UMETNA INTELIGENCA: NOVI ZAPOSLENEC V SLOVENSKEM NACIONALNEM GOSPODARSTVU?

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Začela se je nova tehnološka revolucija! Umetna inteligenca (UI) lahko popolnoma spremeni vse vidike človeškega življenja. V tem prispevku bomo razpravljali o uvajanju umetne inteligence v slovenski zasebni sektor in o tem, kako to področje, ki združuje računalništvo in robustne podatkovne zbirke, omogoča reševanje problemov. Z uporabo večstopenjskega postopka zbiranja podatkov smo lahko opredelili več oblik umetne inteligence, ki so trenutno prisotne v slovenskem zasebnem sektorju. Rezultate empirične raziskave smo ovrednotili z intervjujem s strokovnjakom, ki uporablja orodja, podprta z umetno inteligenco, za celovitejše razumevanje prednosti in morebitnih posledic uvajanja umetne inteligence v zasebnem sektorju. Glede na našo raziskavo je pričakovati, da bo umetna inteligenca v bližnji prihodnosti z odpravo potrebe po človeškem dejavniku ukinila več poklicev v slovenskem zasebnem sektorju. Po drugi strani pa naj bi se pojavili novi poklici, ki bodo temeljili na človeškem dejavniku, ki bo sodeloval z umetno inteligenco in ne proti njej.

ARTIFICIAL INTELLIGENCE: A NEW EMPLOYEE IN SLOVENIA'S NATIONAL ECONOMY?

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A new technological revolution has begun! Artificial intelligence (AI) has the potential to completely revolutionize every aspect of human life. In this paper, we'll discuss the implementation of artificial intelligence in Slovenia's private sector and how this field that combines computer science and robust datasets enables problem-solving. Utilizing a multi-step data collection process, we were able to identify several forms of artificial intelligence currently present in Slovenia's private sector. The results of the empirical research were evaluated through an interview with a professional who utilizes AI-assisted tools for a more comprehensive understanding of the advantages and eventual consequences of implementing artificial intelligence in the private sector. According to our research, artificial intelligence is expected to put an end to several professions in Slovenia's private sector by eliminating the need for human factors in the near-distant future. On the other hand, new professions are expected to emerge and will be based on the human factor working with artificial intelligence and not against it.

1 Introduction

When we use the term artificial intelligence (AI) today, in most cases, it's perceived as a relatively new concept related to information and communication technologies (ICT). Artificial intelligence is one of the oldest and broadest fields of computer science that deals with mimicking the functions required for real-life problem-solving and building that interact, learn, and think just like a real human being would. Artificial intelligence (AI) is a relatively newer term. In its initial phases of research and development, it was known simply as "machine intelligence" (MI) (Poole et al., 2010) in stark contrast to human intelligence (HI) (Russell & Norvig, 2010).

Artificial intelligence is currently rising in popularity due to its unique technical capabilities which are primarily based on the concept of machine learning (ML). Machine learning (ML) is a segment of artificial intelligence-driven by the development of new statistical learning algorithms that were complemented by large amounts of quality data (Abadi et al., 2016). The aim of ML and AI is to evolve into actual software capable of mimicking learning from previous experiences and using available information to mimic active decision-making/problem-solving (Holzinger et al., 2019).

This unique field that combines computer science and robust datasets to enable problem-solving was named: "artificial intelligence" by John McCarthy in 1956 (known as the father of AI). But why are we developing artificial intelligence, and do we need it to improve our lives? According to Poole of the University of Cambridge, the answers can be traced back to ancient civilizations. Throughout history, human beings have been developing technological solutions to improve and model themselves. The earliest traces of human innovation can be found in ancient China, Egypt, and Greece. Innovation has always been the main engine for improving standards of living throughout human history. (Poole et al., 2010).

As AI-assisted tools gain in popularity, across the world, industries and companies are racing to scale up their AI capacities. Artificial intelligence has the unique potential to completely revolutionize the way we do business and conduct our lives. It is considered by many to be the most important technology for the development of the 21st century. With the potential for serious technological, economic, social, and strategic implications, many governments have started adopting national AI

development strategies legal rules, and regulations to take proper advantage of the technology's vast potential (Heumann & Zahn, 2018). As is the case with most modern ICT technologies, the cost of AI-assisted software is gradually decreasing with constant developments and updates. This means that more and more businesses are getting the opportunity to tap into this new venture and integrate AI-assisted software with their own ICT infrastructure and systems to gain a competitive advantage. With the global rush to implement AI-assisted software and the shortage of experts in the field, companies are facing several problems in several areas from human resources management (HR) to information and communications technologies (ICT) (Painoli & Datrika, 2021).

Innovating and incorporating any new form of technology is highly disruptive to business operations because it makes existing ICT infrastructure and systems obsolete. Nevertheless, business must evolve and develop to meet the demands of a dynamic and constantly changing global market. The development and successful integration of AI-assisted software is the basis for enhanced performance of all other technologies and the evolution of modern industries. At the business level, some of the notable benefits of successfully integrating AI-assisted solutions are the rapid unveiling of patterns in big data, speedy visualization and analytics, improved product design, delivering meticulous insights, etc. The potential long-term benefits of successfully integrating AI-assisted solutions include the development and evolution of new services, expansion of business operations, improved performance, cost-effectiveness, etc. (Soni et al., 2019).

Despite the extraordinary potential that AI possesses, a large percentage of companies in Europe still reject incorporating it as a tool. According to the national statistics study on the use of AI in European Union member states conducted by Eurostat in 2022, only about 8% of companies surveyed have incorporated some form of AI-assisted software. According to Eurostat 2022, the company size and the use of AI-assisted software are positively correlated. In Austria, 92% of small companies, 85% of medium-sized companies, and 74% of large companies have not yet considered incorporating AI-assisted software (Statistik Austria, 2021 & Grünbichler, 2023). In contrast, 58% of Chinese companies, 57% of India's companies, 48% of Canadian companies, and 25% of United States companies are actively using AI-assisted software in their business operations (Cardillo, 2023).

Despite AI's potential in business, why is its deployment in European Union countries so low? The answers may lie in some of AI's potentially negative effects on the labor market. Over the years, many concerns have been raised by political officials and labor unions about the potentially negative consequences of implementing AI-assisted tools and solutions on a mass scale in businesses. There is growing concern that incorporating AI in markets would in turn make the labor markets unstable, cause stunt wage growth, and cause a long-term secular decline in both the labor markets and economies. The development of AI in the following decades and the effects its implementation can have on the global economy and societies have the potential to rival the great Industrial Revolution of the 19th century (Ekwueme et al., 2023).

According to West & Allen, despite a widespread lack of familiarity, AI is a technology that is currently transforming every aspect of human life. AI is a wide-ranging tool that enables people to rethink how they integrate information, analyze data, and use the resulting insights to improve decision-making. AI is not some kind of futuristic phantasy, but rather something that is already here and being integrated with and deployed in a variety of sectors such as finance, national security, health care, criminal justice, transportation, and smart cities. There are numerous examples where AI already is making an impact on the world and augmenting human capabilities in significant ways (West & Allen, 2018).

When it comes to our country of interest, according to the Slovenian Artificial Intelligence Society (SLAIS), research into the development of AI began in Slovenia in 1972 at the Computer Science Department of the Jozef Stefan Institute (JSI) in Ljubljana and continued at the Faculty of Computer and Information Science (FRI), University of Ljubljana. At the Jozef Stefan Institute, an AI research group was founded in 1979 and incorporated into an AI laboratory in 1985. In 1995, the Department of Intelligent Systems was established by merging of the Artificial Intelligence Laboratory and the Language and Speech Technology Laboratory. At the FRI, the AI Laboratory was founded in 1981. Both research groups (at JSI and FRI) were led by Professor Ivan Bratko and closely cooperated. Both groups were successful and grew in terms of achievements, employed and newly trained researchers, international collaborations, and projects (SLAIS, 2023).

As is the case in other countries, in August 2020, the Slovenia government released a draft of a national program promoting the development and use of AI in the Republic of Slovenia by 2025 (NpUI). The NpUI aims to reinforce human resources in AI along three lines using the following actions: 1) updating formal educational curricula at all levels providing AI-related knowledge and skills, 2) supporting professionals in acquiring AI skills at work, 3) raising general awareness, understanding and knowledge of AI in the entire population.

The Slovenian Government aims to update the education system, from primary school to secondary level, to include relevant digital and computational thinking topics, and promote and integrate AI-related topics into tertiary-level curricula. The objective is to provide future generations with the necessary skills and competencies in AI and to anticipate labor market trends (Slovenia, 2020 & AI Watch, 2020).

2   Methodology

2.1   Purpose of research

The purpose of this research is to gain a better understanding of the effects of deploying AI-assisted and based software in companies and businesses that make up Slovenia's private sector.

2.2   Research design

This research was a multistep data collection process divided into two phases. In the first phase, a detailed literature review was carried out with the aim of better understanding the origins and effects of deploying artificial intelligence in companies and organizations. The information obtained from our literature review was interpreted by our working professional (active user of AI assisted and based software) who also provided her opinion on the effects of deploying AI-assisted software in privately owned companies and businesses that make up Slovenia's private sector.

2.3   Qualitative research in Slovenia

The interviewee was selected based on her professional experience in the relevant field and availability. The interview was arranged and conducted live in November of 2023 in Ljubljana (Slovenia) and lasted for one hour (60 minutes). The interviewee allowed the interview to be recorded on a voice recorder. The recorded tape was analyzed to write an accurate interview transcript that was returned to the interviewee for evaluation. The interviewee deemed the transcript to be accurate and legitimate.

2.4   Research tools development (interview)

The interview for this research consisted of five questions related to the field in question. The interview questions were composed based on modern and relevant professional literature in the relevant field with assistance from an automated AI-assisted chat service (ChatGPT).

3   Interview with an active user of AI based tools

According to our interviewee, artificial intelligence (AI) is becoming a critical component responsible for enhancing the strategic goals of companies that make up the private sector. AI's role in modern companies is primarily transformative. It offers companies the benefit of enhanced efficiency, customer satisfaction, data-driven decision-making, innovation, and overall competitive advantage. As AI continues to evolve, its integration into business strategies is likely to deepen, offering even more opportunities for growth and innovation.

Some of the challenges companies face when implementing AI-assisted tools include proper integration of AI platforms and frameworks with the existing IT infrastructure and systems, maintaining and updating AI solutions which must be carried out by a dedicated team of experts in the field, shortage of skilled professionals that grasp the potential of AI tools, potential resistance from employees fearing job displacement, eventual ethical barriers, etc. AI systems require large amounts of high-quality data. Poor data quality or lack of relevant data can hinder AI performance.

Integrating AI-assisted tools into existing IT infrastructure can be complex and disruptive and requires a high degree of proficiency and technical skill to execute properly. Since AI technology is still in its early development stage and is relatively new, one of the issues most companies are facing now is the shortage of qualified/skilled professionals who can develop and manage AI systems. Larger companies that work with artificial intelligence are tackling this issue by sending their employees on specialized training programs, external experts, or partnering with AI service providers. The costs of implementing AI-assisted tools are also one of the major challenges that companies face. One has to keep in mind that AI-assisted tools are an investment and should be treated as such by the company management. Companies need to address several key legal and ethical issues to ensure that their AI tools are deployed responsibly and in compliance with legal regulations and ethical standards.

With AI often relying on large sets of personal data, maintaining the privacy and security of this data is crucial. Organizations should adhere to data protection laws like GDPR and implement robust cybersecurity measures. For European companies, they must operate by obeying the EU AI Act. Determining who is accountable for the decisions made by AI systems is essential. Organizations should establish clear guidelines on accountability, ensuring that AI systems are monitored and managed by qualified personnel. Staying updated with and adhering to the evolving regulatory landscape governing AI is important. Organizations should actively engage with regulators and policymakers to understand and influence how AI is governed. AI in the private sector is expected to have a significant impact on the workforce, affecting various industries and job roles in different ways.

The key to future business success lies in proactive planning, investing in employee development, and fostering an adaptable, learning-oriented workforce. According to our interviewee, AI represents an opportunity for developing new job profiles and evolving the existing ones. According to her professional experience, all industries and jobs are susceptible to disruption and as AI continues to reshape industries, job descriptions need to evolve to reflect new realities. Organizations should focus on creating clear, dynamic job descriptions that capture the growing role of AI, while also emphasizing the irreplaceable value of human skills and creativity.

Successful implementation of AI-assisted tools in a company depends on a combination of strategic planning, stakeholder engagement, leadership skills, and open communication. The company itself must have clearly defined objectives and its leadership a more than solid understating of the potential risks and benefits of implementing AI-assisted tools. Open and transparent communication with employees and all parties involved is essential.

4   Discussion

A new digital revolution that will rival the great Industrial Revolution of the 19th century has begun. Artificial intelligence (AI) has the potential to completely revolutionize every aspect of modern human life. As all major changes have their deep roots, so does artificial intelligence. Contrary to popular belief, the concept of artificial intelligence dates back to the 1950s when the term was coined by John McCarthy (known as the father of AI). Since its inception, the purpose of developing artificial intelligence as a field of information and communications technologies (ICT) was to simply test the feasibility of mimicking human creativity and thinking processes. The results of the initial research and developments in the field were described as: "machine learning" (one of the vital components of modern artificial intelligence).

Modern artificial intelligence is a field of ICT that combines robust datasets, algorithms, and machine learning to enable problem-solving by mimicking human thought processes. Realizing its unique and lucrative financial potential, software development companies worldwide are working on further development and integration of AI-assisted components into software-based solutions. In modern business, performance is the name of the game. Every business owner is looking for ways to increase productivity and cut down on operational expenses. The integration of artificial intelligence with existing and basing developing software on it allows for just that.

As our interviewee stated: "Artificial Intelligence is becoming a critical component in aligning with and enhancing the strategic goals of businesses in the private sector. As technology continues to evolve, its integration into business strategies is likely to deepen, offering even more opportunities for growth and innovation."

It has to be pointed out that the concept of implementing AI-assisted tools and developing future software on it is not equally popular worldwide. Asian countries such as China and India (which represent future tech giants) have a high AI implementation rate in businesses. Artificial intelligence requires large amounts of data to operate which is something that China and India can provide. On the other hand, European businesses seem to show more resistance due to the potentially negative implications of implementing AI-assisted tools in modern workplaces.

The fear of AI-based software eliminating the need for a human impute is real and justified. AI's unique technological qualities such as "machine learning" are already redefining certain professions. To counter the potentially negative effects of implementing AI-assisted and based software, many governments have passed national strategies regulating the development and implementation of AI in modern workplaces.

The research and development of artificial intelligence has its roots in Slovenia as well. The first research and development centers were formed back in the 1970s and remain active to this day. The Slovenian Government aims to update the education system, from primary school to secondary level, to include relevant digital and computational thinking topics, and promote and integrate AI-related topics into tertiary-level curricula. The objective is to provide future generations with the necessary skills and competencies in AI and to anticipate labor market trends.

5   Conclusion

The purpose of this research is to gain a better understanding of the effects of deploying AI-assisted and based software in companies and businesses that make up Slovenia's private sector. According to our literature review, artificial intelligence (AI) is a revolutionary field of computer science that is currently redefining many aspects of modern business. AI is a field of ICT that combines robust datasets, algorithms, and machine learning to mimic human creativity and thought processes and utilize them for industrial purposes.

According to our interviewee, artificial intelligence is slowly becoming a critical component responsible for enhancing the strategic goals of companies that make up the private sector. It offers companies the benefit of enhanced efficiency, customer

satisfaction, data-driven decision-making, innovation, and overall competitive advantage. As AI continues to evolve, its integration into business strategies is likely to deepen, offering even more opportunities for growth and innovation. Successful implementation of AI-assisted tools in a company depends on a combination of strategic planning, stakeholder engagement, leadership skills, and open communication. The company itself must have clearly defined objectives and its leadership a more than solid understating of the potential risks and benefits of implementing AI-assisted tools. Open and transparent communication with employees and all parties involved is essential.

Since its inception in the late 1950s, research and development of artificial intelligence has moved up significantly. AI is currently being integrated with existing search and work engines to provide a more simplified and personalized experience for the user. Software development companies are integrating and basing their tools on AI to provide more cost-efficient, integrative, customizable, and productive solutions. Such AI-based software solutions are currently eliminating the need for human impute in certain professions. On the contrary, new professions based on utilizing AI-assisted and based tools are emerging along with new possibilities.

Throughout this research, we came to an interesting realization that research into artificial intelligence has been continuously carried out in Slovenia since the late 1970s. Slovenia pretty much follows European Union-level trends in implementing AI-assisted and based tools in businesses and has imposed strict legal regulations on the matter. The Slovenian Government aims to update the education system, from primary school to secondary level, to include relevant digital and computational thinking topics, and promote and integrate AI-related topics into tertiary-level curricula. The objective is to provide future generations with the necessary skills and competencies in AI and to anticipate labor market trends.

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Appendix

Interview

1. **Strategic Alignment:**

How do you see artificial intelligence aligning with the overall strategic goals of businesses in the private sector? Can you provide examples of how AI has been effectively integrated into existing business strategies?

2. **Challenges and Solutions:**

What are the key challenges that organizations face when implementing AI in their operations, and how can these challenges be effectively addressed? Are there specific tools or approaches that you find particularly effective in overcoming these obstacles?

3. **Ethical Considerations:**

As AI becomes more prevalent in the private sector, what ethical considerations do you think organizations need to take into account? How can businesses ensure that their AI applications are deployed responsibly and in compliance with ethical standards?

4. **Impact on Workforce:**

How do you foresee the integration of AI impacting the workforce in the private sector? Are there specific industries or job roles that are more susceptible to disruption and what measures can organizations take to mitigate negative impacts on employees?

5. **Adoption and Implementation Strategies:**

What strategies have you observed to be successful in facilitating the adoption of AI technologies within private sector organizations? Are there specific best practices or lessons learned that you would recommend for a smooth and effective implementation of AI programs and tools?