RIT | Kosovo

Implications of AI Adoption on Kosovo's Tech SMEs

An Honors Society Project

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Abstract

This study explores the impact of Artificial Intelligence (AI) on small and medium-sized tech enterprises (SMEs), namely the extent to which these SMEs are investing in AI technologies, and how that will impact the organizational structure of those SMEs. While most of Kosovo's tech SMEs have started to engage with AI to some extent, the demand for such services is much lower compared to global levels. This study identifies investment strategies prominent in SMEs, as well as their initiative to internal restructuring instead of hiring. Through a mix of qualitative and quantitative data, this study generates relevant insights from employees and employers of the tech sector, drawing a comparison between the two regarding AI adoption benefits and concerns. The study highlights anticipated job role expansions in AI-related fields and contractions in certain traditional tech roles. From these findings, recommendations to SMEs, tech employees, students, educational organizations, and innovation hubs are derived to ensure a smooth integration of such technologies and minimize job displacement. The findings of this study can fill a critical research gap for AI adoption concerning companies in Kosovo and can serve as a foundation for future research in related contexts.

Keywords: Artificial Intelligence, GenAI, Structural Change, Tech SMEs, Teams, Challenges, Benefits, Kosovo.

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List of Abbreviations

AI – Artificial Intelligence

GenAI – Generative Artificial Intelligence

LLM – Large Language Model

SME – Small and Medium Enterprise

QA – Quality Assurance

1. Introduction

The new wave of Artificial Intelligence (AI) has impacted every sector, to some degree. For some, AI is used as a means for cutting costs, while others take advantage of its capability to alleviate some of the heavy workload and enhance productivity. However, the current digitally transformative era has opened up debates about the future demand for certain skills and their susceptibility to being replaced by AI. Generative AI has been able to increase the technical automation potential of STEM professionals by 29% in 2023 (Chui et al., 2023).

With the deployment of Large Language Models (LLMs), such as OpenAI's ChatGPT and Codex, tech employees have been able to focus on matters of higher priority whilst giving these models tasks to complete that would otherwise be very time-consuming and tedious (Maxwell, 2023). Because of its ability to automate routine tasks, AI technologies will cause certain teams in tech companies to shrink while causing others to grow. According to the World Economic Forum (2023), roles such as AI and Machine Learning Engineers have the highest rate of projected job creation while other tech roles such as Data Warehousing Specialists and Software testers have a significantly higher rate of projected job displacement compared to job creation.

Through digital transformation and job creation, information technology has become one of the key drivers of Kosovo's economic growth (AmCham Kosovo, 2020; UNDP, 2021). Kosovo's youth are increasingly focused on pursuing a career in IT, which also includes the establishment of IT startups financed by innovation centers such as ICK. These startups are often led by young entrepreneurs, some even younger than 20 years old (Ameti, 2022). Since there is a lack of research on the effects of AI in Kosovo, for a country with such tech-savvy youth, it is important to know the extent to which the job ecosystem in tech SMEs will be impacted by it. This capstone project aims to identify the changes that the tech industry in Kosovo will face due to AI adoption, the extent to which tech SMEs are investing in AI technologies, and how that will affect the organizational structure of those SMEs.

2. Background Information

Generative AI (GenAI) is a new type of AI that is trained on data and is able to generate more data through the patterns it has learned (Ferrini, 2023). Specifically, Large Language Models are the type of Generative AI that is being used the most by employees in order to streamline their work. LLMs are trained on extensive amounts of data and are able to produce content from inputs given by human language (Lake, 2023). Although these models have existed for quite some time, it was not until 2022, when ChatGPT was first introduced, that LLMs experienced a sudden and dramatic surge. What stands out to companies the most about these models is the ability to further train them with company data, which maximizes the quality and customizability of their services (Davenport & Alavi, 2023). Although there is a variety of products built on LLMs, the most relevant for the tech industry are products like GitHub's Copilot and Amazon's CodeWhisperer. They have the capability to generate hundreds of lines of code in a matter of seconds and although it is not without fault, it has helped many developers fix bugs in their code and deliver products at a much faster rate (Ponsonby et al., 2023; Corrales, 2023).

However, its striking ability to save time has contributed to substantial layoffs in the tech industry. Tech and media conglomerates like Google and Twitter laid off a considerable amount of their software engineers as a cost-saving measure (Marr, 2023). Furthermore, hiring opportunities for computer programmers and data analysts are expected to decrease because tasks that previously required a team to complete, can now be easily finalized with just a few employees due to GenAI (Mok & Zinkula, 2023). While it might lead to disinterest in some positions, it will also create demand for new roles. Deep Learning engineers, prompt engineers, and data annotators are among the rising roles in tech which are fueled by the surge of AI (Curry, 2023). The majority of companies investing in AI do not intend to forgo all of their employees, they would rather see humans and AI work in symbiosis (McKendrick, 2017).

In the case of Kosovo, there has not been much discussion from tech companies about the extent to which they are investing in AI technologies. The Kosovo Association of Information and Communication Technology (STIKK) IT barometer report for 2021 - 2022 provided a detailed overview of the composition of Kosovo's IT sector. In terms of technologies used to deliver services, AI went up to 36%, compared to 35.71% in the 2020 report, indicating a

tendency for further increase in the future (STIKK 2023; STIKK 2021). After web-based development, which is adopted by 81% of IT companies, other technologies such as AI (36%), Big Data (33%), and Data Science (29%) were the most dominant ones (STIKK 2023). The 2021 - 2022 report is the first time Data Science is included as a service provider technology. Globally, according to PwC's 2023 Emerging Technologies Survey, 55% of US-based companies reported that AI was a top-3 investment priority in the last year (PwC, 2023). Furthermore, the McKinsley Technology Trends Outlook 2023 reported a threefold increase in interest in AI and Generative AI from 2021 – 2022 (Chui et al, 2023).

The composition of Kosovo's tech companies, in terms of salary, starts with senior software developers as being the highest-paid role, with an adjusted amount of 2400 euros (STIKK, 2023). However, the recent global layoffs from Facebook, Amazon, Apple, Netflix, Google (FAANG) companies reported that the median years of experience of their laid-off employees was 11.5 years (Marr, 2023). This implies that due to their high salaries, ranging from $153,000 – $475,000, the layoffs were a cost-reducing measure ("Faang software engineering salaries by experience", 2022). The demand for senior software engineers in the tech sector in Kosovo is still particularly high, while some companies in the US are laying off these positions. This raises the question of whether Kosovo will be affected by this wave of layoffs in the near future, as the demand for jobs in the US is slowly shifting towards AI-related positions. However, since AI has not significantly impacted Kosovo's IT sector, the demand for AI-related jobs in this last year has not been recorded.

Education can play a significant role in choosing the right career. Therefore, a brief analysis of available AI/Data Science university programs can highlight how well-prepared students are for these technologies. Referring to the existing data from public and private universities in Kosovo, the table below shows the courses and programs offered in those universities related to AI and/or Data Science:

Table 1. *AI and Data Science-related university courses and programs offered in Kosovo*

University	Type	Bachelor AI/Data Science-related Courses	Bachelor's Program	Master's Program
University of Gjilan "Kadri Zeka"	Public	Faculty of Computer Science, Computer Science Program, Courses: Intro to Artificial Intelligence, Data Science[a]	NO	MSc. in Systems Control and Artificial Intelligence[a]
University of Prishtina "Hasan Prishtina"	Public	Faculty of Electrical and Computer Engineering, Computer and Software Engineering Program, Courses: Data Engineering, Big Data, Data Mining, Extraction of Information[b]	NO	NO
University of Prizren "Ukshin Hoti"	Public	Faculty of Computer Science, Information Technology and Telecommunications Program, Course: Artificial Intelligence[c]	NO	NO
University of Mitrovica "Isa Boletini"	Public	Faculty of Mechanical and Computer Engineering, Computer Science and Engineering Program, Courses: Business Intelligence, Big Data Processing[d]	NO	NO
University of Applied Sciences in Ferizaj	Public	Faculty of Engineering and Informatics, Applied Informatics Program, Course: Artificial Intelligence[e]	NO	NO
AAB College	Private	Faculty of Computer Science, Computer Science Program, Courses: Data Science, Intro to Artificial Intelligence, Machine Learning[f]	NO	NO
UBT College	Private	Computer Science and Engineering Program, Specialization in Intelligent Systems and Robotics, Courses: Artificial Intelligence, Machine Learning and Vision, Big Data[g]	NO	MSc. in Computer Science and Engineering, Specialization in Data Science[h]
Riinvest College	Private	Degree offered	BSc. in Data Science and Business Analytics, in partnership with the University of London with academic direction	MSc. in Data Science and Business Analytics, Profile in Advanced Data Science[j]

			from the London School of Economics and Political Science[i]	
Universum International College, powered by Arizona State University	Private	Computer Science Program, Course: Artificial Intelligence[k]	NO	MSc. in Data Science[l]
International Business College Mitrovica	Private	Applied Information Technology Program, Courses: Human-Computer Interaction, Intro to Artificial Intelligence, Big Data, Data Analysis and Visualization[m]	NO	NO

Note. Data are from Universiteti KADRI ZEKA Gjilan (n.d.)[a], University of Prishtina (n.d.)[b], Universiteti I Prizrenit (n.d.)[c], UMIB (2022)[d], Universiteti i Shkencave të Aplikuara në Ferizaj (n.d.)[e], Kolegji AAB (2023)[f], UBT (2020)[g], UBT (2023)[h], Riinvest (2022b)[i], Riinvest (2022a)[j], UniversumCollege (2024a)[k], UniversumCollege (2024b)[l], IBC-M (n.d.)[m].

3. Literature Review

This section reviews existing studies on AI, starting from its adoption on a global level, AI integration and adoption barriers faced by SMEs, as well as AI's impact on organizational structure. There is a gap in the literature that covers AI adoption and its potential structural changes in tech companies in Kosovo, therefore the reviewed literature in this study will be used as a comparison. Undoubtedly, many companies and countries have started strategizing the best way to increase competitiveness by keeping up with the latest technology trends. Although AI has been used for a while, the sudden urge to adopt these technologies particularly stems from the infinite possibilities that Generative AI can be applied, to produce innovative and efficient solutions within a company. While this adoption presents some challenges and has given life to the possibility of certain job displacements, it is also considered a key growth factor among companies (Wamba-Taguimdje et al., 2020).

3.1. AI on a Global Level

McKinsey Global Survey on AI unveiled meaningful demographic insights about the exposure to Generative AI tools. Analyzing the responses through the criteria of office location, 5 main regions were identified, namely Asia—Pacific, global developing markets, Europe, Greater China, and North America (Chui et al., 2023). Combining responses that reported regular use of AI tools for work, and regular use for work and outside of work, the 3 locations with the highest percentages in those responses are North America (28%), Europe (24%), and Asia—Pacific (22%). Filtering by industry, respondents from the "Technology, media, and telecom" were the most exposed to GenAI tools for work and outside of work (33%), as compared to other industries (Chui et al., 2023).

In a study by Wamba-Taguimdje et al. (2020), more than 500 case studies were analyzed to determine the business value of AI projects and their impact on firm performance, namely the increase of business value as a result of AI-based projects. Emphasis was brought to many different possible applications of AI in various companies, e.g. fraud detection in the banking sector and optimization of sales processes amongst many (CIGREF, 2018). However, due to the nature of this research, the most crucial application is in the tech sector, in which organizations can automate IT processes through AI (Wamba-Taguimdje et al., 2020). Cases in which AI as a

technology was adopted either by a country or firm demonstrated significant economic impacts. “ A number of economic impacts were also identified, including increasing performance, cost reduction, increased sales, competitiveness, production growth, value creation, reduced resources in organizational structure, increased productivity, and increased GDP.” (Kabalisa & Altmann, 2021). Kabalisa and Altmann’s work examined countries that were low on the AI Index Report, which serves as a suitable comparison with Kosovo since no literature covers the specifics of AI adoption in Kosovo. These countries (Greece, India, South Africa, Philippines, etc.) are attempting to compete with leaders, such as the US, Korea, and Israel, mainly through competitiveness and innovation driven by AI. The study identified 12 categories of motives for adopting AI in the aforementioned countries. The pressure to catch up with the AI trend and also the external pressure to change demonstrates that countries and firms are heavily influenced by competition and do not want to be left behind. Cost-related categories of motive include saving operational expenses, managing the workforce, and maximizing profit through cost reductions (Gomes et al., 2020, Pan et al. 2021; Mamela et al. 2020; Kabalisa & Altmann, 2021).

Global view on AI as a technology is particularly insightful when its adoption rate and patterns are examined in a country that, amongst many others, is considered dominant in the field of tech. The study “AI Adoption in America: Who, What, and Where” from Wharton Business School of the University of Pennsylvania provides a comprehensive analysis of the early adoption of AI-related technologies, specifically automated-guided vehicles, machine learning, machine vision, natural language processing, and voice recognition, across 850,000 firms in the US. The survey of the study revealed that less than 6% of companies used AI technologies, with larger firms showing more AI usage. When adjusting to account for the number of employees in the firms, the average adoption rate was about 18%. Notably, AI usage was higher among dynamic young firms led by educated, experienced, and younger owners, often driven by innovation (McElheran et al., 2023). However, AI adoption was not uniform across the US, indicating the early adoption trends might create an "AI divide," potentially leading to significant economic and social impacts if these patterns persist (McElheran et al., 2023). Additional literature supports the aforementioned economic and social impacts by stating that leading AI countries might realize net economic benefits from 20%-25% compared to 5%-15% for developing countries (Bughin et al., 2018).

3.2. AI Adoption by SMEs

Existing studies show that the journey of adopting a new technology can be different depending on the size of the company. Larger corporations possess both the skills and the resources to undertake a new technology faster when compared to smaller companies. SMEs, though relatively small in size, make up 99% of companies in Europe (Yang et al., 2019). There is a lack of literature that examines AI adoption outcomes in tech SMEs specifically, however, a few studies (Schueffel et al., 2019; OECD, 2020) have been able to draw from the relationship between AI Adoption and SMEs.

Three hypotheses were formulated based on organizational behavior theory regarding the relationship between AI adoption and SMEs (Schueffel et al., 2019). The first hypothesis suggests that there is a positive correlation between the perceived importance of AI and the size of the SME, whereas the second hypothesis states that the size of the SME is positively correlated with the estimated impact that AI will have on that SME (Schueffel et al., 2019). The third hypothesis is dependent on the first hypothesis, as the larger the perceived relevance of AI, the more likely it is that the SME will have an adoption strategy for new technologies (Schueffel et al., 2019).

OECD identified two main areas in which AI can be transformative in SMEs: improving current business conditions and changing how they do business, leading to better productivity, wider reach, and easier growth (OECD, 2020). These changes are necessary for SMEs to evolve in response to business trends or to introduce innovative ideas that increase their competitiveness in the market. Although adoption is beneficial, SMEs face more barriers to adoption compared to larger companies, some of which are similar to those encountered with other digital technologies (Aarstad & Saidl, 2019; OECD, 2020). The biggest challenge is the financial burden; implementing and maintaining AI systems requires significant investments (Bhalerao et al., 2022). Training these systems involves processing large amounts of data and human input to make the data understandable for machines, which is a time-consuming task. Regardless of the open-source AI tools and lower training costs (Coleman et al., 2020), SMEs may struggle to adopt AI due to limited financial resources, which is compounded by difficulties in evaluating the costs versus benefits (Accenture, 2019).

Moreover, SMEs fall behind larger enterprises in adopting complementary technologies essential for effective AI implementation (OECD, 2020). Investments in infrastructures like 5G and high-speed internet, alongside cloud computing, are imperative to enhance digital connectivity and enable data transfer (Attaran, 2023). Technologies like IoT, blockchain, 3D printing, and robotics complement AI, aiding its deployment and potential, therefore AI adoption is recommended to be paired with at least one of the aforementioned technologies (Chatterjee et al., 2023). Integrating AI into business processes requires adapting structures and skill sets, however, this restructuring is not just about replacing systems, it also demands organizational shifts and reskilling of employees to accommodate complementary technologies (Kopka & Fornahl, 2023; Leavy, 2023).

Although AI has the potential to boost productivity, it is uncertain how quickly these gains will be realized. This can be a challenge for SMEs, especially those who are cautious about adopting new technologies that may impact short-term revenues and cash flow (Holmes, Levine, and Schmitz, 2012). As a result, upfront costs may be necessary before seeing the full benefits of AI transformations (Lu et al., 2022).

3.3. Impact of AI on Organizational Structure

The impact of AI on organizational structure is a topic of significant interest in recent studies. Kaiming (2021) suggests that AI, as a general-purpose technology (GPT), initiates structural transformation and reallocation of factors between sectors, categorizing AI as a highly disruptive technology that reshapes traditional organizational structures and requires reevaluation of labor distribution. This phenomenon of structural transformation is supported by Rudko et al. (2023), who explored the dynamics of AI-driven organizational changes. Their research emphasizes the role of individual decision-making, from which they introduced a response model that categorized individuals according to their attitude toward organizational change. Individuals were divided into optimists, doubtful optimists, skeptics, and doubtful skeptics, with doubtful optimists requiring the most amount of managerial supervision to ensure a smooth transition to the new organizational structure (Rudko et al., 2021). Changes in jobs include enhanced job roles with greater autonomy yet reduced job variety due to the elimination of

routine tasks. At the macro level, changes involve less hierarchy, reduced centralization, and changed incentives (Rudko et al., 2021).

In the context of worker and AI coexistence, Zirar et al. (2023) explore the dynamics of this relationship. Their research identifies four key themes: workers' distrust in AI, AI enhancing worker-AI interactions, the requirement of technical, human, and conceptual skills for AI and worker coexistence, and the need for ongoing reskilling and upskilling. AI adoption may also lead to the displacement of certain tasks, emphasizing the need for workers to upskill and reskill to collaborate effectively with AI systems and remain relevant in such a dynamic workplace dominated by AI (Zirar et al., 2023). It argues that workers' fear of job loss to AI might be fueled by exaggerated perceptions of AI capabilities, which highlights the importance of transparent communication about AI adoption within organizations and suggests a need for policies that prioritize effective employment and workers' skill development.

Lastly, Hunt et al. (2022) found that introducing AI technology in organizations is associated with both job creation and destruction. About 22% of AI-introducing organizations reported both job creation and destruction when considering net changes. Factors like sector, size, turnover, and industry type play a role in this dynamic: AI adopters tend to be larger, newer, more technology-intensive, and situated in sectors like manufacturing, construction, or finance (Hunt et al., 2022). In the surveyed organizations, irrespective of the sector, the possibility of job creation are 28.4% higher with AI compared to other tech introductions, while job destruction is 26.6% more likely. Additionally, multinomial regression suggests that the introduction of AI is equally likely to result in job creation as it is in job destruction, compared to non-AI technology. (Hunt et al., 2022).

4. Methodology

To analyze the topic of AI adoption in Kosovo's tech SMEs and to gather insights from both sides; employers and employees, the methodology used in this research consists of primary qualitative and quantitative data, as well as secondary data to provide a global perspective on the implications GenAI has had on the technology sector.

4.1. Survey

A survey was distributed to gather data about the opinions of tech employees and employers regarding AI adoption, exploring potential concerns and attempts to keep up with global trends. The survey platform, Qualtrics was used to administer the survey and also analyze the results at the end. The survey was designed to only be filled out by people working in the tech sector in Kosovo. Respondents had the choice to complete the survey either in English or in Albanian.

Depending on the respondent's role: employee or employer, they were directed to a special set of questions, whereas both parties were asked the same six demographic questions. The employee survey had a total of fifteen (15) main questions and eight (8) sub-questions (See Appendix C), whereas the employer set of questions contained seventeen (17) main questions and six (6) sub-questions (See Appendix D). The sub-questions were prompted to the respondent based on their answer to certain questions that were used in the display logic of the sub-question. A mix of multiple choice, multiple select, and Likert scale questions were used to help achieve the purpose of this study. Convenience and snowball sampling were used to gather the data and the survey was shared through social media apps such as Facebook and LinkedIn.

After three weeks, the survey was closed with a total of 238 respondents, 193 of whom were either employees or self-employed and the remaining 41 were employers. Albeit another section of this research was focused on gathering data from employers and tech companies, the employer portion of the survey was formulated to complement and offer quantitative insights into several matters, such as the extent of investment, anticipations of AI's impact on organizational structure, etc.

4.2. Interviews

Semi-structured interviews with relevant stakeholders in the tech industry were used to gather qualitative insights into the specifics of GenAI's impact on the company's business strategy, their current and future investments in AI technologies, as well as the role that these investments will have in the contraction or growth of certain teams within that SME. Purposive sampling was used to identify the interviewees.

The participating representatives from these companies were chosen through LinkedIn and from the ARBK website by the key activity, i.e. activities related to software services, IT consulting, and other technological services. 50 stakeholders (team VPs, CEOs, CTOs, or executive directors) from IT companies were contacted and eleven (11) of them agreed to participate in this research study. Out of eleven (11) interviews, two (2) of them were held in person, whereas the other nine (9) were held online.

Before conducting the interviews, a consent form along with the interview questions was sent to the interviewees, and hard copies of the consent form were collected from the interviews held in person. Nine (9) interviews were voice recorded whereas notes were taken for the remaining two. The participants were asked eleven (11) questions and based on their answers other related topics were also discussed (See Appendix B). The median duration of these interviews was 17 minutes.

Descriptions of the participating representatives of eleven (11) tech SMEs are given below:

Interviewee A: CEO of a medium-sized software development and data science company.

Interviewee B: Co-founder of a small-sized digital marketing and software development company.

Interviewee C: Founder and member of the board of directors of a medium-sized business solution, software development, and system integration company.

Interviewee D: Director at a small-sized market research and data analytics company.

Interviewee E: Co-founder of a small-sized software development company.

Interviewee F: CTO of a medium-sized software development, web and mobile, UI/UX design company.

Interviewee G: CEO of a small-sized BPO solution, IT support, and software development company.

Interviewee H: VP at a medium-sized media house and content management company.

Interviewee I: Co-founder of a small-sized software development company.

Interviewee J: Manager at a medium-sized SaaS (Software-as-a-Service) company.

Interviewee K: Senior project manager at a medium-sized IT outsourcing company.

4.3. Ethical Considerations

Prior to the interview, the interviewees were sent the informed consent statement (See Appendix A), which was then signed. The foundation of the informed consent statement was derived from the insights gained during the workshop "Applied Research Methods and Ethical Practices" supported by an Erasmus+ project at RIT Kosovo. The workshop's content heavily influenced the research process of this study, thereby making this study compliant with the ethical standards of the project. Other sections of the consent statement ensure the participant's anonymity and proper handling of data. Similarly, survey participants agreed to the terms before participating and they could exit the survey at any time they wished.

4.4. Limitations

The surveys, based on convenience and snowball sampling methods that gathered 238 responses, present valuable insights but are subject to limitations in terms of generalization. The use of convenience sampling introduces selection bias by relying on an easily accessible pool of participants. Furthermore, the sample size and the interviewees may not represent the full spectrum of perspectives within the tech population, limiting the results. Potential response bias is another concern, as the participants may hold different views compared to non-participants. Therefore, future research should focus on using more representative sampling methods, increasing the sample size, and implementing strategies to mitigate response bias.

5. Results and Interpretation

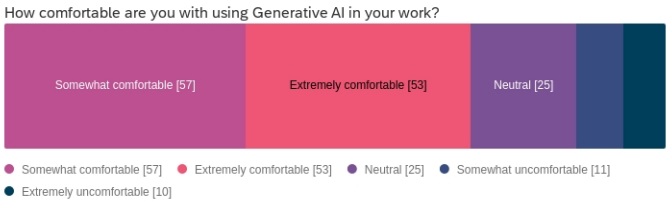
5.1. Survey

Due to the nature of the questions, the results presented below are grouped by the type of respondent (employee or employer) and the focus of the question (opinion towards AI usage or its impact on structural change). While the survey includes a broader set of questions, the graphs below highlight those that provided the most insightful information.

5.1.1. Employees' Opinions Towards AI Usage

When asked about whether or not the respondent personally uses Generative AI or LLMs in their daily work tasks, the majority (82%) of the respondents answered "Yes", with the remaining respondents saying that they do not use GenAI in their daily work tasks. For the respondents who responded with "Yes" to this question, they were then asked about the level of comfort they experience when using GenAI in their work, as well as the level of efficiency when using GenAI in the workplace. As expected, the responses to both of these questions were positive, indicating that tech employees in Kosovo consider Generative AI to be great value-added in the workplace. Fig. 1 shows that 37% of respondents feel somewhat comfortable with using GenAI for work, followed by 34% who feel extremely comfortable. From the remaining percentage of respondents (29%), 16% of respondents don't have any particularly positive or negative level of comfort regarding the use of GenAI for work whereas 7% of respondents feel somewhat uncomfortable, followed by 6% who feel extremely uncomfortable.

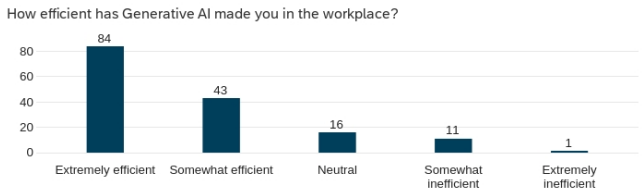
Figure 1. *Employees' comfort level with using GenAI for work*



Source: Survey with employees, 2023

In terms of efficiency, over half of the respondents (54%) said that the use of GenAI in the workplace has made them extremely efficient, which validates the literature review and also is in line with other global studies done with employees regarding efficiency when using AI. The second most chosen choice was "Somewhat efficient", chosen by 28% of respondents. The remaining 18% of

Figure 2. *Employees' efficiency level when using GenAI for work*

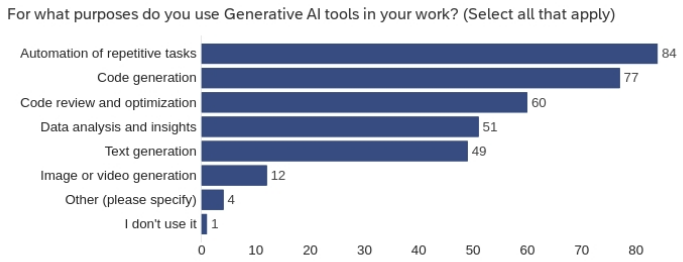


Source: Survey with employees, 2023

respondents reported their level of efficiency regarding AI usage to be neutral, somewhat inefficient, and extremely inefficient (10%, 7%, and 1% respectively).

Out of 156 respondents who reported to using AI tools for work purposes, around 84% of respondents use it to automate repetitive tasks. Code generation (49.3%) and code review and optimization (38.5%) were the next most selected choices, which are a lot more technical and less ambiguous than automation of repetitive tasks.

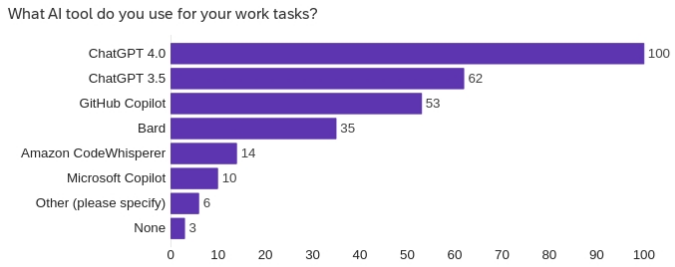
Figure 3. *Purposes for using GenAI in the workplace*



Source: Survey with employees, 2023

Amongst respondents, the most popular GenAI tool is ChatGPT 4.0, which is a paid version of ChatGPT. The visible difference in responses conveys that ChatGPT 4.0 (63.7% of respondents) is superior to its unpaid version, ChatGPT 3.5, which is the next most selected choice with 39.5% of respondents choosing it. Overall, OpenAI's ChatGPT is used considerably more compared to its competitor Google Bard, which was chosen by 22.3% of respondents.

Figure 4. *Types of AI tools used for work*

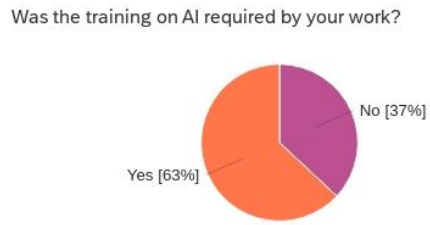


Source: Survey with employees, 2023

When comparing AI tools that specifically aid in code generation and code review, GitHub Copilot (33.8%) is significantly more used compared to Amazon CodeWhisperer (8.9%).

In terms of upskilling initiatives, 59% of employees reported that they have recently completed a training course related to AI. Out of those respondents, 63% of them completed the training because it was required by their work, underscoring an important initiative of employers to upskill their employees and make them feel more comfortable working with these technologies.

Figure 5. *AI training requirement by work*

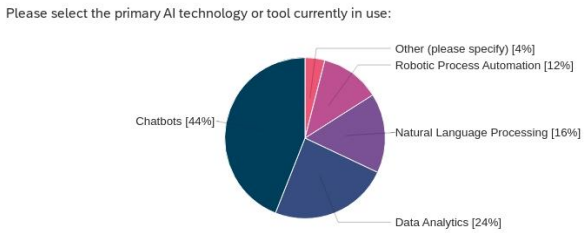


Source: Survey with employees, 2023

5.1.2. Employers' Opinion Towards AI Usage

Out of 41 employers who decided to participate in the survey, 63% of them reported that their company has adopted AI technologies to some capacity. After being asked to select their company's primary AI tool in use, respondents chose Chatbots the most (44%), followed by Data Analytics (24%), Natural Language Processing (NLP) (16%), and Robotic Process Automation (RPA) (12%).

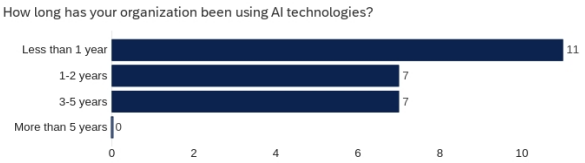
Figure 6. *Primary AI tool in use*



Source: Survey with employers, 2023

It appears that the majority of the companies that use AI technologies are also late adopters. A significant portion of participating employers, 44%, report that their company has been using AI technologies for less than one year, indicating that the recent surge of AI has made them restructure their business strategy. Of those respondents who reported that their company has adopted AI to some capacity, 20% reported that their company has been using AI for 1-2 years, and similarly, 20% of companies have been using AI for 3-5 years. There were no respondents who have adopted AI technologies for more than 5 years, indicating that early adopters of AI are rare in Kosovo as compared to those on a global level.

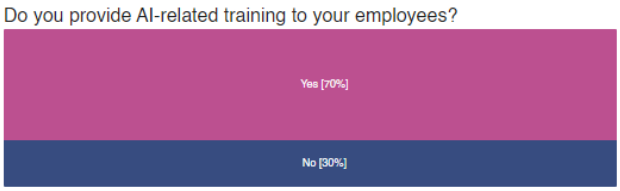
Figure 7. *Timeline of AI Adoption in Companies*



Source: Survey with employers, 2023

Despite the majority having recently adopted AI, 70% of the employers have already started to provide AI-related training to their employees, which is a step forward in ensuring that no one is left out in the attempts to advance as a company and undertake new technologies. It also shows that companies are looking for "cooperation" between their employees and AI, and they are not just looking to replace their staff as a cost-reducing measure.

Figure 8. *Provision of AI-related training to employees*



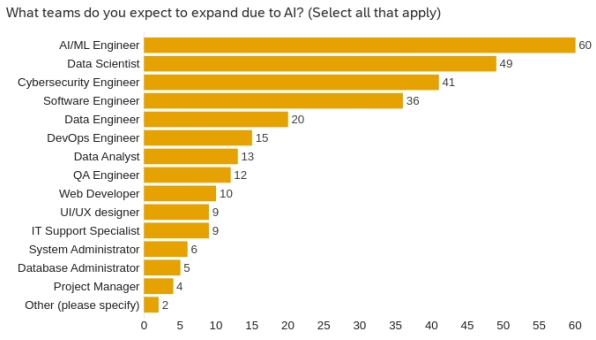
Source: Survey with employers, 2023

5.1.3. Employees' Opinion of AI's Impact on Structural Change

The third block of the questionnaire was formulated to gather insights on both employees' and employers' opinions of the implications of AI on the structure of tech SMEs in terms of team contraction and expansion. When asked whether they think AI will cause certain teams to expand and others to shrink, 75% of employee respondents thought that AI will impact team size, which varied in levels of certainty ("Definitely yes" – 28%, "Probably yes" – 25%, "Might or might not" – 22%). From the remaining 25% of respondents, 18% were sure that AI will not have any impact on team size, whereas 7% said that AI will probably not impact team size in any way.

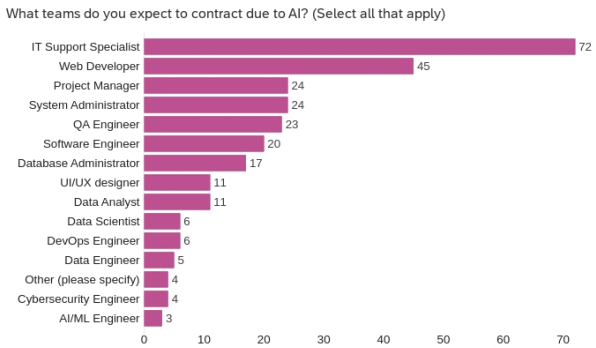
More than 70% of respondents who thought that AI would impact team size were then asked to choose different teams they thought were susceptible to expansion due to AI. The team that is thought to be the most susceptible to expansion is the team of AI/ML Engineers (43%). The next four teams which comprised the majority of the share of responses are Data Scientists (35%), Cybersecurity Engineers (29%), Software Engineers (26%), and Data Engineers (14%). Similarly, respondents were asked to choose the teams they expect to contract due to AI. Over half of the respondents (55%) chose the team of IT Support Specialists as the team to be the most susceptible to contraction. IT Support Specialists were followed by Web Developers, chosen by 35% of respondents, Project Managers (18%), System Administrators (24%), and QA Engineers (23%).

Figure 9. *Teams employees expect to expand*



Source: Survey with employees, 2023

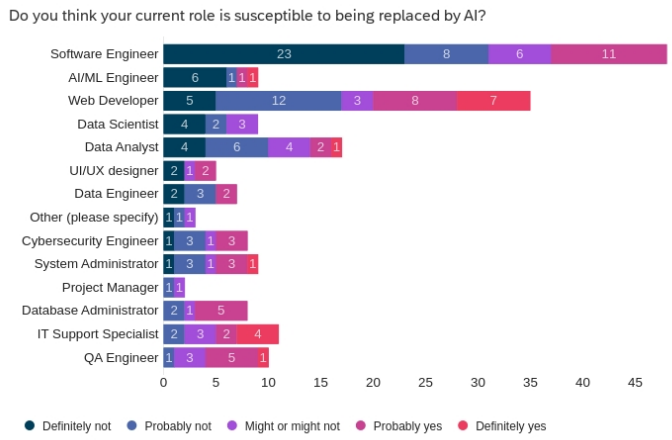
Figure 10. *Teams employees expect to shrink*



Source: Survey with employees, 2023

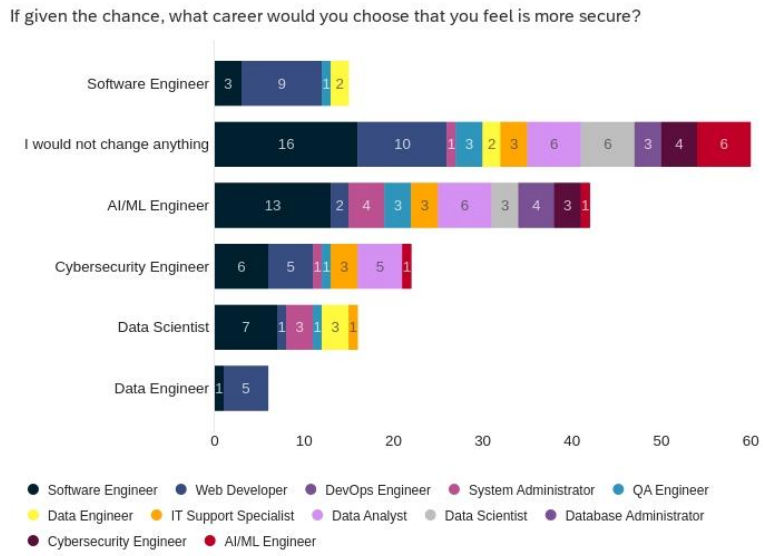
The recent surge of AI has made people reconsider their current roles. An additional goal of this questionnaire was to find out how secure the respondents feel in their current role. Results from the question "Do you think your current role is susceptible to being replaced by AI?" (Fig. 11) were broken down to show responses based on the respondent's role. The respondents who felt the most secure in their current role, i.e. have chosen "Definitely not" or "Probably not" more than "Probably yes" or "Definitely yes", are Software Engineers, AI/ML Engineers, Web Developers, Data Scientists, Data Analysts, and Cybersecurity Engineers. Contrary to respondents thinking AI will cause the team of Web Developers to contract, Web Developers themselves reported a variety of opinions, with the largest share reporting that they feel secure in their role. Data Engineers, on the other hand, despite being identified as one of the teams most likely to expand due to AI, showed an equal proportion of respondents who felt secure in their roles and those who did not. The respondents who reported to be the least secure in their current role were Database Administrators, IT Support Specialists, and QA Engineers.

Figure 11. *Susceptibility of being replaced by AI, examined by role*



Source: Survey with employees, 2023

Figure 12. *Careers perceived to be more secure, examined by role*



Source: Survey with employees, 2023

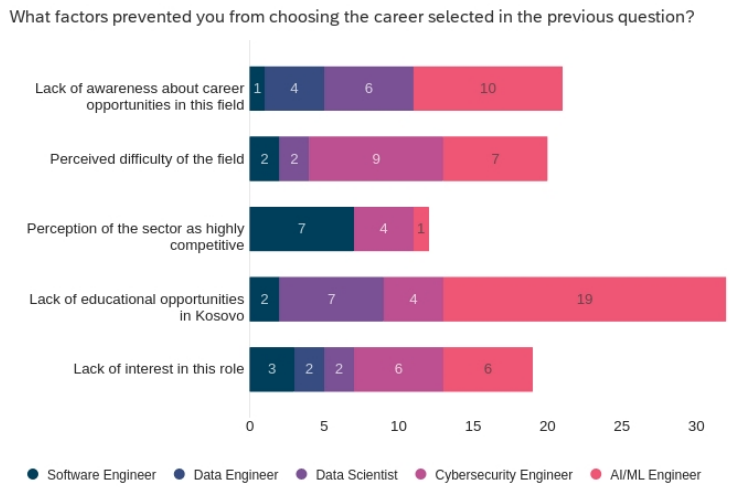
Respondents who felt insecure in their current role were then asked to choose another tech position in which they would feel secure in current circumstances. Fig. 12 represents the six most chosen options and the results are divided further based on the respondent's current role. It is worth noting that in Fig. 12, the top five careers that respondents

chose are also the same teams that respondents think will experience growth due to AI. Other than not wanting to change anything, most respondents chose to switch to AI/ML engineering, primarily those who currently work in software engineering, data analysis, system administration, and DevOps. When looking at the most frequent pairs, a few distinctions can be made:

- The majority of AI/ML Engineers and Cybersecurity Engineers would not change their career.
- Software Engineers feel comfortable in their current role, however, the next biggest share of Software Engineers would choose to become AI/ML Engineers.
- The majority of Web Developers would not change their career, however, the next biggest share of Web Developers would choose to become Software Engineers.
- Almost 50% of Data Engineers would choose to become Data Scientists.
- The majority of System Administrators would either choose to become AI/ML Engineers or Data Scientists.
- Almost an equal percentage of Data Analysts would choose to remain in their current role, switch to AI/ML Engineering, or switch to Cyber Security Engineering.

There might be a variety of factors that prevented respondents from choosing another career initially. To identify those factors, the respondents who wished to switch to another career that they thought provided better job security, were asked to identify the reason that prevented them from choosing that career (fig. 13). Categorizing the results based on the careers they would switch to, fig. 13 provides insights into the most probable reasons for not choosing the selected career initially. The most chosen reason overall is the lack of educational opportunities in Kosovo. More than half the share of respondents who chose that reason chose

Figure 13. *Factors that prevented employees from choosing the more secure career*



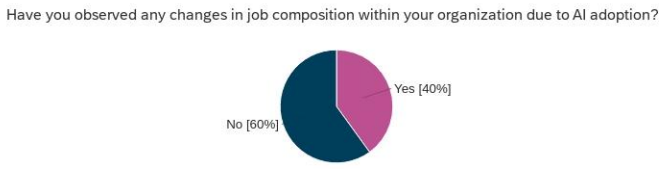
Source: Survey with employees, 2023

AI/ML Engineer as a career they would like to switch to. This is immediately followed by Data Scientists who make up the second largest share of respondents to have chosen that option. The second most chosen option was a lack of awareness about career opportunities in the selected field. Similarly to the most selected option, this one was also mostly chosen by people who wish to switch to AI/ML Engineering and Data Science. The majority of respondents who would choose Cybersecurity engineering as a career also selected perceived difficulty of the field as one of the main factors for not choosing it initially. Additionally, the main reason for not choosing Software Engineering was the perception of the sector as highly competitive. Analyzing these factors by dividing them by careers allows for more accurate measures to be put in place to ensure that prospective students in Kosovo can pursue their desired career paths. Such measures may include reevaluation of current syllabi of IT university programs to include more classes related to AI and/or Data Science, or introduction of new AI-related majors. Likewise, new job postings should be advertised on relevant job sites such as LinkedIn or local sites like KosovaJobs to ensure potential candidates are aware of the opportunity.

5.1.4. Employers' Opinion of AI's Impact on Structural Change

After answering questions regarding general opinion on AI adoption and training provision, employers were then asked a series of questions to determine their opinion on AI's potential effect on the organizational structure of their company. On this aspect, 40% of respondents reported that they have observed some kind of change in job composition within their organization due to AI, meaning the demand for some positions in the company has increased or decreased.

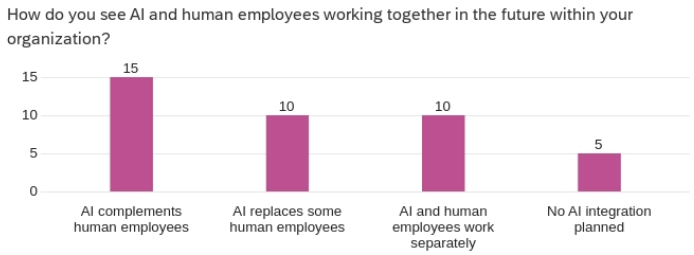
Figure 14. *Observation of changes in job composition due to AI adoption*



Source: Survey with employers, 2023

In terms of human–AI collaboration, 37.5% of employers feel that AI will complement human employees in their company, while on the other hand, 12.5% of respondents do not have any AI integration planned for the future. Despite the majority of responses having a positive outlook on Human - AI collaboration, 25% of employers believe that AI will replace some human jobs, suggesting a belief in the automation of certain tasks, whereas the remaining 25% believe that AI and humans will work separately, implying that AI and human employees will handle different tasks.

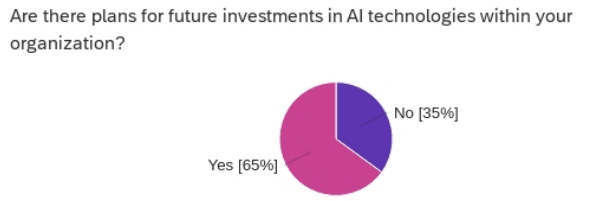
Figure 15. *Perception of human - AI working relationship*



Source: Survey with employers, 2023

Investments in AI were also another area for which the employers' input was requested. In terms of recent investments, 58% of respondents say that they have invested to some level in AI technologies during the past year. Although the share of organizations that have invested in AI is relatively small, when asked about their plans for future investment, 65% of them said that they have plans for future investments in AI within their organization, demonstrating that organizations in Kosovo are willing to adopt technologies that they have not used before.

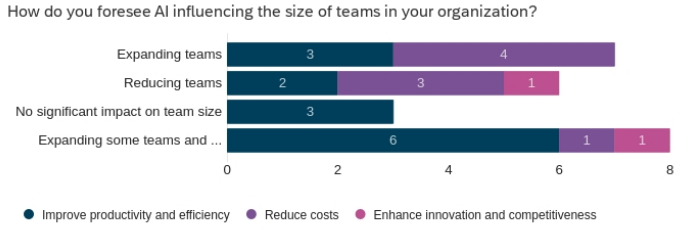
Figure 16. *Plans for future investments in AI*



Source: Survey with employers, 2023

The responses from the employers on how AI will influence the size of teams in their organization are divided by the organization's motive for adopting AI technologies. This simple crosstab analysis allows for a deeper understanding of the employers' predictions on their organizations' structural changes. The majority of respondents who believe that AI will expand some teams and reduce others have also reported that they have integrated AI to improve productivity and efficiency, which was also the main reason for AI integration of respondents who think that AI will have no significant impact

Figure 17. *Foresight of AI's impact on team size, examined by reason of AI adoption*

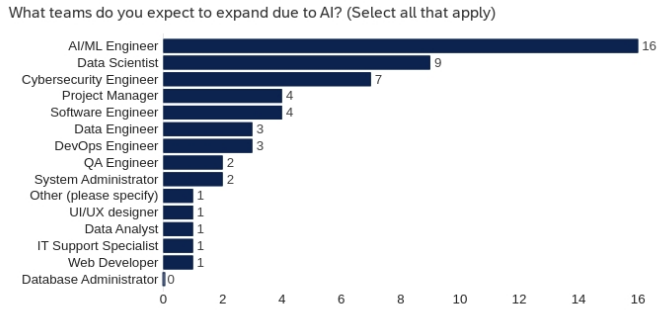


Source: Survey with employers, 2023

on team size. The second most chosen option is team expansion which is chosen by respondents who predominantly have integrated AI as a cost-reducing measure, followed by means of improving productivity and efficiency. The option of team reduction has the smallest share of respondents who have integrated AI to improve productivity and efficiency, instead, the respondents were trying to reduce costs as well as enhance innovation and competitiveness. Analyzing the results through the respondent's motive for AI integration has overall explained that employers who think that AI's effect on their organizational structure will be balanced (i.e. expand some teams and reduce others or have no significant effect) have also integrated AI mainly for improving productivity and efficiency, whereas the employers who think AI will have a more drastic effect on their organizational structure (i.e. only expand teams or only reduce teams) possess a greater variety of reasons behind AI adoption, that reason predominantly being cost reduction.

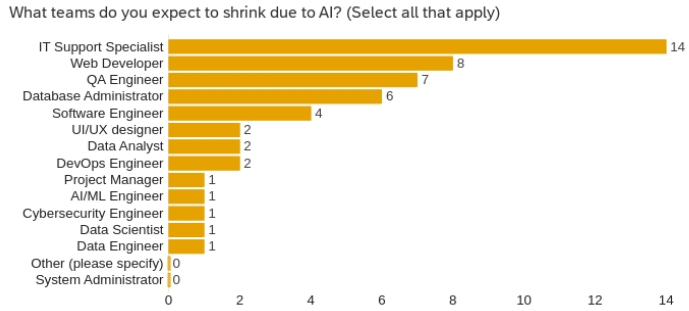
Similarly to employees, employers were also asked to identify teams they expect to expand and shrink due to AI. Only employers who chose "Expanding teams" and "Expanding some teams and reducing others" were asked to identify teams they think are likely to expand due to AI. The team that is thought to be the most susceptible to expansion is the team of AI/ML Engineers chosen by 84% of respondents. The next four teams which comprised the majority of the share of responses are Data Scientists (47%), Cybersecurity Engineers (37%), Project Managers (26%), and Software Engineers (21%). Contrary to employees' expectations of teams that are likely to expand, Data Engineers did not make the top five for the employer's list, instead it was replaced with Project Managers. Similarly, only employers who chose "Reducing teams" and "Expanding some teams and reducing others" were asked to identify teams they think are likely to contract due to AI.

Figure 18. *Teams employers expect to expand*



Source: Survey with employers, 2023

Figure 19. *Teams employers expect to shrink*



Source: Survey with employers, 2023

Over half of the respondents (56%) chose the team of IT Support Specialists as the team to be the most susceptible to contraction. IT Support Specialists were followed by Web Developers, chosen by 32% of respondents, QA Engineers (28%), Database Administrators (24%), and Software Engineers (16%). Contrary to the employees' expectations for teams that are likely to shrink, the top five list for employers did not include System Administrators and Project Managers, it instead included Software Engineers, which employees have qualified as a team that is likely to expand.

5.2. Interviews

After transcribing the voice recordings gathered from the interviews, a Natural Language Processing algorithm (Term Frequency-Inverse Document Frequency) was used to identify frequently used phrases, and after careful analysis, five reoccurring themes were derived from the interviews. Findings from the surveys appear to complement the interviews, however, the survey results provide a more in-depth view of anticipated changes in the organizational structure from both the employers' and employees' points of view, whereas interviews give more details on the strategies and the companies' journey of AI adoption.

5.2.1. Investments in AI

One of the prominent themes in interviews with SME representatives focuses on the investment strategy concerning AI integration. Strategies vary from company to company, some having already started to invest or have promising plans for investments, whereas others are more cautious when starting to invest. Interviewee A emphasized a commitment to boosting efficiency by allocating a substantial budget, ranging between $42 to $50 per individual, dedicated to AI tools. However, investing in AI is not a priority for some companies (B). When considering investments in a new technology, many are faced with a major challenge: stabilizing their operational and market position before committing to long-term AI investments. This conservative stance is based on the volatility often observed in smaller companies, where workforce instability can prevent successful technological transitions (B). Interviewee D emphasized balancing the costs and benefits of investing in platforms and tools for enterprises. Furthermore, this process requires a careful evaluation of the return on investment, and the ultimate aim is to streamline the company's work processes. By investing in the right platforms and tools, enterprises can achieve greater efficiency and productivity, which can lead to improved profitability and a competitive advantage in the market (D).

A great emphasis was put on balancing current and future investments while attempting to deal with uncertainties surrounding market demand (E, I). Interviewee E mentioned that they have allocated a portion of their workforce to handle AI projects and suggested a plan to begin offering related services, however, due to the aforementioned uncertainties, they have not been able to prioritize this initiative. To avoid risky investments, investments have been made in AI tools and resources but not through inventions, and although some software development with AI has been initiated, it is not yet formalized (I). This cautious approach aligns with the majority of the companies' representatives and shows that adoption of this technology is at a much slower pace than globally. The unpredictable nature of the technological advancements was also a major cause of delaying investments (G). However, Interviewee G expressed that they do have plans to invest in other AI companies and business models that align with their model and organizational structure. Improving internal operations was also another investment strategy that was done through the automation of report generation (K).

5.2.2. Level of AI Adoption

The interviews revealed that the integration of AI technologies, specifically GenAI, has been transformative for tech SMEs. According to Interviewee A, the integration of AI tools into everyday business processes represents a significant step towards enhancing operational efficiency. The company's decision to migrate its entire repository and embrace advanced tools, such as Copilot, were commitments to help streamline the software development timelines, which will contribute to a more efficient operational system and one that is likely to result in tangible benefits for the organization in the long run (A). Similarly, Interviewee B highlighted substantial gains in project planning efficiency through OpenAI, where a task that once took weeks to be finalized can now be accomplished within a few days. However, the interviews collectively revealed that GenAI is a technology marked by both curiosity and caution (C, E, F). Although AI tools like ChatGPT and Copilot are proven to be effective, concerns remain regarding their optimal utilization and market demand. It was often noted through all of the interviews that responses from GenAI tools like ChatGPT were not sufficient to be used on their own without human supervision. In contrast to early adopters like Interviewee H, who have both integrated and developed AI since the beginning, other interviewees demonstrated a more measured approach. For instance, AI tool utilization for specific tasks was done while maintaining a research-oriented perspective (K). While each company is using AI tools for

multiple reasons and tasks, it was apparent that these tools were particularly effective in aiding code generation and project planning. The completion of these repetitive tasks by AI allowed the employees to focus on more challenging aspects and the generation of ideas.

5.2.3. Structural Changes and Hiring

The interview results provided relevant insights into the organizational structure, which consisted of internal restructuring but no hiring to accommodate these technologies yet. The complex nature of existing projects and the special use of technologies are one of the main reasons for refraining from immediate restructuring (A). Since Company A focuses on data science projects, no further restructuring or hiring was necessary, at least not currently nor in the short term (A). Similarly, Interviewee E highlights that their company was lucky to already have employees who were familiar with AI technologies and to accommodate for potential future AI projects they have assigned those people to a new team. Other strategies include the creation of a task force since some of the employees already possess a data science background (D). This task force is responsible for identifying AI tools that will help the company in the work process and also in the development of internal tools (D). In terms of hiring, Interviewee D expressed that it is still too early to tell, however for market research the hiring will most likely go down due to automation. Interviewee H' company took a proactive approach by forming a dedicated AI team in early 2021, using existing employees to create the team. The composition of this team consists of software engineers, who depending on the demand, are flexible to help any team within the company, however around 3 people on the team are solely working on AI and cannot work elsewhere in the company (H).

Conversely, Interviewee B states that their company has not hired nor done any restructuring as a result of the recent surge of AI. Because of their current projects and clients' demands, it was not necessary to consider hiring or internal restructuring. However, they elaborate that in the future, hiring AI engineers will become inevitable or their employees will have to advance and expand their skills to accommodate these technologies. Across interviews (C, F, K), there were numerous predictions regarding the need for new roles and skill sets due to AI's recent surge. Interviewee K shared that their company formed a big data team in the last 6 - 7 months which demonstrated great success. They hold an optimistic view, highlighting that their

workforce will most likely increase because of the development of new roles in AI that they might not be aware of yet.

Overall, the interviewees demonstrated a positive view regarding the future of employment, which they think will most likely increase in the future. Even though there might not be a need for some roles, certain people will advance to take on new roles that are not yet needed, as Interviewee K entailed: a manager that once managed a few people on the team, will later get to manage the performance and accuracy of AI tools and software.

5.2.4. Preferred Skills and Training

During the interviews (A, B, C, D, E, F, H, I, J, K), it became clear that problem-solving skills and a growth-oriented mindset are highly valued. With increasing usage of AI tools, it will be easy to replicate code generation and additional technical skills, however, people who possess critical thinking and problem-solving skills will add value to their technical abilities. Interviewee C predicted that AI's rise would lead to an adjustment in hiring for software development roles, which in a few years will decrease, however, it will require a specialized skill set. On the other hand, Interviewee E expressed concern about potential skill erosion that could result from excessive reliance on AI in coding. This issue is particularly concerning for junior programmers who might get accustomed to overusing AI tools and not focus enough on skill development (E).

AI tools will not necessarily help to achieve effective outcomes if the problem is not understood to some extent by the employee, who will still have to possess the foundational knowledge about the field and then AI can be used to build on that existing knowledge (E). Overall, there are no major changes to preferred skills, however, a candidate who demonstrates a good ability to integrate these AI tools in their work routine will always be one step ahead of those who do not (A, D, E, F, H).

During the interviews, it was notable that all the participating companies have started informing their employees about AI and potential use cases. Training methods varied, ranging from regular team meetings (B, G, H, J) that discussed AI integration, to formal external training programs (C, K) and internal knowledge-sharing sessions (D, F). All of these initiatives help to upskill and adapt the workforce to the dynamic tech sector.

5.2.5. Provision of Internal and External AI Services

The use of AI services in Kosovo's tech SMEs reveals various approaches and strategies. Interviewee A is committed to integrating AI tools into their daily operations to improve efficiency. On the other hand, AI integration into services is done cautiously due to market uncertainties and low demand (C, D, E, F). Interviewee H is an early adopter of AI services and has been using them internally and offering them as a package for clients for various types of services. Existing AI tools have started to be used, however, there is no current engagement in the development of these technologies (G) while another company has proactively developed an internal GenAI product during their experimental phase of AI integration (I).

The interview results suggest that Kosovo seems to be moving slowly concerning the provision of external AI services, however, that is entirely dependent on clients' requests, which signifies the need for raising awareness of the advantages of AI services. On the other hand, almost all the interviewees shared that their company has integrated or is in the process of developing internal AI tools to increase efficiency.

5.3. Discussion and Summary of the Key Findings

Both the findings from the survey and interviews highlight the increased use of AI tools within Kosovo's tech industry. The survey shows a strong adoption rate among employees, revealing relatively high comfort and increased efficiency in using Generative AI for various work tasks, particularly in automating repetitive work and code generation. Similarly, the interviews complement the survey’s findings, highlighting the significant impact of tools like ChatGPT and Copilot in enhancing efficiency and speeding up project timelines.

Consistently, both the survey and interviews foresee potential shifts in job roles due to AI integration. There's a shared expectation of certain roles expanding amongst survey participants, such as AI/ML and Data Science, while others, notably in IT support, possibly face reductions. However, interviewee C noted that the need for Software Engineering will slowly start to decrease which contradicts the findings from the survey, especially from employee participants who voted Software Engineers as one of the teams that is expected to expand due to AI. Interviews confirmed the future need for AI roles however, they did not identify teams within their company that will be susceptible to contraction, which may result from hesitation to

disclose such opinions or the interviewees are much more optimistic regarding the future of employment compared to the survey participants.

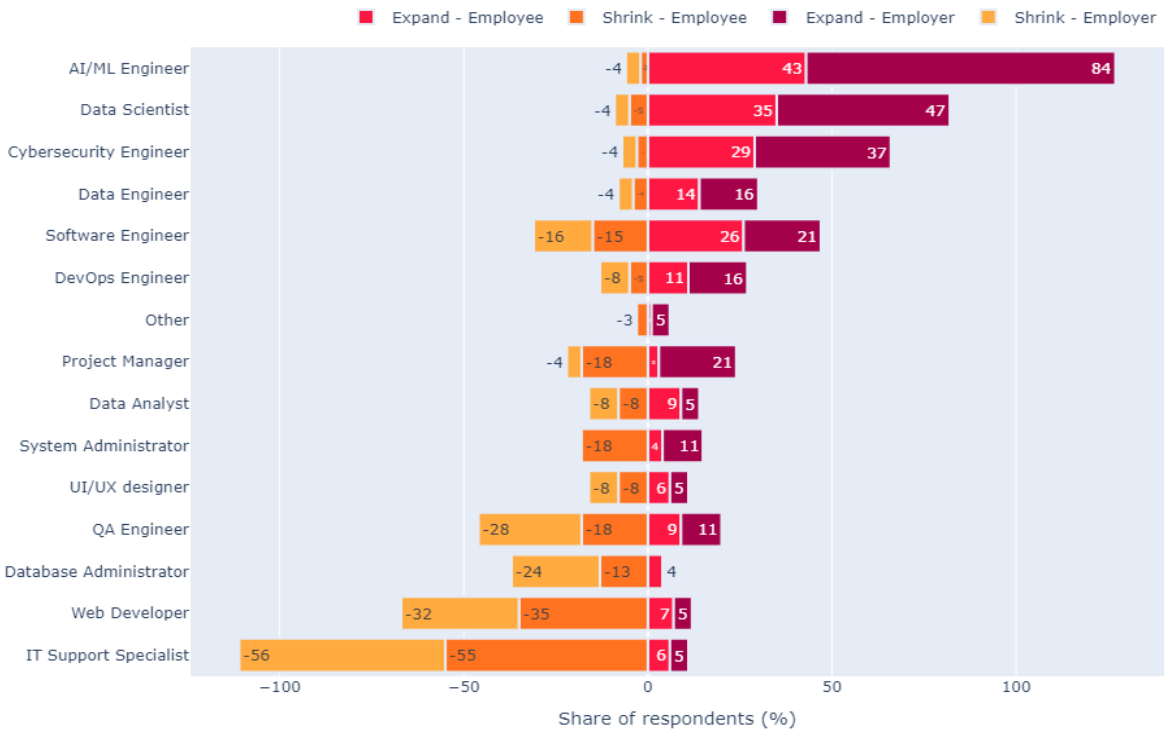
While the survey offers a greater understanding of the possible changes in organizational structure, the interviews shed light on the investment strategies, challenges, and perspectives of tech SMEs. A recurring theme across both sources is the forward-thinking approach adopted by many companies. Interviewees demonstrated both proactive and cautious strategies for investing in AI, which is supported by the survey findings indicating that the majority of companies have started to invest in these technologies or are planning to do so shortly. On the other hand, the survey findings reflected concerns about job security in certain roles, which is also confirmed to some extent by the interviews, indicating a collective awareness of potential uncertainties AI might introduce into traditional job structures.

Although there were a lot of interesting insights from the survey and the interviews, the key findings from both methods are summarized below:

- The majority of tech SMEs have started to integrate AI to some extent in their organization, with the biggest reason being to automate internal processes with hopes of developing and being more involved with the technology in the future when demand for these services starts to increase.
- Almost all the participating employers in the survey and the interviewees reported to have provided training and upskilling to employees regarding AI, as well as providing individual licenses to use GenAI tools for work purposes, indicating that GenAI usage in the workplace is highly encouraged.
- The main concern regarding AI usage is the depreciation of skills and heavy reliance on these tools to complete tasks at the same complexity that human employees can. Skill depreciation was a more prominent concern among junior developers since they might rely on GenAI tools for problem-solving and not learn new concepts on their own.
- Soft skills have started to become more valuable since technical skills can be easily replicated to some degree. Skills such as critical thinking and good problem-solving abilities can be key differentiators among applicants who share relatively similar technical skills.

- The main reason for adopting AI among tech companies in Kosovo was reported to be productivity and efficiency improvement, followed by cost reduction.
- Some tech SMEs have reported some organizational changes due to AI (fig. 14), but the majority of those changes consisted of internal restructuring and leveraging the skillset of their existing employees. Although employers agree that in the near future, AI roles will be highly sought after, they have not started to hire anyone new for these roles.
- The biggest reason for not choosing AI/ML engineering and Data Science as careers was because of the lack of educational opportunities in Kosovo, followed by the lack of awareness of career opportunities in such fields.
- As shown in fig. 20, the top three chosen teams by employers and employees that are most likely to expand are AI/ML Engineers, Data Scientists, and Cybersecurity Engineers whereas the top three teams that are most likely to shrink due to AI are IT Support Specialists, Web Developers and QA Engineers.

Figure 20. *Structural change projection from employers and employees*



Source: Survey with employees and employers, 2023

6. Conclusion and Recommendations

The findings of this capstone project give an overview of how AI is being used in Kosovo's tech SMEs. The research shows that there are benefits to using AI, but also challenges to incorporating it into these businesses, especially those dealing with employment stability. By inspecting the level of adoption, the workforce, and the structural changes, it is clear that much more is being done concerning AI adoption as compared to changes in the hiring of certain roles. Although there are anticipations by both employees and employers of certain team expansions and certain contractions, these structural changes have not yet started to take place in SMEs seeing as the only form of organizational change has been the reassignment of tasks to deal with AI research and development, as well as internal restructuring for either incorporating AI into services or to their workflows. These anticipations demonstrate two opposing trends. On one hand, there will be an increase in job opportunities related to AI. On the other hand, tech jobs mostly related to IT support may see a decline in employment prospects. According to the surveys and interviews, Kosovo's tech SMEs are using AI tools to enhance productivity and operational efficiency, however, some show dissatisfaction because they feel that it is not being used to its fullest potential. While this has generated interest, there are also concerns expressed by employees regarding the relevance of certain skills and the potential for job displacement. Investment strategies have been identified that mainly categorize Kosovo's tech SMEs to either be cautious or proactive. Their approach focuses on forward-thinking and already having started experimentation with such technologies, however, some are cautious with the investments since local demand still does not justify prioritizing investments in AI. The emergence of soft skills and creativity in knowing how to leverage these technologies to increase efficiency comprise the main qualities that these SMEs look for in prospective employees. Knowing the priorities of SMEs and also the concerns of employees allows for proper solutions to be made and ensures a smooth integration of these technologies.

Given the research findings, recommendations are proposed for four key parties involved in this technological transition: tech SMEs, employees and students, universities, and innovation hubs.

Recommendation for tech SMEs: Tech SMEs are advised to invest in training and upskilling programs that help their current employees adapt their skills to complement AI

technologies. Offering subscriptions to popular training platforms such as Udemy, Coursera, and LinkedIn Learning, among many others, is heavily advised seeing as it will not only educate the employees on AI but select courses such as “ChatGPT / AI Ethics: Ethical Intelligence for 2024” course in Udemy also discusses ethical data security practices. Alongside these platforms, the provision of frequent live demos of AI use cases specific to that SME will offer employees hands-on experience and will give them the chance to apply the concepts they learned to their projects. Offering these programs will also encourage the workforce to integrate AI into their work as much as possible, resulting in a positive impact on the company itself. This mindset will promote continual learning and innovation, rather than make AI be perceived as a threat to job security. Developing long-term strategies that balance AI integration with workforce sustainability can identify potential job shifts and create plans to restructure roles in ways that align with AI advancements while preserving job opportunities.

Recommendation for employees and students: Employees and students are recommended to actively seek opportunities to learn about AI and its applications. Broadening the skillset to include a variety of technical skills as well as soft skills is a great way to quickly adapt to changes in the sector. Similarly to the platforms recommended for tech SMEs, students and employees are advised to seek training, for both technical and soft skills, in platforms such as Udemy, Coursera, edX, Microsoft Learn, Google Learning, and YouTube. All of these platforms offer free courses if the paid courses are not preferable, with the majority being self-paced. Working on personal projects is also a good way to showcase and learn more about how to apply AI. YouTube offers countless step-by-step projects in AI with differing levels of difficulty and for various fields of application. For employees to remain valuable in the evolving job market, it is best to learn to utilize AI tools to their advantage and always be up to date with the latest tools to remain competitive.

Recommendation for universities: Continuous cooperation with the tech industry is advised to design a curriculum that aligns with the industry's needs, as well as eliminate potential future job displacements. Offering majors such as AI and Data Science will help ensure that prospective students pursue majors that will increase their job security in the future. The inclusion of real-world projects and internships will help students be better prepared to enter the competitive job market. The inclusion of classes that encourage the development of

communication, problem-solving, and adaptability skills is also advised to help minimize the chances of job displacement in the future. The provision of more extensive AI/Data Science elective classes should not be overlooked as it can still teach students how they can apply AI without choosing it as a major. Potential electives should also include ethical data practices surrounding AI, seeing as the way AI and how data is retrieved and handled, are under-discussed in various universities in Kosovo (see Table 1). To ensure that students receive an education that is reflective of the current trends in technology, cooperation with the tech sector and the Ministry of Education is heavily advised to engage the faculty in frequent training to avoid teaching outdated information and ensure that the curriculum is updated regularly to include recent developments in the field of tech.

Recommendation for innovation hubs: To enhance the adoption of AI in Kosovo's tech SMEs, innovation hubs can organize frequent informational sessions that would serve to educate business owners about the benefits of AI compared to other technologies, as it is essential to emphasize the practical advantages that AI can offer to their specific businesses. Additionally, establishing partnerships with higher education institutions is crucial, since innovation hubs can organize events and hackathons targeted towards students in problem-solving in the field of data which enriches the education they are receiving from their respective universities. Working closely with local government is essential to establish policies that encourage businesses to invest in AI technologies. Moreover, hosting monthly events where local businesses, tech experts, and those interested in AI can come together, provides a valuable space for sharing ideas and knowledge and it may be also used to connect AI startups with potential investors. Innovation hubs are also advised to offer additional accessible skill development programs, promote open data initiatives, and engage with the local community through outreach activities that contribute to building a skilled workforce and raising awareness about AI.

Considering these recommendations, future research should concentrate on monitoring the growing impact of AI on employment stability and skill relevance over time. Additionally, it should delve into the role of governments in managing the integration of AI in the workforce and also address the ethical considerations associated with AI implementation, which will in turn support the sustainable and responsible growth of AI in Kosovo's tech sector.

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Appendices

Appendix A - Informed Consent Form for Interviews

Informed Consent Form for Interviews

This informed consent form is for manager positions and above of Tech SMEs in Kosovo participating in the capstone project titled "Willingness to Employ vs. Embracing AI: Implications for the Future of the Workforce of Kosovo's Tech SMEs".

Agullina Shllaku

Rochester Institute of Technology

Willingness to Employ vs. Embracing AI: Implications for the Future of the Workforce of Kosovo's Tech SMEs

This Informed Consent Form has two parts:

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you agree that your child may participate)

You will be given a copy of the full Informed Consent Form

Part I: Information Sheet

Introduction

I am Agullina Shllaku, a senior student at RIT Kosovo, with a study plan focusing on Web & Mobile Computing and Economics & Statistics. I am doing an honors capstone project to understand the extent to which Tech SMEs in Kosovo have begun to incorporate AI and identify the potential changes it can introduce to the company's organizational structure.

Purpose of the research

This project aims to identify the changes that the tech industry in Kosovo will face due to AI adoption, the extent to which tech SMEs are investing in AI technologies, and how that will affect the organizational structure of those SMEs.

Type of Research Intervention

One-on-one interview.

Participant Selection

Manager Positions and above of Tech SMEs in Kosovo are invited to participate.

Voluntary Participation

Participation in this study is entirely voluntary. You may choose to not participate or withdraw from this study at any time without penalty.

Procedures

Participants will be a part of a one-on-one interview, which consists of 11 questions in total.

Duration

The interview is expected to last for approximately 30 minutes.

Risks

There are no significant risks associated with participating in this study.

Benefits

The benefits include helping the young generation in successfully navigating an evolving job market helping, guiding growth-oriented workforce planning.

Reimbursements

You will not be provided with any payment to take part in the research.

Confidentiality

All information collected will be kept confidential. Your responses will be anonymized, and no personally identifiable information will be shared with anyone.

Sharing the Results

The research findings will be publicly available but will not include any identifiable information.

Right to Refuse or Withdraw

You have the right to refuse to participate or to withdraw from the survey at any point without providing a reason.

Who to Contact

If you have any questions or concerns about the survey or your participation, please contact Agullina Shllaku, at as4945@rit.edu.

Part II: Certificate of Consent

I have been invited to participate in a capstone research project about the implications for the future of the workforce of Tech SMEs in Kosovo regarding AI adoption.

I have read the information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study.

Print Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

If participant does not read

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

*Print name of witness*_____

Signature of witness _____

Date _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following will be done:
1. One-on-one interview

2. Record the interview for research accuracy.

3. All data will be kept confidential

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant.

Print Name of Researcher/person taking the consent_____

Signature of Researcher /person taking the consent_____

Date _____

Day/month/year

Appendix B – Interview Questions for Tech SMEs' Representatives

FIRST PART:

Discuss the company's type, services offered, and size in terms of employees.

SECOND PART:

1. Can you provide an overview of the company's current stance on AI adoption?

2. How has the recent surge in AI adoption affected the company's overall business strategy and competitiveness in the market?
3. Are there any plans for future investments in AI, machine learning, or data science technologies within your organization?
4. Have you introduced a dedicated AI, ML, or data science team within the company, or have you made changes to your existing team structure to accommodate these technologies?
5. Are there specific teams or departments within your organization that are actively exploring or using generative AI techniques for problem-solving, and if so, how has it impacted the efficiency and speed of software development processes within these teams?
6. If your company plans on investing in various types of AI technologies that can be used for different teams in your company, what are your plans for training the employees on working with these technologies?
7. Have you experienced any resistance or concerns from your employees regarding AI, and how have you managed these concerns?
8. How do you foresee AI adoption impacting the size and composition of your workforce in the coming years? Are there expectations of hiring more specialized AI roles?
9. In what ways do you anticipate AI will enhance the efficiency and productivity of your employees and the overall work environment?
10. Have you observed any shifts in the demand for specific roles within your organization as a result of AI adoption, and if so, can you specify which ones?
11. Have you noticed any changes in the skill sets or qualifications you look for in potential employees due to the increasing integration of AI into your business, and if so, can you specify which ones?

Appendix C – Questionnaire for Employees in the Tech Sector

Start of Block: Consent Form - ICT employee and employer questionnaire

Agullina Shllaku
Rochester Institute of Technology
Willingness to Employ vs. Embracing AI: Implications for the Future of the Workforce of Kosovo's Tech SMEs

This Informed Consent Form has two parts:
1. Information Sheet (to share information about the study with you)
2. Certificate of Consent (agreement to participate)

Part I: Information Sheet
I am Agullina Shllaku, a student at the Rochester Institute of Technology, conducting this research as part of my capstone project. This project aims to identify the changes that the tech industry in Kosovo will face due to AI adoption, the extent to which tech SMEs are investing in AI technologies, and how that will affect the organizational structure of those SMEs.

The benefits include helping the young generation in successfully navigating an evolving job market helping, guiding growth-oriented workforce planning.

The research will involve an online questionnaire consisting of 24 questions. These questions will include multiple-choice and Likert scale questions. The online questionnaire will take approximately 5 minutes to complete.

Employers and employees in the ICT sector in Kosovo older than 18 are invited to participate in this study.

Participation is completely voluntary. There are no significant risks to participants. The questionnaire is anonymous, and all data collected will be kept confidential. There are no reimbursements for participating in this study. All information collected will only be used for academic purposes.

The findings will be made publicly available through the RIT Library as a thesis project, but will not include any identifiable information.

You have the right to refuse to participate or to withdraw from the study at any point.

For any questions or concerns, please contact Agullina Shllaku at as4945@rit.edu or agullina.s@gmail.com.

Part II: Agreement to Participate I have read and understand the information; I am above the age of 18. I understand the following: I have the opportunity to ask questions about the research. Participation involves the completion of an online questionnaire. Data will be used for academic purposes. All data will be kept confidential.
Do you agree to participate?

- ○ Yes
- ○ No

End of Block: Consent Form - ICT employee and employer questionnaire

Start of Block: Demographic

Gender:

- ○ Male
- ○ Female
- ○ Other

Age:

- ○ 18 - 24
- ○ 25 -34
- ○ 35 - 44
- ○ 45 - 54
- ○ 55 and over

Education Level (if you are completing a degree, i.e. Bachelor's, please select that degree):

- ○ High School
- ○ Bachelor's Degree
- ○ Master's Degree
- ○ Ph.D. or equivalent

Do you currently work in the ICT sector in Kosovo?

- ○ Yes
- ○ No

How long have you been working in the ICT sector?

- ○ Less than 1 year
- ○ 1-2 years
- ○ 3-5 years
- ○ 6-10 years
- ○ More than 10 years

Please specify your role within the ICT sector:

- ○ Employee
- ○ Employer
- ○ Self-employed

What is your current job position?

- ○ Software Engineer
- ○ Web Developer
- ○ DevOps Engineer
- ○ System Administrator
- ○ QA Engineer
- ○ Data Engineer
- ○ IT Support Specialist
- ○ Data Analyst
- ○ Data Scientist
- ○ Database Administrator
- ○ Cybersecurity Engineer
- ○ AI/ML Engineer
- ○ UI/UX designer
- ○ Project Manager

○ Other (please specify) _____

End of Block: Demographic

Start of Block: Opinion Towards Generative AI

Are you aware of the use of Generative AI or Large Language Models (LLMs) in your workplace?

○ Yes

○ No

Do you personally use Generative AI or LLMs in your daily work tasks?

○ Yes

○ No

How comfortable are you with using Generative AI in your work?

○ Extremely uncomfortable

○ Somewhat uncomfortable

○ Neutral

○ Somewhat comfortable

○ Extremely comfortable

What AI tool do you use for your work tasks?

- [ ] ChatGPT 3.5
- [ ] ChatGPT 4.0
- [ ] GitHub Copilot
- [ ] Bard
- [ ] Amazon CodeWhisperer
- [ ] Microsoft Copilot
- [ ] None
- [ ] Other (please specify) _____

Does your workplace provide you with licenses to use paid AI tools or software?

- ○ Yes
- ○ No
- ○ Not sure

For what purposes do you use Generative AI tools in your work? (Select all that apply)

- [ ] Code generation
- [ ] Code review and optimization
- [ ] Data analysis and insights
- [ ] Automation of repetitive tasks
- [ ] Text generation
- [ ] Image or video generation
- [ ] I don't use it
- [ ] Other (please specify) _____

Have you recently completed any training course related to AI?

- ○ Yes
- ○ No

Was the training on AI required by your work?

- ○ Yes
- ○ No

How efficient has Generative AI made you in the workplace?

- ○ Extremely inefficient
- ○ Somewhat inefficient
- ○ Neutral
- ○ Somewhat efficient
- ○ Extremely efficient

End of Block: Opinion Towards Generative AI

Start of Block: Impact of AI on Job Role

Do you think AI will cause certain teams to expand and others to shrink?

- ○ Definitely not
- ○ Probably not
- ○ Might or might not
- ○ Probably yes
- ○ Definitely yes

What teams do you expect to expand due to AI? (Select all that apply)

- [ ] Software Engineer
- [ ] Web Developer
- [ ] DevOps Engineer
- [ ] System Administrator
- [ ] QA Engineer
- [ ] Data Engineer
- [ ] IT Support Specialist
- [ ] Data Analyst
- [ ] Data Scientist
- [ ] Database Administrator
- [ ] Cybersecurity Engineer
- [ ] AI/ML Engineer
- [ ] UI/UX designer
- [ ] Project Manager
- [ ] Other (please specify) _____

What teams do you expect to contract due to AI? (Select all that apply)

- [ ] Software Engineer

- [ ] Web Developer
- [ ] DevOps Engineer
- [ ] System Administrator
- [ ] QA Engineer
- [ ] Data Engineer
- [ ] IT Support Specialist
- [ ] Data Analyst
- [ ] Data Scientist
- [ ] Database Administrator
- [ ] Cybersecurity Engineer
- [ ] AI/ML Engineer
- [ ] UI/UX designer
- [ ] Project Manager
- [ ] Other (please specify) _____

Do you think your current role is susceptible to being replaced by AI?

- ○ Definitely not
- ○ Probably not
- ○ Might or might not

- ○ Probably yes
- ○ Definitely yes

Has the recent surge of AI made you reconsider your career choice?

- ○ Yes
- ○ Maybe
- ○ No

If given the chance, what career would you choose that you feel is more secure?

- ○ Software Engineer
- ○ Web Developer
- ○ DevOps Engineer
- ○ System Administrator
- ○ QA Engineer
- ○ Data Engineer
- ○ IT Support Specialist
- ○ Data Analyst
- ○ Data Scientist
- ○ Database Administrator
- ○ Cybersecurity Engineer

- ○ AI/ML Engineer
- ○ UI/UX designer
- ○ Project Manager
- ○ I would not change anything
- ○ Other (please specify) _____

What factors prevented you from choosing the career selected in the previous question?

- ☐ Lack of interest in this role
- ☐ Lack of educational opportunities in Kosovo
- ☐ Perception of the sector as highly competitive
- ☐ Perceived difficulty of the field
- ☐ Lack of awareness about career opportunities in this field
- ☐ Other (please specify) _____

Appendix D – Questionnaire for Employers in the Tech Sector

Start of Block: Consent Form - ICT employee and employer questionnaire

Agullina Shllaku
Rochester Institute of Technology
Willingness to Employ vs. Embracing AI: Implications for the Future of the Workforce of Kosovo's Tech SMEs

This Informed Consent Form has two parts:
1. Information Sheet (to share information about the study with you)
2. Certificate of Consent (agreement to participate)

Part I: Information Sheet
I am Agullina Shllaku, a student at the Rochester Institute of Technology, conducting this research as part of my capstone project. This project aims to identify the changes that the tech industry in Kosovo will face due to AI adoption, the extent to which tech SMEs are investing in AI technologies, and how that will affect the organizational structure of those SMEs.

The benefits include helping the young generation in successfully navigating an evolving job market helping, guiding growth-oriented workforce planning.

The research will involve an online questionnaire consisting of 24 questions. These questions will include multiple-choice and Likert scale questions. The online questionnaire will take approximately 5 minutes to complete.

Employers and employees in the ICT sector in Kosovo older than 18 are invited to participate in this study.

Participation is completely voluntary. There are no significant risks to participants. The questionnaire is anonymous, and all data collected will be kept confidential. There are no reimbursements for participating in this study. All information collected will only be used for academic purposes.

The findings will be made publicly available through the RIT Library as a thesis project, but will not include any identifiable information.

You have the right to refuse to participate or to withdraw from the study at any point.

For any questions or concerns, please contact Agullina Shllaku at as4945@rit.edu or agullina.s@gmail.com.

Part II: Agreement to Participate I have read and understand the information; I am above the age of 18. I understand the following: I have the opportunity to ask questions about the research. Participation involves the completion of an online questionnaire. Data will be used for academic purposes. All data will be kept confidential.
Do you agree to participate?

- ○ Yes
- ○ No

End of Block: Consent Form - ICT employee and employer questionnaire

Start of Block: Demographic

Gender:

- ○ Male
- ○ Female
- ○ Other

Age:

- ○ 18 - 24
- ○ 25 -34
- ○ 35 - 44
- ○ 45 - 54
- ○ 55 and over

Education Level (if you are completing a degree, i.e. Bachelor's, please select that degree):

- ○ High School
- ○ Bachelor's Degree
- ○ Master's Degree
- ○ Ph.D. or equivalent

Do you currently work in the ICT sector in Kosovo?

- ○ Yes
- ○ No

How long have you been working in the ICT sector?

- ○ Less than 1 year
- ○ 1-2 years
- ○ 3-5 years
- ○ 6-10 years
- ○ More than 10 years

Please specify your role within the ICT sector:

- ○ Employee
- ○ Employer
- ○ Self-employed

What is the size of your organization in terms of the number of employees?

- ○ Less than 5
- ○ 6-20
- ○ 21-50
- ○ 51-100
- ○ 101-250
- ○ More than 250

End of Block: Demographic

Start of Block: Opinion Towards Generative AI

Are you aware of the use of Generative AI or Large Language Models (LLMs) in your workplace?

- ○ Yes
- ○ No

Has your organization adopted AI technologies in any capacity?

- ○ Yes
- ○ No

Please select the primary AI technology or tool currently in use:

- ○ Chatbots
- ○ Data Analytics
- ○ Natural Language Processing
- ○ Robotic Process Automation
- ○ Other (please specify) _____

How long has your organization been using AI technologies?

- ○ Less than 1 year
- ○ 1-2 years
- ○ 3-5 years
- ○ More than 5 years

What was the main motivation for adopting AI technologies in your organization?

- ○ Improve productivity and efficiency
- ○ Reduce costs
- ○ Enhance innovation and competitiveness
- ○ Other (please specify) _____

Do you provide AI-related training to your employees?

- ○ Yes
- ○ No

Do you issue licenses for your organization to use Generative AI tools?

- ○ Yes
- ○ No

End of Block: Opinion Towards Generative AI

Start of Block: Impact of AI on Job Role

Have you observed any changes in job composition within your organization due to AI adoption?

- ○ No
- ○ Yes

How do you see AI and human employees working together in the future within your organization?

- ○ AI complements human employees
- ○ AI replaces some human employees
- ○ AI and human employees work separately
- ○ No AI integration planned

Has your organization made significant investments in AI technologies in the past year?

- ○ Yes
- ○ No

Please select the areas or projects where AI investments were made:

- ☐ Data Analytics
- ☐ Customer Support Automation
- ☐ Process Automation
- ☐ Research and Product Development
- ☐ Other (please specify): _____

Are there plans for future investments in AI technologies within your organization?

- ○ Yes
- ○ No

How do you foresee AI influencing the size of teams in your organization?

- ○ Expanding teams
- ○ Reducing teams
- ○ No significant impact on team size
- ○ Expanding some teams and reducing others

What teams do you expect to expand due to AI? (Select all that apply)

- [ ] Software Engineer
- [ ] Web Developer
- [ ] DevOps Engineer
- [ ] System Administrator
- [ ] QA Engineer
- [ ] Data Engineer
- [ ] IT Support Specialist
- [ ] Data Analyst
- [ ] Data Scientist
- [ ] Database Administrator
- [ ] Cybersecurity Engineer
- [ ] AI/ML Engineer
- [ ] UI/UX designer
- [ ] Project Manager
- [ ] Other (please specify) _____

What teams do you expect to shrink due to AI? (Select all that apply)

- [ ] Software Engineer

- [ ] Web Developer
- [ ] DevOps Engineer
- [ ] System Administrator
- [ ] QA Engineer
- [ ] Data Engineer
- [ ] IT Support Specialist
- [ ] Data Analyst
- [ ] Data Scientist
- [ ] Database Administrator
- [ ] Cybersecurity Engineer
- [ ] AI/ML Engineer
- [ ] UI/UX designer
- [ ] Project Manager
- [ ] Other (please specify) _____