicing system highlights the advantages of this automated invoicing system. According to several studies, traditional invoicing systems often suffer from bottlenecks related to manual data entry and approval delays. Research indicates that semi-automated invoicing solutions face data synchronisation and real-time tracking challenges, as highlighted in various articles discussing integrating advanced methodologies like DevOps [4] and blockchain [5] for improved invoice processing. Unlike the systems stated there, this automated invoicing system provides end-to-end automation, eliminating most of the manual intervention, thus significantly reducing the invoicing time and ensuring data accuracy. Furthermore, the invoicing systems in the studies mainly focus on partial automation for the invoicing process only. In contrast, this system includes not only invoicing but also payroll calculation, payment tracking, and credit control, all of which are integrated within a single platform.

In conclusion, the phased approach taken to implement the automated invoicing system ensured a smooth transition, allowing for iterative improvements and adaptations of the system based on the feedback received. The well-structured rollout to the clients, in combination with the extensive training and support provided, resulted in a smooth and seamless transition for both the clients and the internal team. By addressing the inefficiencies found in the old invoicing system and other similar ones, this solution provided full automation and significant advancement in the overall operational efficiency of the invoicing process.

## 5 Results

With the implementation of the automated invoicing system, the operational efficiency of the company significantly improved. Previously, the process of generating one single invoice took between 5 and 10 minutes, which resulted in hundreds of work hours spent monthly only on the

generation and issuance of the invoices. With the new system, an overwhelming majority of the invoices are generated and issued automatically, reducing the average processing time per invoice to 5 seconds. The only exception is when the payroll calculation must be done manually for non-supported countries. Even in these cases, the process is still smoother and faster, proving how the new automated invoicing system has drastically improved the whole invoicing process.

The automation of the invoicing process led to the reallocation of the internal resources, i.e. the previously named invoicing team. This dedicated team worked on managing the invoice creation, manually inputting the data and ensuring the accuracy of the invoices. For the new invoicing system, only one person is required to oversee and manage the invoicing processes through it, which allowed the rest of the team to be reallocated to more strategic roles, focusing on process improvements, business development and other financial and operational processes. Additionally, with the implementation of the new system, the need for paying for the old third-party invoicing system ceased to exist, and all of these together led to significant cost reductions for the company and positively impacted the company's profitability and scalability.

With this implementation of the automated invoicing system, the most significant efficiency gains can be observed in the invoicing and payroll processes. The time required for invoicing was reduced by over 98%, thus allowing a single employee to manage the entire process instead of a full team. Similarly, the payroll calculations also saw a substantial improvement, decreasing the time taken for payroll calculations by 80%. In Figure 3, it can be visually observed how significant the efficiency gains are from a comparison between the old and new system when it comes to generating one invoice and one payroll calculation. With this upgrade, many resources were freed up for other strategic initiatives while significantly reducing operational costs.

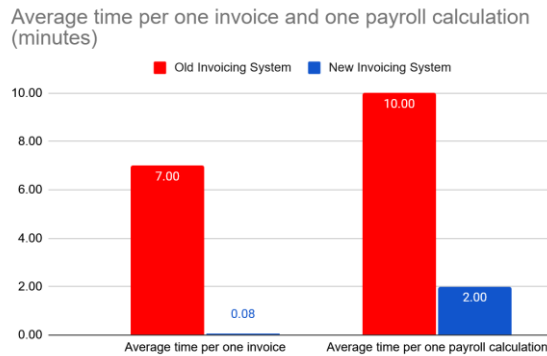


Fig 3. Average time per one invoice and one payroll calculation comparison

For example, in Figures 4 and 5, an invoice generated by the new system can be observed in how it is structured. Furthermore, to better explain the efficiency gains, if one employee is taken and is working 8 hours daily, how many invoices and payroll calculations can they do in one day? Figure 5 shows how one employee with the old invoicing system can process 69 invoices or do 48 payroll calculations, as compared with the invoicing system, where they can process 6,000 invoices or do 240 payroll calculations on a daily basis. The difference and efficiency gains are staggering when observed, and it comes as no surprise that one employee working on the invoicing can replace the whole invoicing team, which was needed with the old system.

**Final invoice**

Invoice Date	2025-03-01	Invoice Number	INV-9999	VAT number	99999
--------------	------------	----------------	----------	------------	-------

TO	FROM
Example Client	Example Entity
Address	Address
Post Code	Post Code
City	City
Country	Country
example@gmail.com	

DESCRIPTION	QUANTITY	UNIT PRICE	VAT	AMOUNT EUR
Example employee 1	1	111.00	No Vat	111.00
Example employee 2	1	666.00	No Vat	666.00
			Subtotal	777.00
			Total VAT	0.00
			Total EUR	777.00

Fig 4. The first page of the generated invoice

DESCRIPTION	QUANTITY	UNIT PRICE	VAT	AMOUNT AMD
<p><b>Due Date : 2025-03-15</b></p> <p>Account Currency: (EUR)</p> <p>Receiving Bank (Pay to): test</p> <p>City : test</p> <p>SWIFT Code: 345345345345</p> <p>Beneficiary name (For Credit to): test</p> <p>IBAN: EX000111222333444555666</p>				
<p>The contracting part of record is:</p> <p>Example Entity</p> <p>Address</p> <p>City, Country</p>				
<p>VISA   </p> <p>View and pay online now</p>				

Fig 5. The second page of the generated invoice



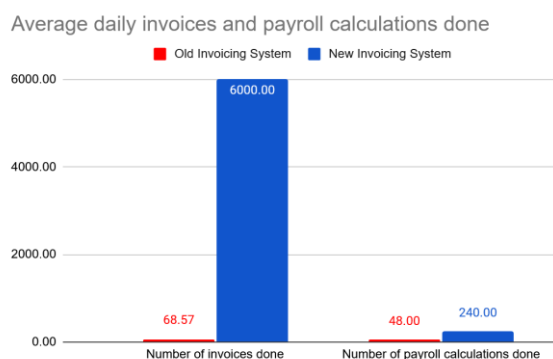


Fig 6. Average daily invoices and payroll calculations are done by one employee

Beyond the internal efficiency gains, the new automatic invoicing system has also improved client satisfaction and overall cash flow management. Now, clients receive more accurate invoices faster, with fewer errors experienced, which allows the payments to be made faster. Alongside this, the automated credit control system ensures that any unpaid invoices are immediately followed up on, thus reducing payment delays. The company improved its cash flow and financial stability by processing the invoices more efficiently. All in all, the automation of the invoicing system created an efficient, scalable and cost-effective approach to handling large amounts of invoices on a monthly basis.

## 5 Conclusion

Efficient operational processes are essential for any company that aims to improve its productivity, reduce its costs, and improve its overall performance. As shown in the case study, optimising the invoicing via automation not only streamlined the whole invoicing process but also reduced the number of manual tasks, reduced the number of errors occurring and improved the cash flow of the company. By shortening the invoice generation time from 5 to 10 minutes per invoice to an average of 5 seconds, the company significantly increased its efficiency in the process and utilised the human resources previously working on this for other strategic initiatives. This upgrade highlights the broader impact a well-optimised operational process can have when the repetitive manual tasks are automated; companies can reallocate their workforce

to other higher-value initiatives, which will bring additional long-term value to the company.

A key lesson to be learnt from this case study is that companies should constantly review their operational processes in order to identify any inefficiencies, which can be improved via automation. The shift from the old third-party invoicing system to the new automated invoicing system demonstrates the significant time and cost savings achieved by the company, rightfully focusing on improving its operational processes. Other companies, especially ones with a more significant number of B2B clients, can apply similar automation strategies for their invoicing process and reap the benefits. By utilising digital tools and different automation strategies in the operational processes, companies can improve their efficiency and enhance their customer satisfaction, scalability and financial stability. This automated invoicing system's success shows the importance of proactive innovation in a company, ensuring long-term success and resilience in a competitive market.

## Declaration of Generative AI and AI-assisted technologies in writing process

While preparing this work, the author(s) used Grammarly to correct the grammatical and syntactical errors, improving the study's correctness and readability. After using these tools/services, the author(s) reviewed and edited the content as needed and took full responsibility for the publication's content.

### References:

- [1] Gunaratne, H.; Pappel, I. Enhancement of the e-Invoicing Systems by Increasing the Efficiency of Workflows via Disruptive Technologies. In *International Conference on Electronic Governance and Open Society: Challenges in Eurasia*; Springer International Publishing: Cham, Switzerland, 2020. DOI: 10.1007/978-3-030-67238-6\_5
- [2] Bhardwaj, V.; et al. Optimising Structured Data Processing Through Robotic Process Automation. *arXiv* 2024, arXiv:2408.14791. <https://doi.org/10.18280/jesa.570528>

- [3] Fernandes, A.; Ferreira, I. Electronic Invoice System as a Driver to Enhance Efficiency and Competitiveness: The Case of Tabique Engenharia Enterprise. *Journal of e-Government Studies and Best Practices*, Vol. 2022, Article ID 607448, 2022. DOI:10.5171/2022.607448.
- [4] Dragomirescu, O.-A.; Crăciun, P.-C.; Bologa, A.R. Enhancing Invoice Processing Automation Through the Integration of DevOps Methodologies and Machine Learning. *Systems* 2025, 13, 87. <https://doi.org/10.3390/systems13020087>
- [5] Danner, M., Maurer, B., Schuh, S., Greff, T., Werth, D. (2021). Invoice Automation: Increasing Efficiency in the Office at Satherm GmbH Using Artificial Intelligence. In: Urbach, N., Röglinger, M., Kautz, K., Alias, R.A., Saunders, C., Wiener, M. (eds) *Digitalization Cases Vol. 2. Management for Professionals*. Springer, Cham. [https://doi.org/10.1007/978-3-030-80003-1\\_3](https://doi.org/10.1007/978-3-030-80003-1_3)
- [6] Sontakke, N. et al. A novel approach for invoice management using Blockchain. *arXiv preprint arXiv:2309.03303* (2023) <https://doi.org/10.48550/arXiv.2309.03303>
- [7] Verhoef, P.C.; et al. Digital Transformation: A Multidisciplinary Reflection and Research Agenda, *Journal of Business Research*, Vol 122, 889–901. 2021. <https://doi.org/10.1016/j.jbusres.2019.09.022>
- [8] Ramírez-Rosas, J.G.; Neri-Suárez, M.; Torres-González, M.A. Automation of Fiscal Auditing in SMEs through a Sequential Algorithm for Extracting Tax Receipts: A Focus on the Digital Economy. *International Journal of Combinatorial Optimization Problems and Informatics*, vol. 15, no. 5, Nov. 2024. <https://doi.org/10.61467/2007.1558.2024.v15i5.565>
- [9] Mäkelburg, J., John, C., Acosta, M. (2024). Automation of Electronic Invoice Validation Using Knowledge Graph Technologies. In: Meroño Peñuela, A., et al. *The Semantic Web. ESWC 2024. Lecture Notes in Computer Science*, vol 14664. Springer, Cham. [https://doi.org/10.1007/978-3-031-60626-7\\_14](https://doi.org/10.1007/978-3-031-60626-7_14)
- [10] Felix Krieger, Paul Drews, Burkhardt Funk, Automated invoice processing: Machine learning-based information extraction for long tail suppliers,

*Intelligent Systems with Applications*, Volume 20, 2023, 200285, ISSN 2667-3053, <https://doi.org/10.1016/j.iswa.2023.200285>

#### **Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)**

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

#### **Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself**

No funding was received to conduct this study.

#### **Conflict of Interest**

The authors have no conflicts of interest to declare that are relevant to the content of this article.

#### **Creative Commons Attribution License 4.0 (Attribution 4.0 International, CC BY 4.0)**

This article is published under the terms of the Creative Commons Attribution License 4.0

[https://creativecommons.org/licenses/by/4.0/deed.en\\_US](https://creativecommons.org/licenses/by/4.0/deed.en_US)