

Leveling Up Process Efficiency: AI as a Game-Changer for SMEs

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Abstract. *This paper explores the artificial intelligence (AI) technology influence on business processes in small and medium-sized enterprises (SMEs) in the Republic of Croatia. Artificial intelligence tools that improve operational efficiency and competitiveness include big data analytics, pattern recognition, consumer behaviour prediction, and process automation. A survey was conducted among representatives of owners and directors of Croatian SMEs, and descriptive statistics were performed. SMEs in the Republic of Croatia face obstacles such as high upfront expenditures and security concerns, which hinder their implementation, despite the growing global adoption of AI. A Croatian study of 413 SMEs found that while AI's potential is widely recognized, its current application is still somewhat limited. According to the results, AI will gradually impact the operations of SMEs, improving their ability to compete in the market, be cost-effective, and be innovative.*

Keywords. artificial intelligence, business process, small and medium-sized enterprises

1 Introduction

Artificial intelligence (AI) is one of the main things that is driving the digital transformation of businesses today. Also, AI is becoming more widely available to small and medium-sized enterprises (SMEs) now that it has a range of tools for making operations more efficient, flexible, and responsive to the market. Before, AI was only available to large enterprises with a lot of technology infrastructure. Enterprises can use AI tools like big data analytics, pattern recognition, predicting consumer behavior, and automating processes to improve their operations, cut costs, and make decisions based on data. Since SMEs frequently function with limited financial, human, and technological resources, these capabilities are especially pertinent to them.

AI is not only a tool for improving processes, but it is also a strategic way for SMEs to stay competitive. AI can help enterprises create and deliver new and distinctive outcomes that meet the needs of specific customers in much less time. By adding AI to their operations, SMEs can react to the market and make their production systems more flexible. Therefore, in a business world that is getting more dynamic and unpredictable, digitalisation and automation help SMEs become stronger and more flexible.

According to empirical research, some fields, like transportation, logistics, automotive, and information technology, are adopting AI faster than others, like the chemical industry (Küpper et al., 2018). These disparities reflect differing expectations, sector-specific constraints, and varying levels of digital readiness. Furthermore, skepticism among some managers regarding the tangible value of AI contributes to cautious investment behavior, even when potential efficiency gains are well-documented.

It is also anticipated that AI will increasingly influence core business processes, from procurement and supply chain management to production, marketing, finance, and customer support. Notably, AI does not aim to replace existing business methodologies, but rather to augment them, primarily by automating routine jobs and helping employees to concentrate on higher-value, creative, and strategic roles (Küpper et al., 2018).

The adoption of AI will also entail structural shifts in the labor force. While some job functions may become obsolete due to automation, new roles will emerge in areas requiring complementary human skills and advanced digital literacy (Küpper et al., 2016). This transformation highlights the demand for constant employee education and training, particularly in SMEs seeking to build long-term competitive advantages.

This study examines the AI role in transforming business processes within Croatian SMEs, focusing on perceived benefits, adoption challenges, and the broader implications for organizational efficiency and competitiveness.

The following section outlines the theoretical framework that informs this analysis, including definitions of AI, classification of SMEs, and adaptation of AI technology in business processes. The third section presents the methodological framework used in this study to assess the adoption patterns and perceived impacts of AI among Croatian SMEs. The fourth chapter presents an analysis and the fifth discussion of the results. The last chapter is a conclusion with stated limitations and recommendations.

2 Theoretical background

Artificial intelligence represents “a branch of computer science concerned with developing the ability of computers to perform tasks that require certain forms of intelligence. This may include navigating specific situations, learning to handle new circumstances, acquiring new concepts, analyzing data and drawing conclusions based on that analysis, understanding language, and many other activities” (Prister, 2019, p. 69).

Also, AI contains a wide range of computational techniques that allow machines to complete tasks typically demanding human intelligence, like learning, reasoning, problem-solving, and decision-making (Russell & Norvig, 2020). In a business context, AI technologies—including machine learning, natural language processing, computer vision, and robotics—facilitate automation, predictive analytics, and real-time data interpretation, thereby contributing to enhanced decision-making and operational efficiency.

Small and medium-sized enterprises are a vital component of national and regional economies, particularly within the European Union, where they represent around 99% of all enterprises and generate more than half of total value added (Di Bella et al., 2023). The number of employees (fewer than 250) and the annual turnover (not exceeding €50 million) are two common ways to define SMEs. However, definitions may differ by country (Official Journal of the European Union, 2003).

SMEs are crucial for economic growth, but they often face structural challenges, including insufficient funding, limited research and development capabilities, and slow growth. These things often make it difficult for them to invest in and use new technologies, like AI. Additionally, AI systems are highly complex, and SMEs often lack the in-house expertise to capitalize on digital opportunities.

Structured and related tasks that work together to make a product or service that meets specific customer needs are called business processes (Dumas et al., 2018). Adding AI to these processes can enable organisations to work more effectively by making them faster, more accurate, and more flexible (Davenport & Ronanki, 2018). Predictive maintenance in production systems, intelligent supply chain management,

dynamic pricing models, fraud detection, and AI-enhanced customer service platforms are among the most common applications of AI in business process optimization (McKinsey & Company, 2021).

Artificial intelligence is a big step forward in how enterprises make money by automating tasks. AI-powered solutions are becoming increasingly important for “smart automation,” which helps enterprises automate monotonous tasks, make workflows better, personalise customer experiences, and guess what will happen in the future (Davenport & Ronanki, 2018). This change affects more than just operations. It also affects strategic planning and the ability to come up with new ideas at every level of the value chain.

In manufacturing, AI has the potential to revolutionise production processes through task automation, predictive analytics, and the development of adaptive systems (Arinez et al., 2020). Artificial intelligence assists SMEs with intelligent manufacturing, predictive maintenance, customised production, and supply chain optimisation. These factors enhance the flexibility and efficiency of enterprises (Li et al., 2017; Buchmeister, 2019). Moreover, AI is helpful in some ways, but SMEs have problems implementing it since it demands many data, is hard to train models, is risky for cybersecurity, and uses more energy (Plathottam et al., 2023; Perrault et al., 2019). Nevertheless, SMEs can use AI to enhance productivity, product quality, and competitiveness in the market by carefully dealing with these problems and encouraging people and AI to work together.

Due to its ability to facilitate data-driven decision-making, real-time customer interaction, and process automation, AI in marketing is essential to increasing the competitiveness of SMEs. Machine learning, natural language processing, and predictive analytics are examples of AI technologies that help SMEs with performance optimisation, content personalisation, and market segmentation (Abrokwah-Larbi & Awuku-Larbi, 2023; Eriksson et al., 2020). Enterprises may engage with customers, cut costs on assistance, and provide service 24/7 with chatbots and other tools (Johannsen et al., 2018; Jin et al., 2019). Artificial intelligence also helps marketers by giving them important information about how customers act, which lets them set prices that change, automate content, and target customers more precisely (Enshassi et al., 2024). When SMEs start embracing AI, they need to modify the way they do things and the way their workers conduct their jobs. Though AI will make them more efficient, satisfied customers, and offer them an edge over their competitors in the long run (Verma et al., 2021; Enholm et al., 2021).

Artificial intelligence in sales helps SMEs by taking care of dull administrative work, which frees up sales staff to spend more time selling and getting things done faster (Chatham, 2023; HubSpot, n.d.). Also, AI looks at many data to help with lead scoring, dividing customers into groups, and coming up with more

innovative sales techniques. This makes people work harder and sell more (Chatham, 2023; Salesforce, 2024). Artificial intelligence's predictive analytics and automation tools give SMEs an edge over their competitors by allowing them to connect with customers in a more personal way and make strategic changes at the correct time (McKinsey, n.d.a).

AI is becoming more and more important to SMEs as a way to assist them in making better decisions by discovering patterns and predicting trends. This gives them an advantage over their rivals (Pozzo et al., 2024). Enterprises can make decisions faster and more accurately with the help of AI that also does things on its own, makes greater use of resources, and decreases the chance of human error. This helps enterprises generate new ideas and establish plans for the future (Filippi et al., 2024). A key benefit of AI is lowering prediction costs, much like how semiconductor technology reduced computational costs and transformed industries; this has expanded AI's application in inventory management, finance, and marketing, leading to better data-driven decisions (McKinsey, n.d.b). Despite AI's predictive superiority, human judgment remains essential for final decision-making (McKinsey, n.d.b).

3 Methodology

This research examines the opinions of SMEs owners and employees in Croatia about how AI affects their jobs. The study looked at how AI affected the business processes of a number of enterprises in a variety of fields, the challenges that came up when it was put into use, and the benefits that were expected to come from AI in the future.

The main goal of this study was to find out how AI affects the workflows of SMEs by asking about their processes, figuring out the best ways to use AI in these workflows, and figuring out how to put it into practice. The questionnaire was adapted from two prior studies conducted among German SMEs: one involving 98 enterprises (Szedlak et al., 2020) and another surveying 283 firms (Uric & Frank, 2021).

Also, the survey was designed and conducted from August to October 2024 using a Google Forms questionnaire. The survey targeted SMEs across various industries and geographic locations within the Republic of Croatia. The anonymous questionnaire was distributed via email to enterprise addresses obtained from the FINA database. Out of 4,400 emails sent, 435 responses were collected, resulting in a response rate of 9.89%.

The survey consisted of 13 primarily closed-ended questions. Participants assessed the degree of AI's influence on different business processes on a 5-point Likert scale, ranging from 1 (no impact) to 5 (extremely high impact).

The first three questions aimed to gather essential enterprise information, including industry sector,

enterprise size, and geographic location for classification purposes. Subsequent questions focused on the adoption and duration of AI technology use, as well as the primary applications of AI in daily business operations.

The survey then explored the extent of AI's impact on business activities, the importance attributed to AI integration in specific business processes, and perceived opportunities stemming from AI adoption. Additionally, respondents were asked about challenges or barriers encountered or anticipated during AI implementation. Finally, the survey assessed the perceived significance of investing in AI for the enterprise's future strategic development.

4 Analysis of results

A total of 435 responses were collected, of which 22 were from large enterprises; these were excluded from the analysis. The final sample consisted of responses from 413 enterprises.

The first survey question addressed the industries in which the participating enterprises operate. The largest share, 22.8% (99 enterprises), was in wholesale and retail trade, followed by 15.2% (66 enterprises) in construction and 14.3% (62 enterprises) in other service activities. Additionally, 9.2% (40 enterprises) operated in telecommunications, computer programming, and other IT services, while 8.3% (36 enterprises) were in manufacturing. Other industries accounted for 5% or less of the sample. These results indicate that the survey included enterprises from diverse industries, not solely SMEs focused on technology or closely related to AI.

The second question focused on enterprise size classification. Among respondents, 43.2% (188) identified as small enterprises, 30.3% (132) as medium, and 21.4% (93) as micro enterprises. Large enterprises accounted for 5.1% (22) and were excluded from further analysis due to the study's focus.

The third question addressed the geographical location of the enterprises' headquarters within Croatia. The majority, 57% (237 enterprises), are based in Central Croatia, followed by 18% (73) in Dalmatia, 13% (53) in Slavonia, and 12% (50) in Istria and Kvarner. The data indicates that most surveyed enterprises are situated in Central Croatia, with 165 of them headquartered in Zagreb.

The following question explored the duration of AI usage within the surveyed enterprises. A majority of 56.3% enterprises (240) reported not using any form of AI in their operations. Meanwhile, 16.3% (67) have adopted AI within the past year, 19.5% (81) between one and three years ago, 3% (9) for three to five years, and 4.8% (17) for over five years. This indicates that 43.7% of the respondents currently use AI technology, which is a significant proportion for SMEs in Croatia.

A related question addressed the frequency of AI use in daily business activities. Of the enterprises

surveyed, 44.8% (191) do not utilize AI regularly, 17% (70) use it rarely, 16.8% (69) occasionally, 12% (48) frequently, and 9.4% (37) very frequently.

The sixth question examined how enterprises incorporate AI technologies—whether as part of their product offerings, embedded in daily processes, or as services provided. Among 413 respondents, 6.1% enterprises (25) indicated that AI is used within their products, 33.9% (140) employ AI as part of their processes, and 22% (91) integrate AI within their service offerings, while 53.1% (231) do not use AI technologies.

The next question examined respondents' perceptions of AI's impact across various business functions. AI was seen to have any level of influence on finance (52%), human resources (51%), and accounting (55%), while 45 to 49 % of enterprises believe that AI does not affect the listed business functions. The highest percentage of any impact was reported in research and development and IT, both at 67% while 34 % of enterprises believe that there is no impact of AI in the aforementioned business areas. Sales (60%), logistics (55%), and production (47%) were also noted as influenced by any level of AI (low, moderate, high or extremely high). Overall, production, accounting, finance, and HR were rated as having low impact (means from 2 to 2,04), sales, logistics, and customer service as moderate (means from 2,14 to 2,34), while marketing, IT, and R&D had high but not extremely high influence (means from 2,71 to 2,82).

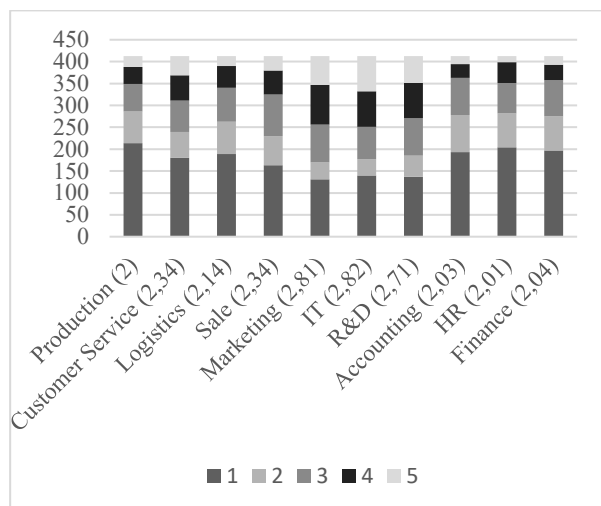


Figure 1. AI's influence on different business areas (mean in bracket)

Source: authors' work

In Figure 2, the results indicated that autonomous vehicles, resource management, and robotics were deemed the least important processes influenced by AI (means 2.03 and 2.27). Quality control, process management, predictive maintenance and logistics processes, were moderately important processes (means from 2.29 to 2.32), while chatbots, assistance (aid) systems, automation, and language assistants

were considered the most critical processes being influenced by AI (means from 2.47 to 2.91).

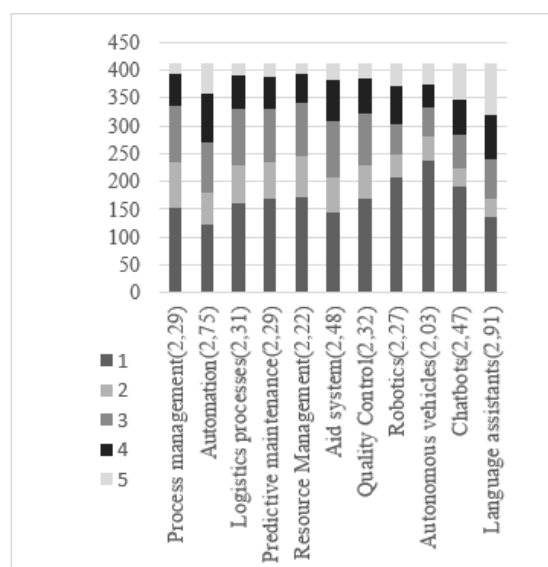


Figure 2. The importance of certain processes being influenced by AI (mean in bracket)

Source: authors' work

Enterprises identified key opportunities from AI implementation as process acceleration (61.4%), improved data utilization (56.6%), process automation (46.7%), and cost savings (46%). Enhanced decision-making (37.7%) and new business model development (32.6%) were also highlighted.

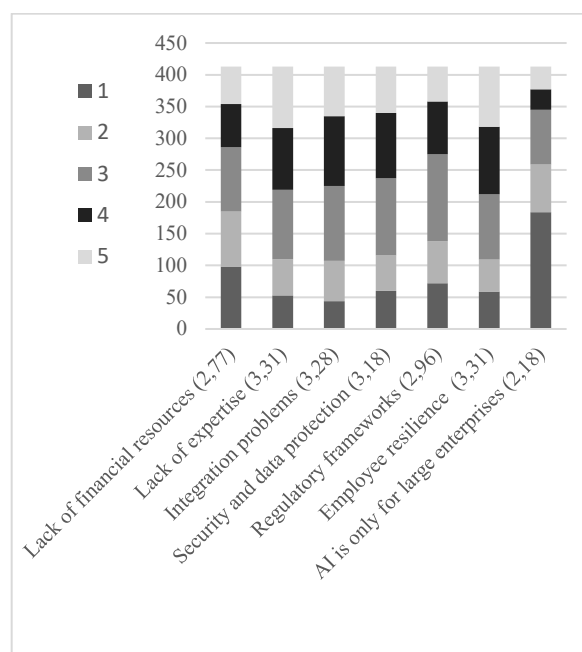


Figure 3. Challenges/obstacles to implementing AI (mean in bracket)

Source: authors' work

Regarding challenges, employee resistance and lack of expertise were identified as primary barriers (both mean 3.31). Integration issues (mean 3.28) and

data security (mean 3.18) were moderate concerns, while regulatory frameworks (mean 2.96), financial constraints (mean 2.77), and perceptions of AI being suitable only for large enterprises (mean 2.18) were less significant obstacles. Open-ended responses pointed to data inaccuracy and misinformation as additional implementation challenges.

When asked about AI's future impact, 91.3% of SMEs anticipated some level of influence, ranging from moderate (35.6%), minor (26.4%), high (19.1%) to extremely high (10.1%). Finally, 90.6% recognised the importance of investing in AI as part of their future development strategy, though opinions varied on the level of importance (23.7% low, moderate 34.9%, high 17.2% and 9.4% extremely high).

Table 1. The key findings of the paper

Main industries of the surveyed enterprises	Wholesale and retail trade (22.8%), Construction (15.2%), IT (9.2%)
Classifications of enterprises	43.2% Small, 30.2% Medium and 21.4% Micro
Geographical area of the surveyed enterprises	57% Central Croatia
Duration of AI usage by surveyed enterprises	56.3% do not use, 19.5% use AI in the last 1-3 years
How SMEs are using AI	As part of the process (32.2%)
The most influenced business areas by AI technologies in the surveyed enterprises	IT & Marketing
The most important processes to be influenced by AI	Language assistants
The main opportunities for the implementation of AI in the business of the surveyed enterprises	Speed up the process (61.4%)
The main challenges that the surveyed enterprises face for the implementation of AI	Lack of expertise and the resilience of employees to change
How many enterprises think AI will have an impact on their business in the future	35.6% - medium impact, 26.4% - low impact, 19.1% - high impact
The importance of the surveyed enterprises on investing in AI as a strategy for future development	34.9% - medium-important, 23.7% - minor, 17.2% - very important

Source: authors' work

The key findings are summarized in table 1.

5 Discussion

The survey collected responses from enterprises across various industries, encompassing a total of 413 participants. Among these, 22.8% were from the wholesale and retail trade sector, 15.2% from construction, 14.3% from other service activities, and 9.2% from the telecommunications and IT sector. This distribution indicates a broad representation of SMEs beyond those directly engaged in technology sectors.

Comparatively, a similar study conducted in Germany surveyed 98 SMEs, with 27% from service industries, 17% from IT, and 15% from manufacturing (Szedlak et al., 2020). A different German research of 283 SMEs indicated that 38% of them were in the services sector, 11% were in manufacturing, and 41% were in information (Ulrich & Frank, 2021). These studies help us learn more about how SMEs in different nations use AI and what it does.

When it comes to using AI, 32.2% of Croatian SMEs stated they used it in their processes, 21.1% in their services, and 5.7% in their goods. The German research, on the other hand, indicated higher adoption rates, with 51% using AI in processes, 16% in services, and 6% in goods (Szedlak et al., 2020). The differences between the two countries could be because they are at different levels of AI knowledge and use.

The survey also looked at how respondents thought AI might affect different areas of business. Fifty-two percent of Croatians SMEs were asked said that AI had an effect on finance, 51% said it had an effect on human resources, 55% said it had an effect on accounting, 67% said it had an effect on R&D, 67% said it had an effect on IT, 60% said it had an effect on sales, 55% said it had an effect on logistics, and 47% said it had an effect on production. These results suggest that respondents are aware of the effects of AI on a range of moderate to high-level business tasks.

In contrast, the German studies revealed that AI had a higher effect on finance (88%), human resources (78%), accounting (80%), research and development (75%), IT (90%), sales (85%), and production (80%). These differences could suggest that the two countries are at different stages of being ready for AI and being able to employ it.

Seventy percent of SMEs in Croatia considered that automation processes must be under the influence of AI. This is the same as 80% of SMEs in Germany who said the same thing (Szedlak et al., 2020). Respondents in Croatia believe that the assistance (aid) system it is important to be influenced by AI for 65% of Croatian SMEs 65%, while it was important to 95% of German SMEs. These were the major discrepancies in the compared results.

When asked what the benefits of using AI were, 61.4% of SMEs in Croatia said it would speed up processes, 56.6% said it would make data use more efficient, 46.7% said it would automate processes, 46% said it would save money, 37.7% said it would help them make better decisions, 32.6% said it would help

them come up with new business models, and 22.1% said it would help them control risks better. The German study found that AI could speed up process 66%, data was used more efficiently 72%, processes were automated 77%, possible savings 55%, decisions were made better 53%, new business models were created 43%, and risks were controlled 31% (Ulrich & Frank, 2021).

The study also found that 86% of Croatian SMEs were worried about their employees not wanting to use AI and not knowing enough about it. The German studies also showed that a lack of competencies and expertise is the main barrier to implementing AI for 65% enterprises (Ulrich & Frank, 2021). These problems keep coming up, which shows how important it is to change the enterprise's culture and teach people new skills so they can use AI more easily.

Finally, Croatian SMEs know that AI has a lot of potential, but they don't seem to be using it or incorporating it as much as their German counterparts. This means that enterprises need to do more to teach their employees how to use AI, raise awareness of it, and build the infrastructure that will help them get the most out of its benefits.

6 Conclusion

AI technologies like machine learning and neural networks have made it possible for enterprises to look at large datasets, detect patterns, and make decisions based on data. With these technologies, enterprises can save money, work more efficiently, and improve their overall performance. Increasingly, departments in both large and small enterprises are utilizing AI. Production, logistics, marketing, human resources, and strategic management are some of these divisions. An enterprise that uses AI has an advantage over its competitors in today's fast-paced world because with AI, an enterprise can monitor market trends, predict what customers will want, and improve business strategies.

The results show that Croatian SMEs know how AI can help them, mostly by speeding up work, automating tasks, and keeping track of resources. A lot of people know about AI solutions, but they haven't started using them yet. Respondents think that the biggest problems are high start-up costs, not having enough skilled workers, and worries about keeping data safe and managing risk.

Yet enterprises that use AI early on are likely to get ahead of their competitors and do better in the market. The survey found that 91% of respondents think AI will have an effect on their business in the future, and 10% think it will have an extremely high effect. Furthermore, 90% consider investment in AI technologies important for their future development strategies, and 9.1% view it as critically important for long-term growth.

These findings highlight that Croatian SMEs are increasingly open to exploring AI, especially when its value is clearly linked to enterprise outcomes. Enterprises willing to adapt and strategically implement AI stand to not only improve performance but also contribute positively to the broader economy.

However, this study surveyed 413 SMEs in Croatia, representing only about 0.2% of the total SME population, which limits the generalizability of the findings. Data were collected solely through self-reported online questionnaires, introducing potential subjectivity and response bias. Additionally, the research was conducted within a specific timeframe, which may affect the applicability of results under changing economic conditions. Future studies should consider larger, more diverse samples and incorporate qualitative methods, such as in-depth interviews, to provide deeper insights into AI's impact on SMEs.

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