

BUDAPEST UNIVERSITY OF
ECONOMICS AND BUSINESS

FACULTY OF FINANCE AND
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THESIS

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Full-time training

Finance and Accountancy

Financial Services

BUDAPEST UNIVERSITY OF
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ACCOUNTANCY

Why is Hungary lagging in AI adoption?

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DECLARATION

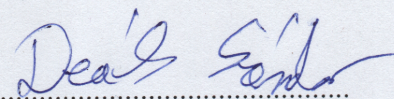
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1. Introduction

Artificial Intelligence (AI) has transitioned from a specialised technological sector to a versatile technology with the potential to transform economic systems, job markets, and daily life. In the last ten years, global investments in AI have skyrocketed, digital tools have become ordinary, and the adoption of AI across various industries has rapidly progressed. The European Union views AI as a crucial strategic technology and invests over one billion euros each year into AI research, regulation, and implementation to secure a competitive edge in an increasingly digital world (European Commission, 2025-b). However, despite this favourable landscape, EU Member States exhibit significantly differing levels of readiness and adoption of AI. Hungary, in particular, has been one of the slower adopters in the EU, consistently ranking among the lowest in AI usage within businesses, digital competencies, and organisational change.

This thesis explores the reasons behind Hungary's slow adoption of AI, even though certain sectors enjoy beneficial macroeconomic conditions, strong digital infrastructure, and a relatively tech-savvy younger demographic. As of 2024, Hungary's AI adoption rate among businesses stands at just 3.7%, which is lower than the EU average of 8% (European Commission, 2024). This discrepancy continues despite the presence of solid broadband coverage, high smartphone penetration, and an emerging ecosystem of digital financial services. The conflict between promising technological infrastructure and sluggish organisational adoption is the primary issue this study aims to investigate.

Hungary represents a unique scenario because, although its population is experiencing a decline, particularly in the 15-74 age group (KSH, 2025-e; 2025-b), the level of educational attainment has consistently increased. The percentage of individuals holding a bachelor's degree or higher is increasing, and younger generations have a significantly higher digital literacy compared to older groups. This demographic shift should ideally provide a helpful environment for the integration of AI, particularly in labour-intensive industries such as retail banking, manufacturing, logistics, and public administration. However, AI adoption continues to be slow. In contrast to in Northern and Western Europe, where AI applications have been incorporated into various business functions, decision-making, customer service, and manufacturing, Hungarian workplaces predominantly depend on manual processes, legacy IT systems, and human-reliant administrative tasks.

The disparity becomes more apparent within the financial sector, which is a global frontrunner in AI usage. Globally, banks utilise AI technologies for various purposes, including fraud detection, risk evaluation, credit assessment, conversational agents, algorithmic trading, and wealth management. In Hungary, however, the use of AI in banking is restricted to basic chatbots and simple automation. Robo-advisors, which are widely accepted in the US and Western Europe, have seen very limited adoption in the market. Revolut is the sole provider of such services, even though younger generations display significant interest in investing and financial planning. This lack of adoption highlights regulatory, structural, and behavioural obstacles, making Hungary an interesting case for analysing AI's widespread usage.

I remember not using my junior debit card for years and when I needed its PIN code and changing the purchase limit, I had to go to the bank and had to fill out multiple papers, which took some time, now I can ask the AI to change my purchase limit and can sign the request within seconds using my fingerprints, also I can request my PIN code anytime, and then tell the AI that, I have made sure that no one can see it, and can be shown to me, as it is blurred out by default. These routine, expensive, and tedious tasks are outsourced to chatbots, personalised services, and AI robots for self-service. The main purpose of this is to reduce administrative tasks and be active even during times when workers are not available, thus letting workers carry out valuable tasks, instead of dealing with administrative ones. On the other hand, this change implies that workers will need to have higher qualifications and better skills. In 2020, the financial sector had the biggest proportion of AI usage. (Rahman et al., 2021) AI plays a significant role in fraud detection, preventing potential risks and reducing investigation time. AI can also predict customer behaviour by analysing past data, which increases the success rate of targeted promotions. AI allows better service customisation by analysing past payment history, which some consider too much of a risk to their privacy. However, as it is not yet perfect it can also give people an opportunity to take advantage of it or disrupt it for example by Distributed Denial of Service attacks, which can slow down or even shut down the whole server by overloading it with unnecessary data or hacked thus one could take over the control or change how it works, although such attacks are considered illegal many attackers still can remain anonymous to this day. Also, regulatory frameworks are still in development, and the service customisation and targeted advertisements and promotions it provides might violate data protection laws if such happens without the consent of the customer and also might be hard to point out who is responsible in case of a bad decision made by the AI. Many institutions still run older systems that are incompatible with AI, and they also employ workers who rarely have

the skills to interpret the data Artificial Intelligence provides them correctly. Younger generations are more likely to adopt AI, while older generations lag behind. (Rahman et al., 2021)

The primary aim of this thesis is to explore the structural, cultural, economic, and generational influences that shape Hungary's slow AI adoption path. This involves examining national policy, labour market conditions, digital competencies, industry makeup, organisational preparedness, trust in AI technologies, and behaviours of younger generations who are progressively influencing the future workforce. Additionally, it includes examining the relationship between macro-level elements (government strategies, national regulations, industry frameworks) and micro-level aspects (individual perceptions, behaviours, and skills). Based on these considerations, I came up with the following hypotheses:

H1: Generation Z prefer self-service technology over human assistance when performing administrative tasks.

H2: Even among Generation Z, Revolut's Robo-Advisor remains unpopular.

H3: Most members of Generation Z have used at least one of the chatbot services offered by Hungarian banks.

H4: The majority of Generation Z believe that AI will have an effect on their future employment.

H5: In the context of portfolio management, the presence of a human advisor remains important even for younger generations.

2-4. Literature Review

2.1. Digital Context

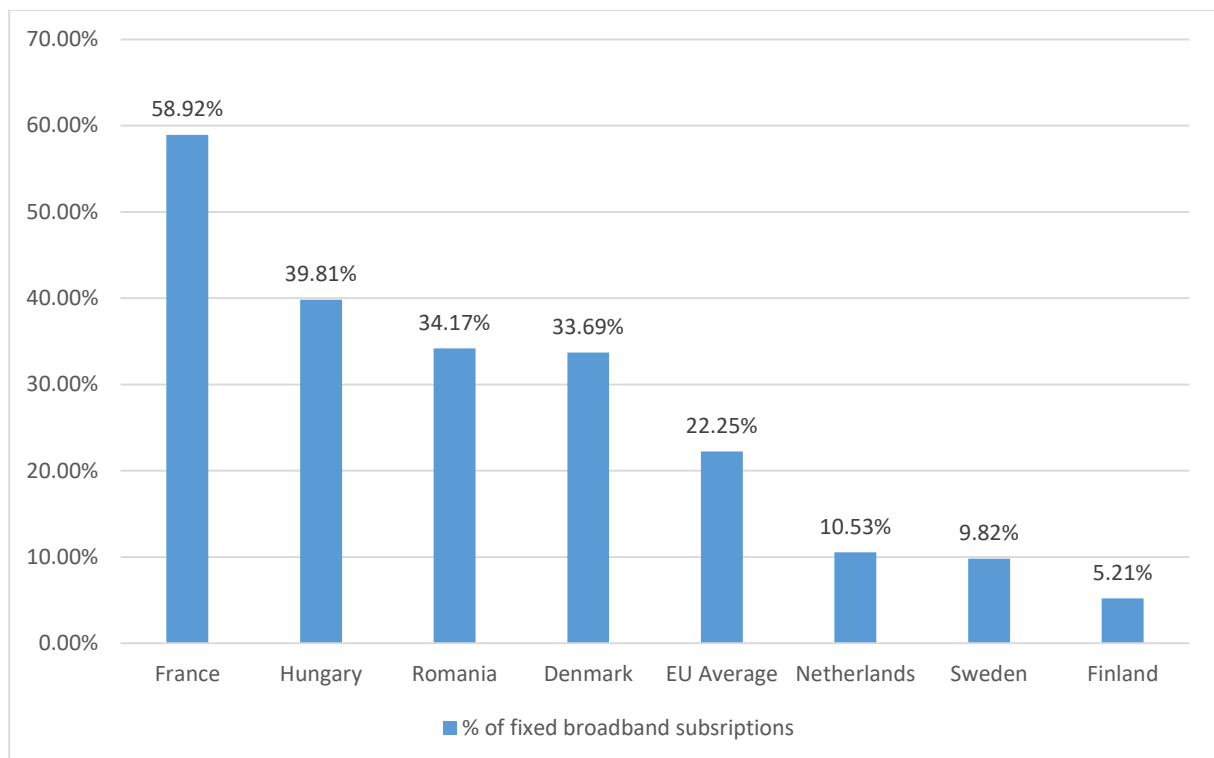
The European Union has prioritised AI as a key area, pouring significant resources into research and infrastructure development. For instance, EU initiatives like Horizon Europe and Digital Europe each dedicate approximately 1 billion Euros annually to AI projects, aiming to gather around 20 billion Euros by 2030 through a combination of public and private investments. In theory, Hungary stands to gain from this supportive framework, along with strong physical infrastructure (European Commission, 2025-b). Nationwide broadband

coverage is extensive, with household internet access consistently increasing and reaching nearly 91% by 2021. (Fróna et al., 2025) However, in spite of this strong foundation, the adoption of AI and digital technologies among Hungary's businesses and citizens remains behind.

Official statistics highlight the weakness: only 3.7% of Hungarian businesses reported using AI in 2024, compared to an average of 8% across the EU (European Commission, 2024). Hungary lags behind the EU standard in most digital measures. For instance, only about 63.7% of Hungarians possessed basic digital skills in 2024, while only around 4% had advanced digital abilities, in contrast to EU averages of about 75-80% for basic skills and 31% for advanced skills. Although educational levels are improving, the pace of digital skills development remains slow, with basic ICT skills increasing by only 2-3% annually. As Kergroach and Hérítier (2025) observe, Europe is currently experiencing a rapid expansion in AI, yet legal issues, data governance challenges, and particularly skill shortages may create gaps between nations. In the case of Hungary, ongoing skill gaps and limited AI education mean that many employees are not prepared for AI-enabled work (PwC, 2019; OECD, 2024-a).

The Government is aware of these issues. Hungary's new AI Strategy (2025-2030) sets ambitious goals to address skill development and adoption. By 2030, it aims to educate 2.5 million citizens with a focus on AI, and to provide 60% of public administration services online using self-service AI systems. Additionally, it aims for 40% of small and medium-sized businesses (SMEs) to use AI by 2030, representing a significant rise from current levels. These policy goals acknowledge that Hungary needs to accelerate and deepen AI integration, particularly in the business and public sectors, to meet EU-wide objectives. (Magyarország Kormánya, 2025)

Figure 1: Share of fixed broadband subscriptions ≥ 1 Gbps, Total



Source: European Commission, 2025-d (own editing)

As can be seen, Hungary is second to France and surpasses the EU average by quite a large portion when it comes to the internet, which is faster than 1 Gigabit per second. 39.81% of Hungarian households have a 1 Gigabit per second or faster internet connection. This is part of the incredible Hungarian infrastructure, because numerous AI tasks are performed in the cloud, where extensive datasets are kept, processed, and models are developed. High-speed, low-latency internet enhances the speed and reliability of uploading substantial training datasets, while also minimising delays when engaging with AI applications. (The Swiss Quality Consulting, n.d.)

2.2. What drives adoption from the side of the people

Trust can be one of the biggest challenges, as people are more likely to hang up calls from AI than from humans. In case of medical, military and financial issues, customers also prefer getting advice from humans, rather than robots/AI and are more likely to take the advice. Trust can't be built in people by AI. The expertise of humans is very important; people tend to

give the same amount of trust to the efficiency of the AI and beginner advisors, even if that is not the case. Stress can be caused by negative portfolios, and there are customers who start panic selling because of the lack of a human who can calm them down and answer their questions.

2.3. What governmental framework can drive adoption?

Education and available training are the most important a government can do, as European Commission (2025-c) suggests making efforts to train more vulnerable groups such as people in rural areas and people with lower education level than the average, although that could potentially result in losing political power for the current administration as people with higher education and younger people even in rural areas tend to vote against them.

According to estimates, about 49% of all job hours could have been automated in the Hungarian market (McKinsey & Company, 2018), but it would result in mass termination, transformation of workplaces, and many new jobs would emerge in their places, which would require different competencies. Currently, only about 63.7% of the Hungarian population has at least basic digital skills, if Hungary stagnates with its 2.4% annual change from the 58.9% of 2023. (European Commission, 2024)

A government should also provide protection for the personal life of their citizens, which can be challenging as when a new technology emerges, regularly also means that the use of personal data increases and the way of it is handled changes, the combat the misuse of these, strong data-protection laws must be enforced, for which the European Union gives a very strict guideline as in like many other cases the European Union acted first.

Another social challenge could be the inequalities between societies and internal social differences, such as educational level, place of living, professional and social competencies, which all contribute to one's income.

Artificial intelligence systems could play an essential role in business etiquette, transparency and accountability, which can change the current system of social responsibility, many are still very against it in fields like art, and call AI soulless appropriation, and also many celebrates it as it is much faster than a human and also cheaper, making digital asset creating

more efficient at the expense of talent in the entertainment industry. It is questionable what the role of humans can be after mass automation.

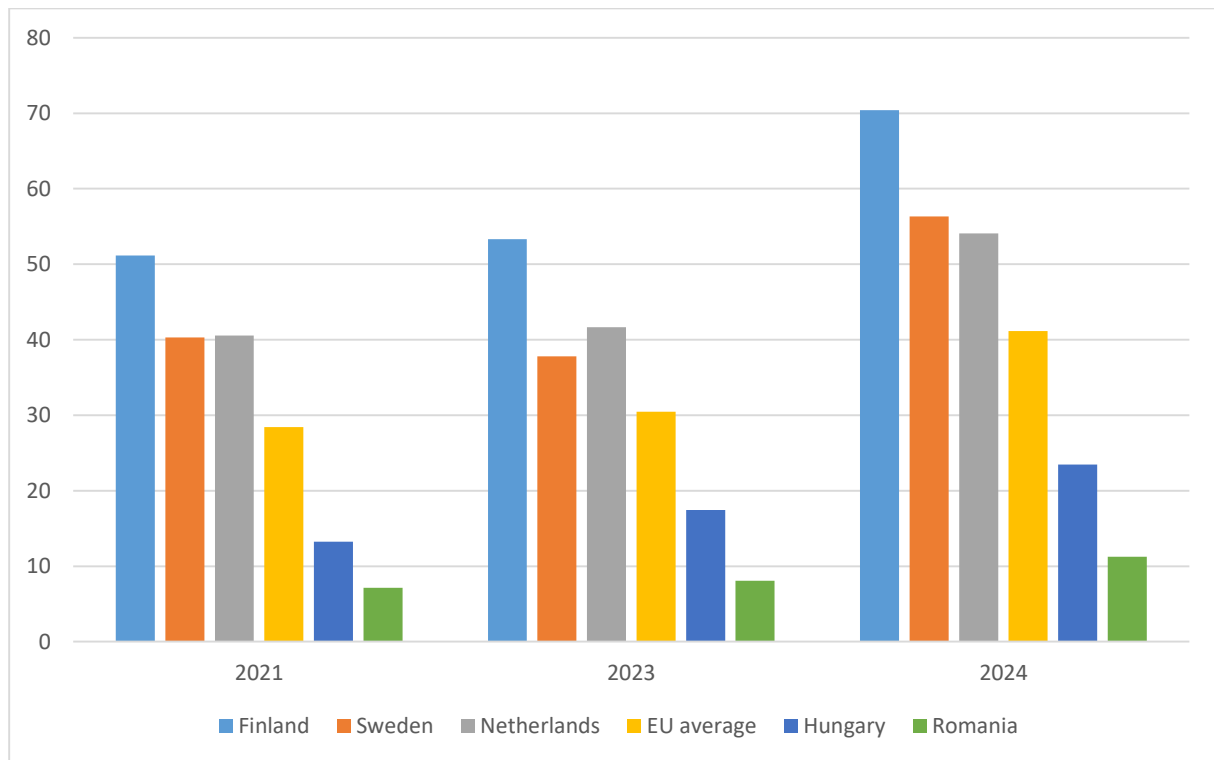
Artificial intelligence also comes with national security concerns, and the Hungarian Government (2025) declared that the valuable Hungarian data should be physically in the territory of Hungary; otherwise, it is a risk for Hungarian self-determination. Many critics argue that most AI systems run on Azure Cloud and the chips are designed mainly by Nvidia and to a lesser extent by AMD, which are all located in the United States of America. On the other hand, countries are in need of data exchanges, technological development and innovation, thus they can all benefit from data, which could result in better products.

According to the Hungarian Government (2025), national defence is of utmost importance. AI should be ready to be used by the military, especially when it comes to decision-making and autonomous systems, so that it is capable of operating without the need for a human.

The Hungarian Government named its goal to educate people to keep up with global competency launching programs in higher and corporate adult education, stating that by 2030, 2.5 million people will be trained, 40% of all SMEs will use artificial intelligence, ammonia emission will be down 32%, 60% of all clerical work will be carried out by AI, high-tech products reach 20% in export, at least 200 AI based start-up will be created and spend 30 million euros to conserve the Hungarian Language.

3. Hungarian industrial infrastructure

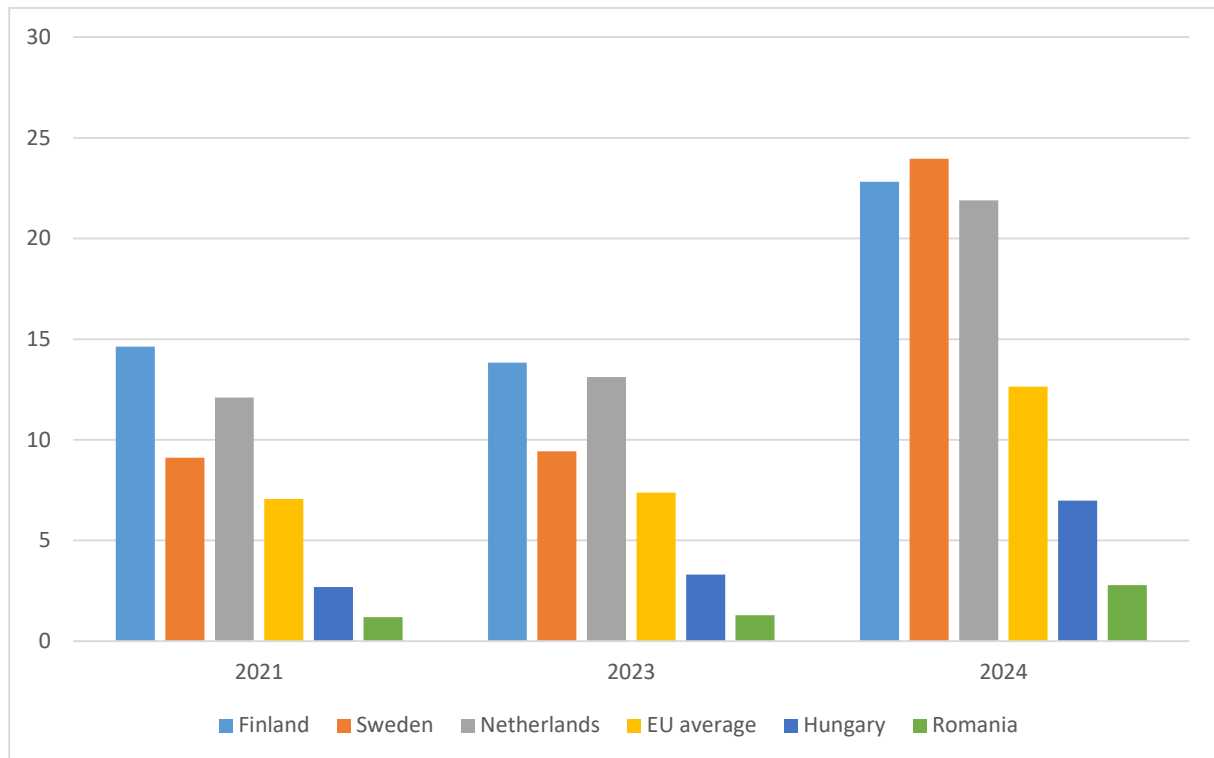
Figure 2: AI usage in companies with at least 250 employees



Source: Eurostat 2025

In the EU, the Benelux and Nordic states are the fastest adopters, while Hungary is 4th from the back after Romania, Poland and Bulgaria. As of 2024, 8% of European enterprises had adopted artificial intelligence, while this number was only 3.7% for Hungarian ones. The financial, information and communication sectors are about 7% of the Hungarian economy, which usually employ more than 250 employees. (PwC, 2019)

Figure 3: AI usage in companies with 10 to 249 employees



Source: Eurostat 2025

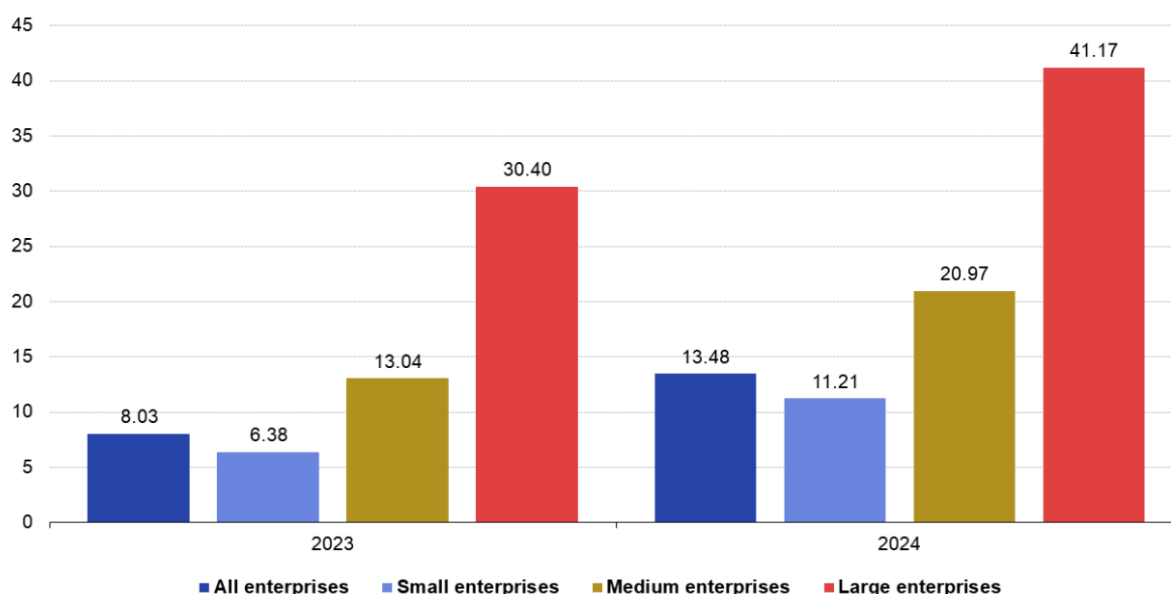
The Hungarian Government (Magyarország Kormánya, 2025) presents Statista's forecast, which is the following: the volume of the AI market will be 127.2 billion dollars for the whole of Europe by 2030, and Hungary's 2024 market volume of 149.4 million dollars will increase to 948.8 million dollars by 2030. The population of the EU is about 448 million, and the population of Hungary is about 9.6 million, so Hungary has about 2.14% of the EU's population, while its forecasted market volume for AI is only 0.75%, which doesn't even reach Hungary's contribution to the total GDP of the EU, which is 1.2%.

According to KSH, the workforce of Hungary aged 15-74 was 4 million 621 thousand in early 2019, while according to PwC (2019), Hungary's workforce was around 4 million people in 2018, from which almost 1 million worked in manufacturing alone. Currently, 4 million 676 thousand people are employed according to KSH, and there is a 4.4% unemployment rate. The publication of PwC (2019) suggests that the first job sectors which were impacted are finance and insurance, information and communication technology, and professional, scientific and technical services. There is still a high impact on financial, clerical

support, manufacturing, transportation and storage. The most impact on the Hungarian economy and job market will be in the 2030s, as by that time, construction, sewage and waste management and with fully autonomous vehicles and robots, the transportation and storage will be disrupted.

Figure 4: Enterprises using AI technologies by size class, EU, 2023 and 2024

Enterprises using AI technologies by size class, EU, 2023 and 2024
(% of enterprises)



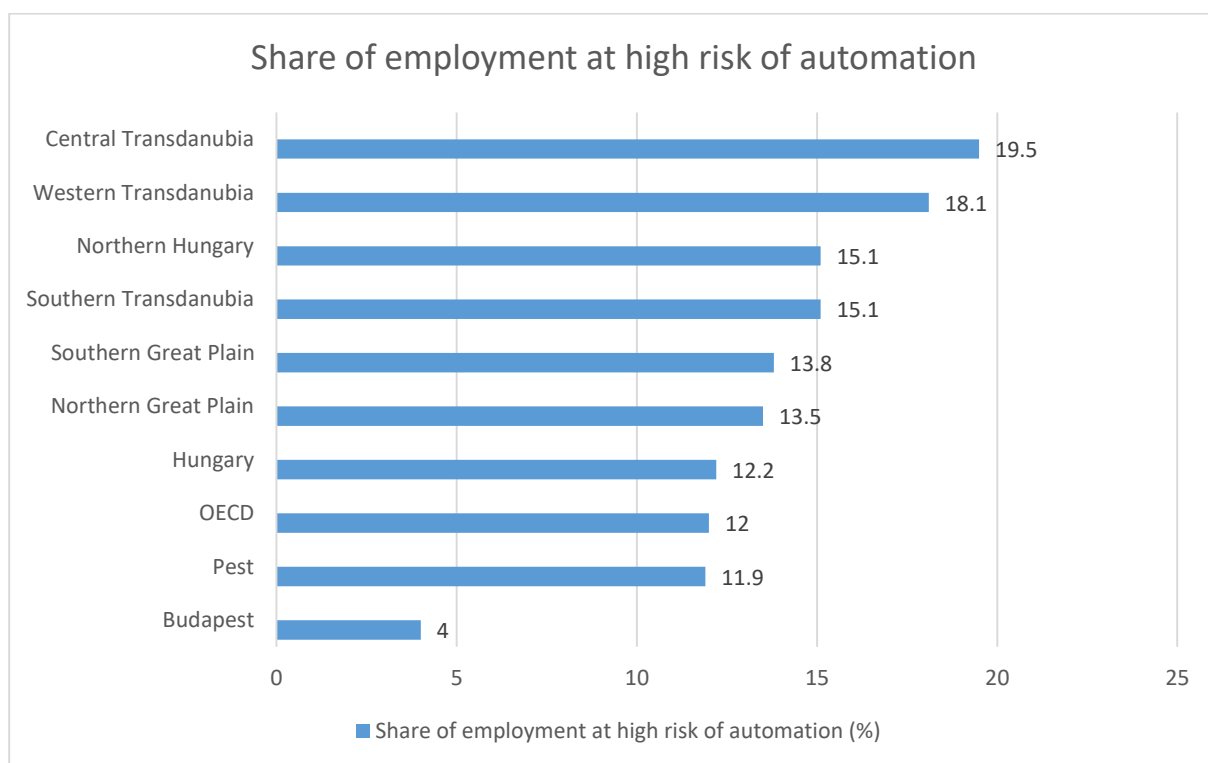
Source: Eurostat (online data code: isoc_eb_ai)

eurostat

Source: Eurostat 2025

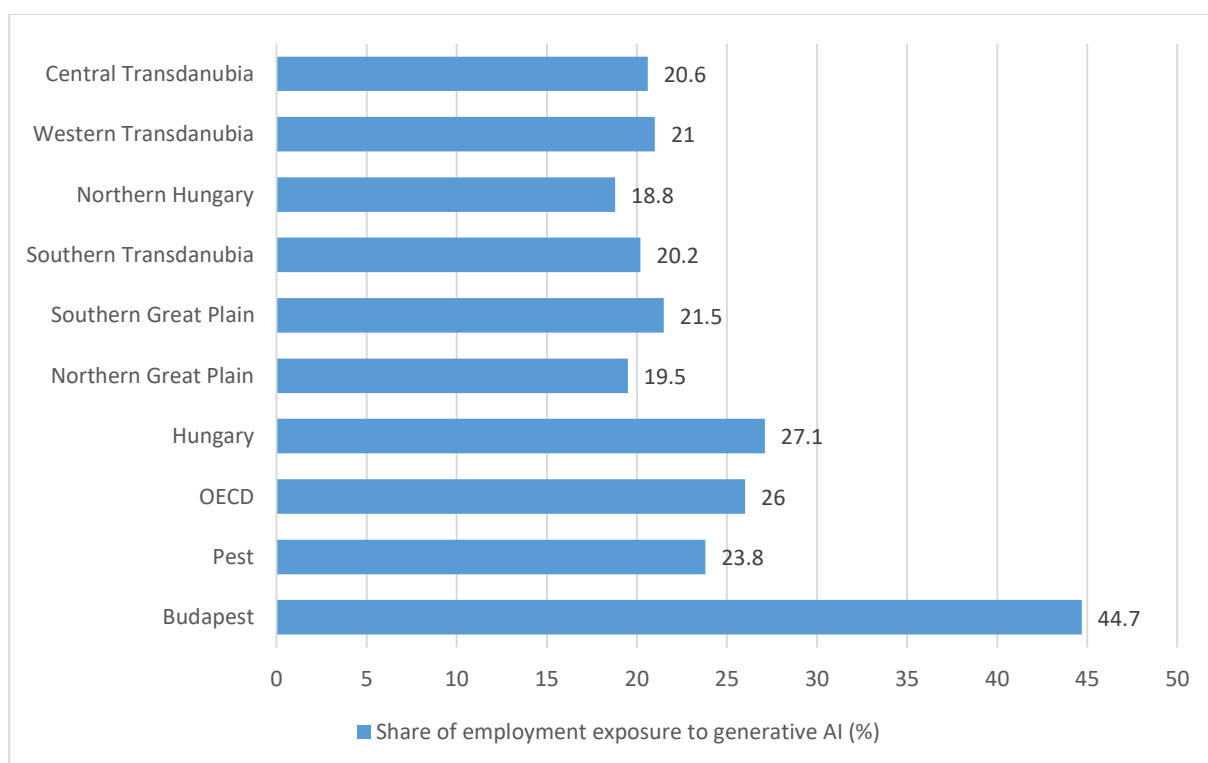
By the mid-2030s, 900,000 jobs will be at high risk of automation; the least affected will be Budapest, as AI innovations there will come sooner, and they will only remove some administrative tasks, while many in the countryside could lose their jobs. (Zsinkó, 2025)

Figure 5: Share of employment at a high risk of automation in 2022



Source: OECD, 2024-a

Figure 6: Share of employment exposure to generative AI in 2022

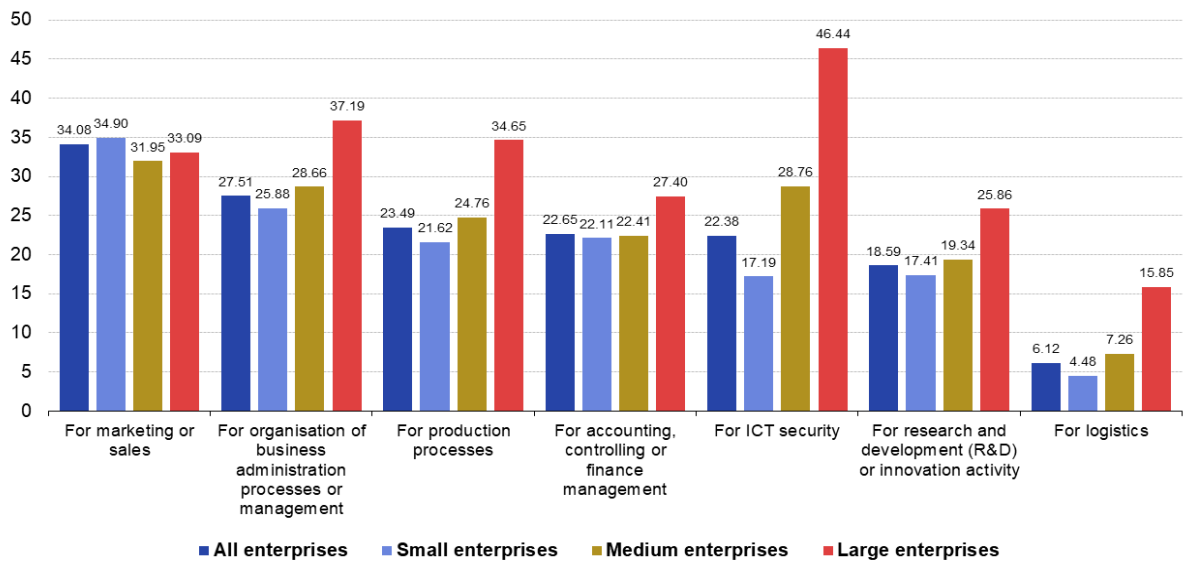


Source: OECD, 2024-a

AI adoption in industrial economies such as Hungary could have a higher impact as jobs are more automatable, while in service-dominated economies such as the Netherlands, jobs are less likely to be automated. (PwC, 2019) In the Nordic countries, such as Finland, automation is already pretty high, and jobs are really skill and knowledge-based, so the risk of losing a job is much lower there. The capital of Hungary, Budapest, has the highest exposure to generative AI, meaning at least 20% of tasks could be solved twice as fast by using AI, rather than human resources, and has the lowest share of employment at high risk of automation, which indicates that an average job in Budapest requires higher skills and knowledge than in the countryside. (OECD, 2024-a)

Figure 7: Enterprises using AI technologies by type of purpose and size class, EU, 2024

Enterprises using AI technologies by type of purpose and size class, EU, 2024
(% of enterprises using at least one AI technology)



Source: Eurostat (online data code: isoc_eb_ai)

eurostat

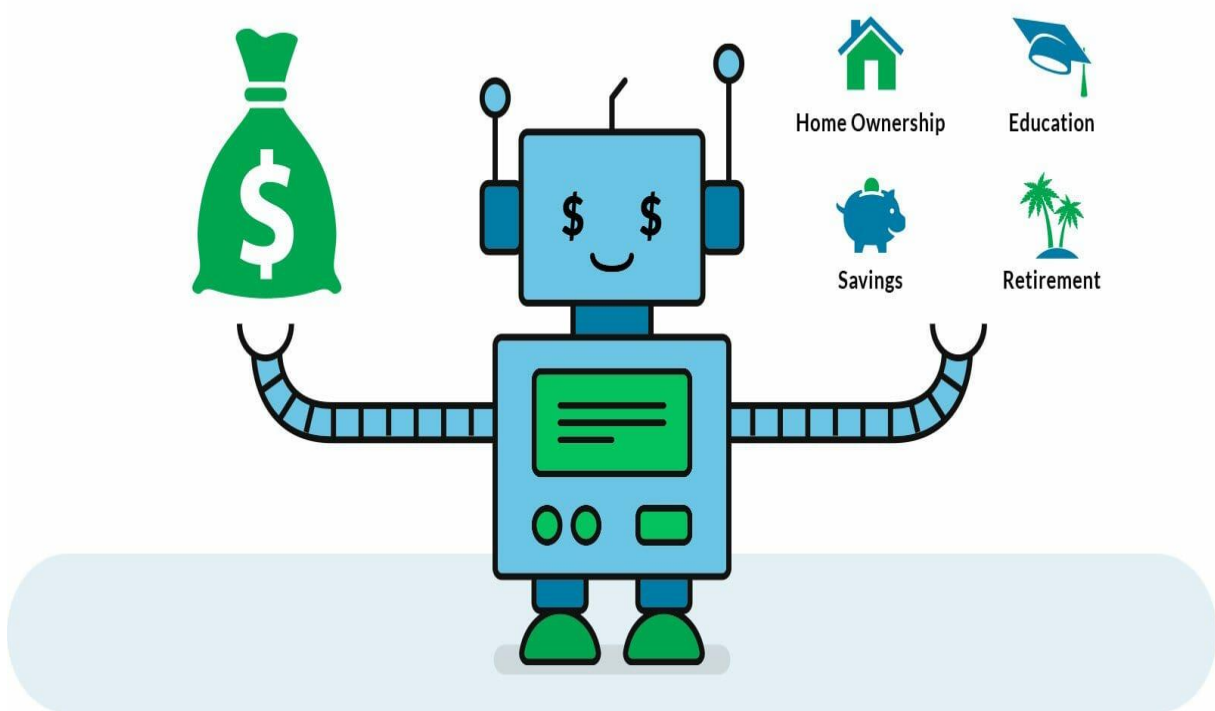
Source: Eurostat, 2025

AI is currently most commonly used for marketing and sales in general in the EU. The second most popular use of artificial intelligence is the organisation of business administration processes and management. In the case of large and medium-sized enterprises, information and communication technology security is very common too. Large enterprises also already use AI for production mainly abroad. (Eurostat, 2025)

4. FinTech and AI

4.1. Robo-advisors

Figure 8: Robo-advisor



Source: Islamic Finance Guru, 2023

Unlike its name, they have very little to do with advisory; they are rather an algorithm-based portfolio management service without human interference, where one is expected to transfer money into the account monthly, and it can buy and sell ETFs and bonds and charge a yearly fee after the assets under management. ETFs also have a yearly fee, which must be covered. Its main purpose is to keep the risk level at a point, which is comfortable for the customer, for example 2% cash, 10% bonds and 88% ETFs. The cash is to prevent it from selling just to cover costs, and it can also acquire cash yearly after the dividends from the ETFs, because it can buy distributing ones too, not limited to accumulating. (Phoon et al., 2018)

Data shows that the Asset Management fees in the US are between 0.25-0.35% of assets under management, 0.25-0.75% in the UK, and most of them are under 0.7% and targeting mass affluent investors rather than high net worth individuals, opposed to regular wealth management. (Phoon et al., 2018)

Revolut Hungary is the sole company that offers robo-advisory for the public for an annual fee of 0.75%, which, compared to the American counterparts, is really high. It caters to the needs of individuals by offering several plans after answering 10 questions, which include trading experience, monthly expenses, liabilities altogether, risk tolerance, aim of the portfolio, expected length of the investments, and financial knowledge, and then offers customers a choice from core and socially responsible portfolios. (Revolut, n.d.-a) (revb, 2024)

Robo-advisors are considered one of the first smart Self-Service Technologies. Service robots, customer service chatbots, AI medical providers and robo-advisors have emerged due to AI in recent years. These new types of SSTs can use analytical, intuitive and even social skills, thus can complete complex tasks, not like their predecessors, which could only use mechanical skills to solve simple tasks, for example, like ATMs, grocery checkouts and ticket kiosks. Robo-advisors have reduced human error possibilities like bias, and thus could achieve more accurate and precise forecasting. Data shows that in many cases, robo-advisors can offer the same quality advice for cheaper than a regular advisor, and are also more likely to be transparent. There is a risk that an advisor acts in their own interest and withholds information from the customer, which means that AI is less likely to have a conflict of interest with the customers. (Zhang et al., 2021)

These days, even big wealth management companies like Vanguard (n.d.) offer the service in the United States of America, starting at as low as a minimum of 100 US dollars in portfolio, but the interesting fact is that they also provide a hybrid robo-advisor and human service for customers starting from 50,000 US dollars, which is only the one-hundredth part of their wealth management service. Knowing this amount, it is not a far-fetched idea that these hybrid models could even influence Hungarian private banking, and in fact, there was an attempt to make that a reality.

The pioneer of Hungarian robo-advisory could have been Blueopes, which was developed in cooperation with MKB Private Banking. It offered suggestions with the help of environmental, social, and governance data, so it focused on socially responsible investment. (eu-startups, n.d.) It was a hybrid advisor using artificial intelligence to support the work of private bankers, which itself could not execute orders. The company behind Blueopes is currently under voluntary liquidation. (Céginformáció, n.d.).

4.2. Chatbots

Figure 9: Chatbot in Retail Banking



Source: Streebo, 2025

OTP has OTP Chat, which uses AI, but only to connect one with a human assistant. K&H offers Kate, which can execute many tasks like send money, change card limits, view PIN code, as I mentioned in the introduction, block and activate cards, pay insurance, check balances, or switch account packages and the only one which customers can talk to in Hungarian, it comes from Belgium, which is the leading adopter in the EU, from the owner of K&H, KBC Group. Erste Bank offers Mira as an AI assistant, which is mainly for frequently asked questions. Gránit Bank's Gránit Guru can be used for account opening, loan information and onboarding. Finally, Raiffeisen Bank's RAIA offers navigation in the mobile app and answers questions about products.

The main purpose of these chatbots is to reduce the time spent on administrative tasks and to increase productivity at the same time. Banks have already had self-service technology in the form of ATMs, and as they are large companies, employing more than 250 people, they have the capability and also the required funding to invest in new technologies.

5. Methodology

The research was conducted by quantitative and qualitative methodology, mainly among Gen Z (72), Gen Y (37), and some Gen X (8) Hungarian citizens, to find out their relationship to AI in their workplace and FinTech habits as customers. The survey could be completed anonymously, through Google Forms (docs.google.com), which served as a great website to collect responses on.

In the questions, I aimed to gain a comprehensive understanding of how often, in what form they use AI, whether they have encountered AI-driven financial services, who they hold responsible for enhancing their advanced digital skills and their experience and expectation in the job market.

The questions will be aimed at confirming or denying these hypotheses:

H1: Gen Z prefer self-service technology over human assistance when it comes to administrative tasks.

H2: Even amongst Gen Z, Revolut's Robo-Advisor is unpopular.

H3: Most of Gen Z have used at least one of the chatbots provided by Hungarian banks.

H4: Most of Gen Z think that AI will have an effect on their job.

H5: In the case of portfolio management, the presence of a human advisor is important for younger generations, too.

My aim was to reach at least 100 people with my questionnaire.

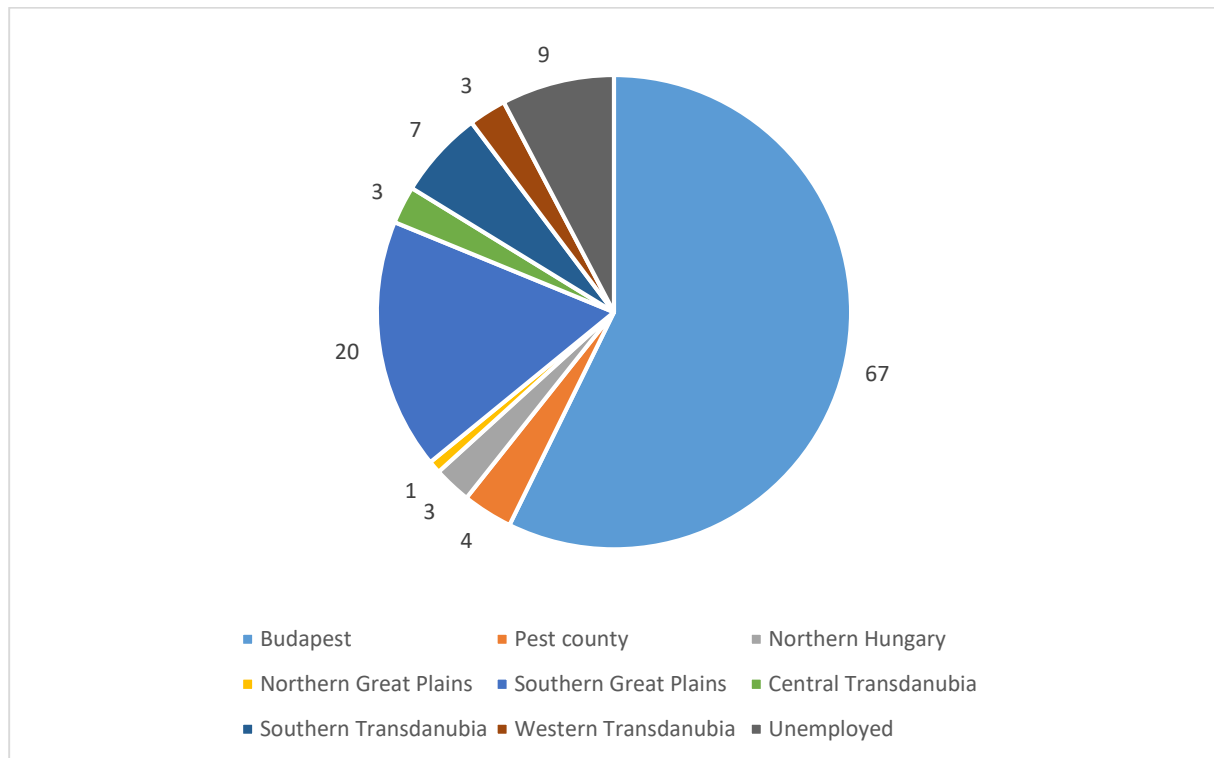
Number of completed questionnaires: 117

Date of evaluation: 2025. November

6. Results of the questionnaire

6.1. Demographic information of the respondents

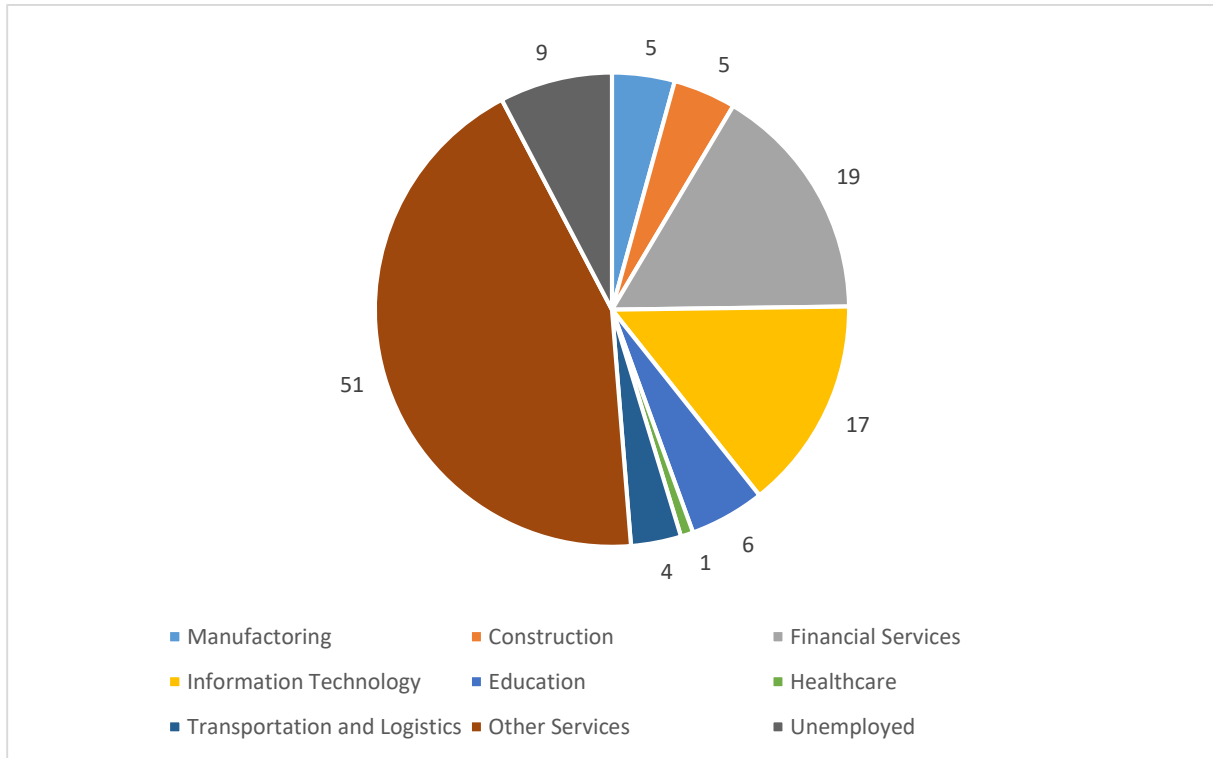
Figure 10: Number of respondents by region of workplace



Source: own editing, based on my own questionnaire

The questionnaire was filled out by 117 individuals, 52.67% of the respondents work in Budapest, the capital of Hungary, which has a population of about 1,685,209 (KSH, 2025-d), the most populous city by far, which has the power to attract investment and many people to study, live, and work temporarily or permanently there, many residents from the surrounding area also work in the capital, and even there are people who travel 8 hours twice or three times a week to the capital to work, and spend the rest of their week working from home office. The second biggest, 17.09% of the respondents work in the Southern Great Plains, where I live and most of my acquaintances and childhood friends come from, and I did my internship in, thus the relatively higher number of respondents.

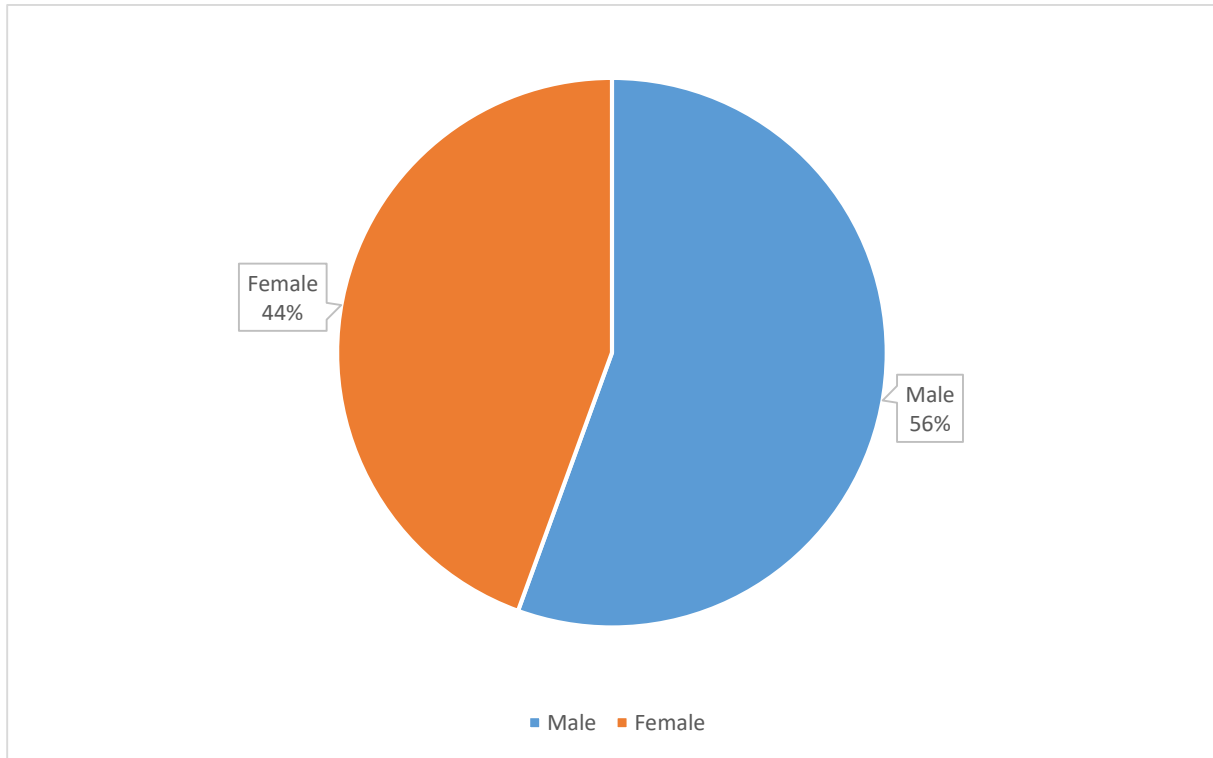
Figure 11: Number of workers by industrial sector



Source: own editing, based on my own questionnaire

Many fall into the other services category, as the predefined categories unfortunately weren't able to capture the role they have at their company; the second and third largest groups were financial services and information technology. According to KSH (2024), in 2022, the three main industries people worked in were: the manufacturing and processing industry, about 887 thousand, the commerce and trade industry, about 618 thousand, and the public administration industry, about 425 thousand people worked, so it is likely that most people who responded with other services worked in the commerce and trade and in the public administration industries. Despite being the most populous industry in Hungary, manufacturing is underrepresented as most of the respondents were undergraduates or postgraduates, so more likely and therefor most likely work in commerce and trade, public administration, information technology and financial services sectors, even education a sector which is perceived by most as an underpaid sector surpassed manufacturing, also manufacturing is more characteristic to the countryside and a high number of respondents are working in the capital.

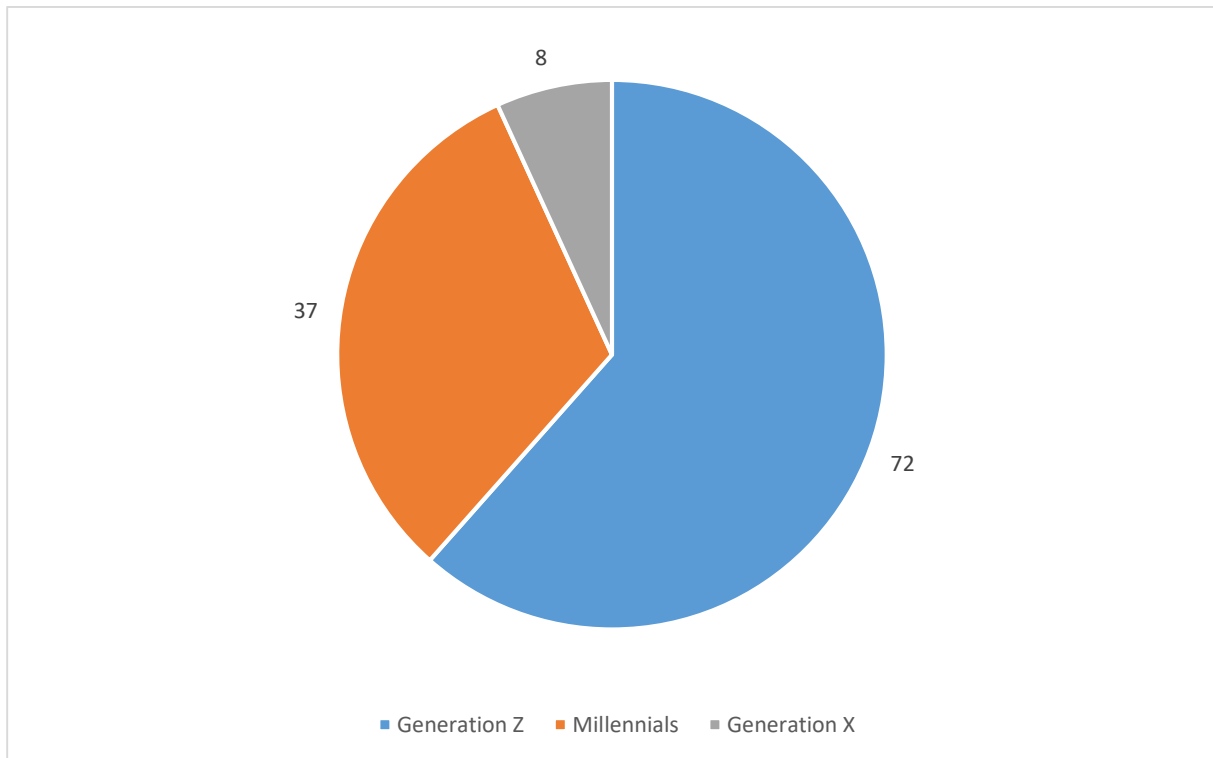
Figure 12: Number of respondents by gender



Source: own editing, based on my own questionnaire

Both genders were represented in fairly high numbers, but in Hungary, women tend to have a higher level of education; 36.5% have at least a bachelor's degree, compared to men. 25.7% of men have at least a bachelor's degree. (KSH, 2025-a) The bias can be attributed to the fact that I have sent the questionnaire to a few Discord groups where members were primarily males. If we separate the Generations it turns out that 45.83% of Gen Z were female, and 54.17% were male, while in case of the other 2 Generations there are huge differences, in the case of Millennials 37.84% were female, and 62.16% were male, and finally 62.5% of Generation X respondents were female, and only 37.5% of them were male.

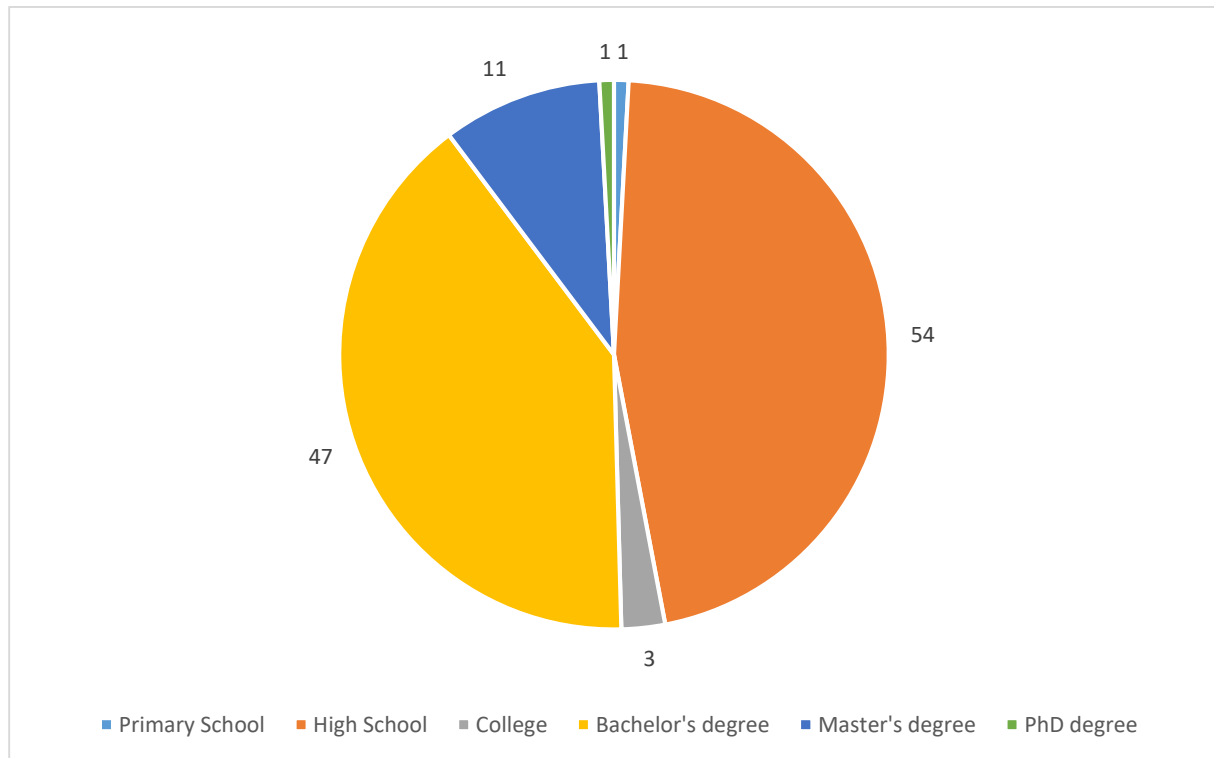
Figure 13: Number of respondents by generations



Source: own editing, based on my own questionnaire

61.5% of respondents were the representatives of Generation Z, as the study mostly targeted fellow undergraduates and friends, as I am part of the generation too. Millennials were fairly highly represented too, contributing to 31.6% of the whole group of respondents, while only 8 out of the 117 respondents were a part of Generation X.

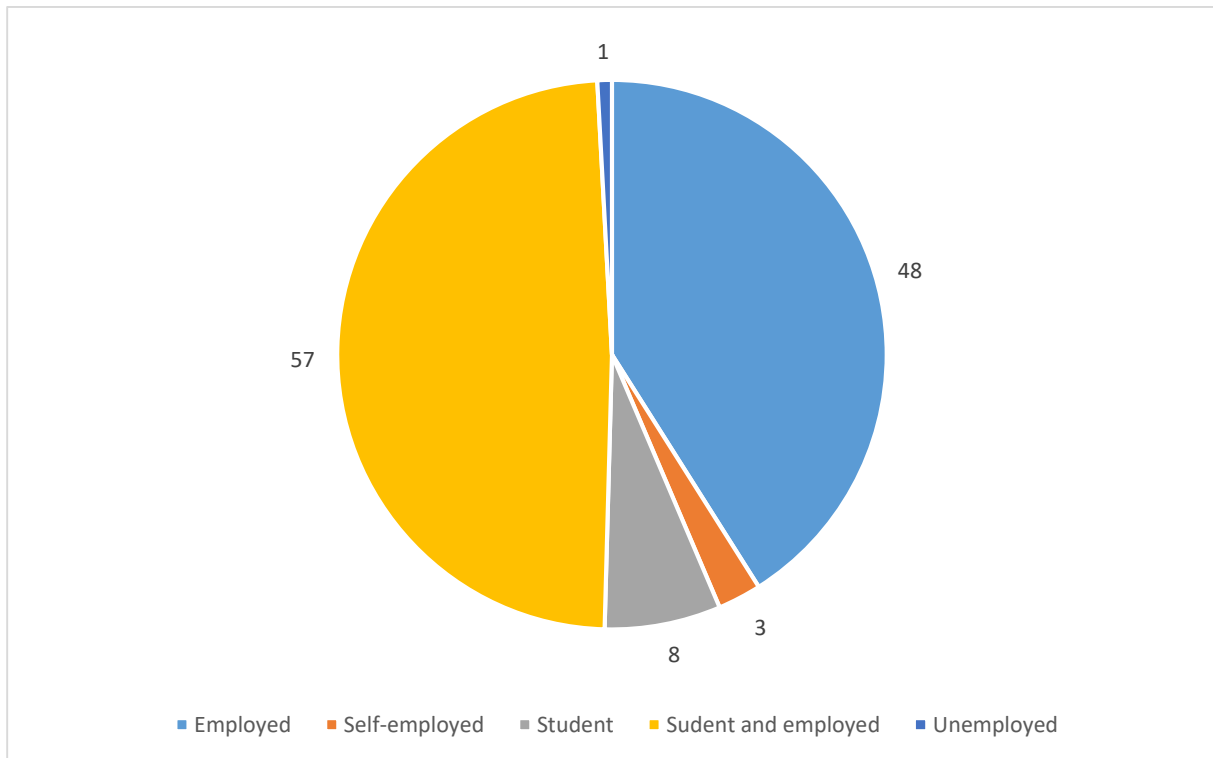
Figure 14: Number of respondents by highest level of education



Source: own editing, based on my own questionnaire

High school graduates were the highest group, 46.15%, followed by bachelor's degree holders, 40.17% and then individuals with a Master's degree, 9.4%, reflecting quite educated young generations, thus early- and mid-career individuals.

Figure 15: Number of respondents by current occupation

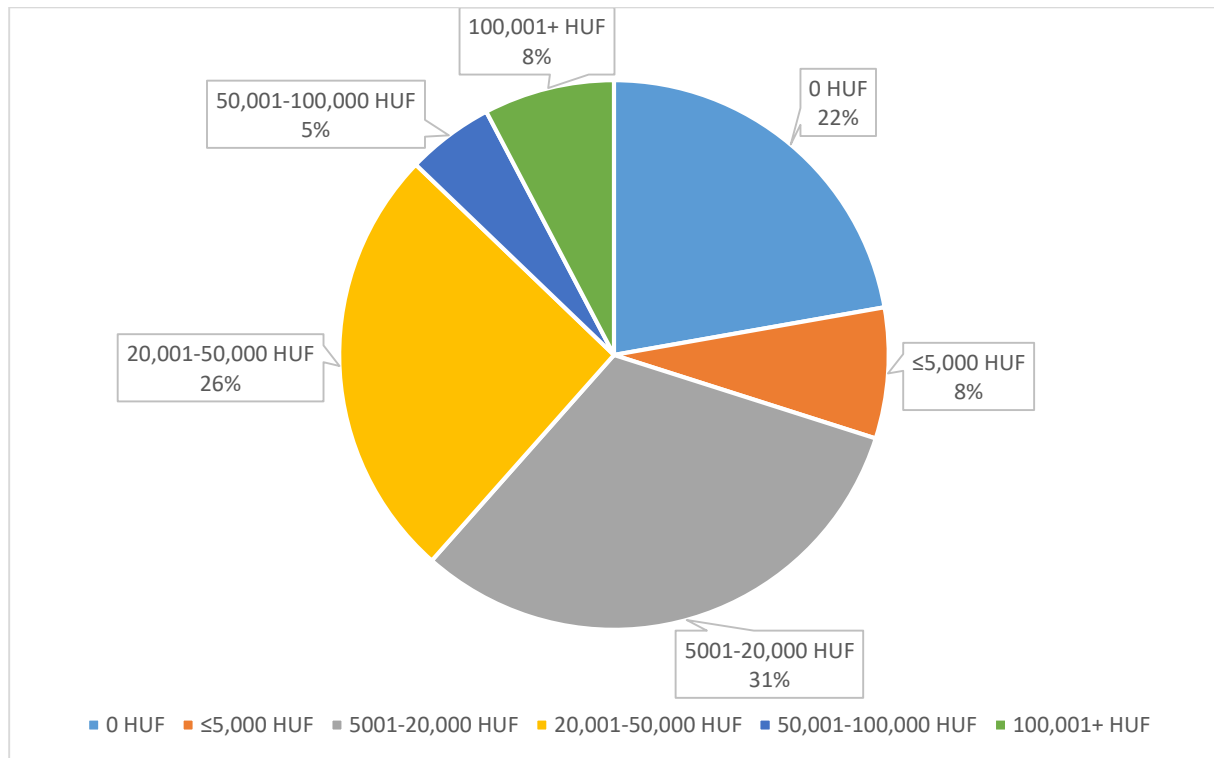


Source: own editing, based on my own questionnaire

As shown on the pie chart, 92.31% of the respondents were employed, 55.56% were students, and only 7.69% were currently unemployed, of which only 1, 0.85%, were not students.

6.2. Investment, Banking AI usage and perception-related questions

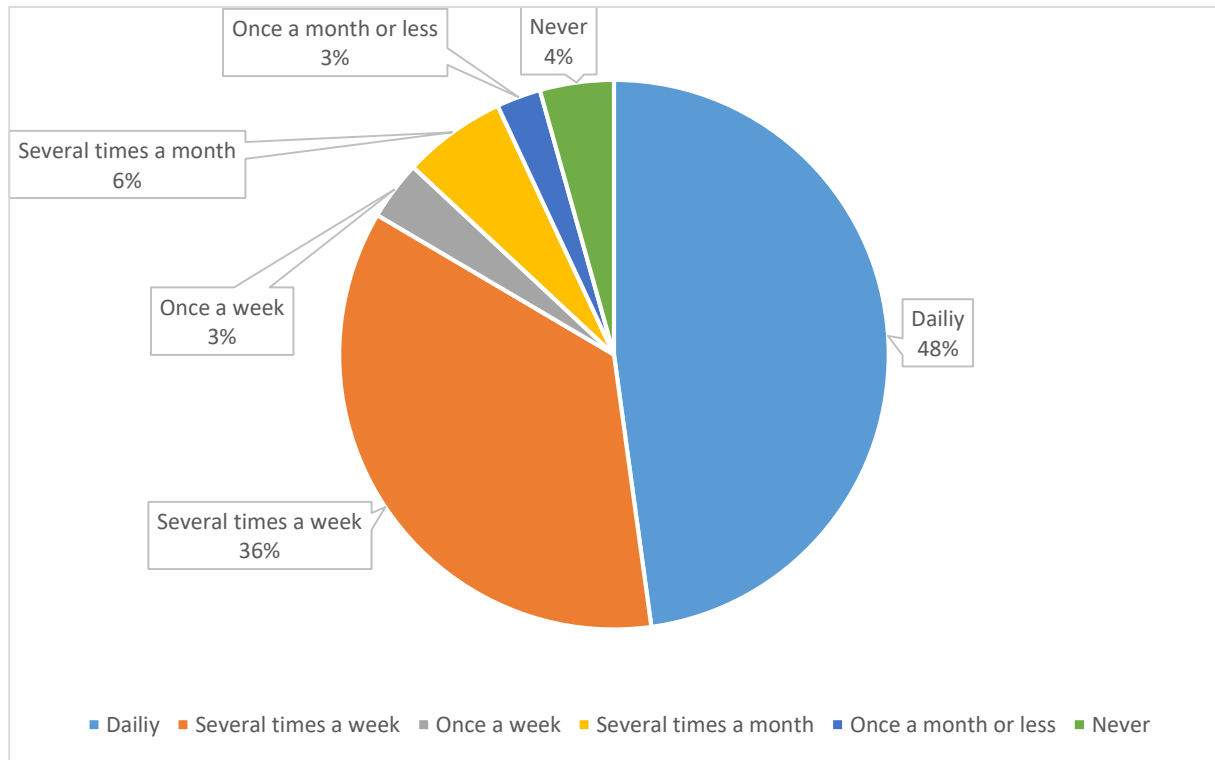
Figure 16: Number of respondents by monthly investment



Source: own editing, based on my own questionnaire

Data shows that the largest portion of the respondents invest from 5,001 to 20,000 Hungarian Forints monthly, 31%. The second largest portion invests between 20,001 and 50,000 Hungarian Forints monthly, 26%, which shows that most of these young generations are responsible and apart from the 22%, who do not invest any money, given the age of the respondents, it is safe to assume, that their investments were executed through online platforms or a mobile application, also 8 respondents are students, without an income, thus up to 85% of the respondents can have at least basic digital skills, which is much higher, than of the older generations, or even the average of Hungary as well. At the same time, it is quite concerning that 30% of the respondents invest only 5000 or less money, given that only 9 out of the 117 do not have an income. This can be due to lifestyle, the very high cost of living compared to their income, as most of these people are in the early stages of their careers.

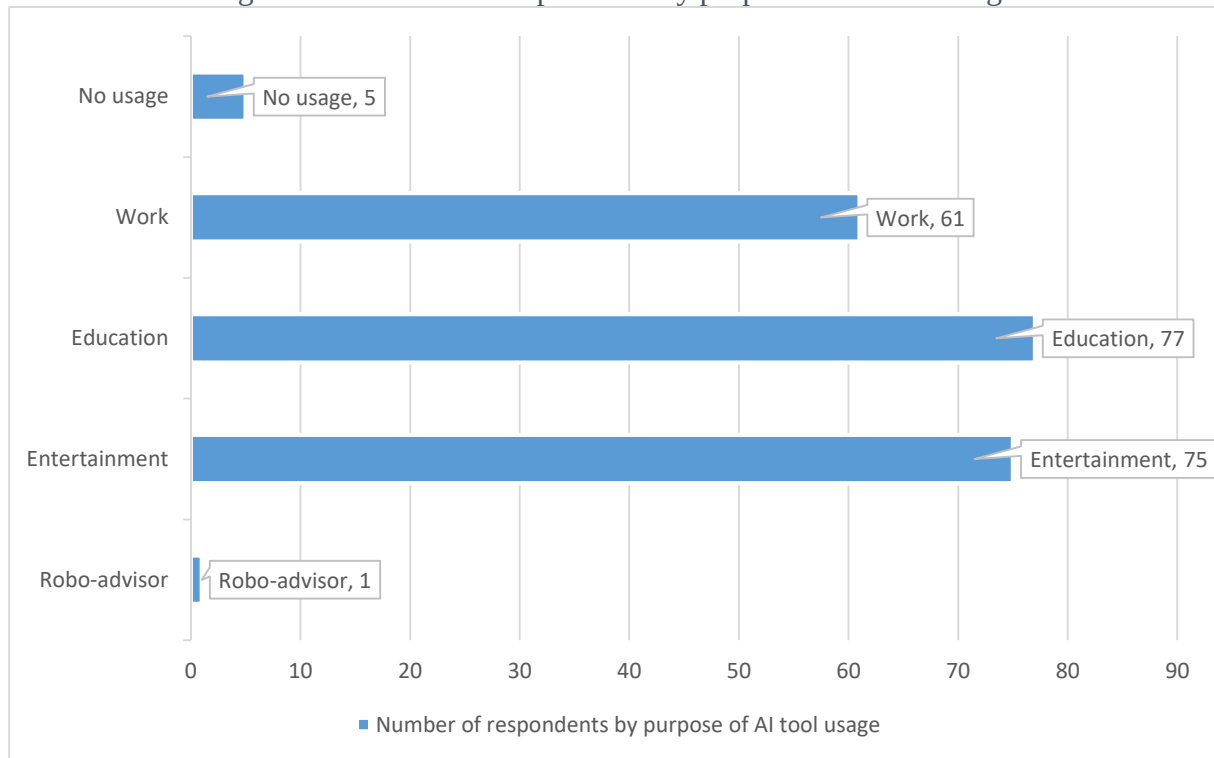
Figure 17: Number of respondents by AI tool usage frequency



Source: own editing, based on my own questionnaire

Only 5 people, 4%, said that they have never used any Artificial Intelligence tools, while 84% use AI tools every week, and 96% have used AI, and as 8 respondents represent Generation X, it could mean that every single person from the generations Z and Y (Millennials) has used AI tools. More Millennials, 56.76%, reported daily AI usage than Generation Z, 41.67%, but combined with several times a week, it is very similar, 87.5% in the case of Generation Z, while 83.79% of Millennials reported using AI, daily or several times a week.

Figure 18: Number of respondents by purpose of AI tool usage

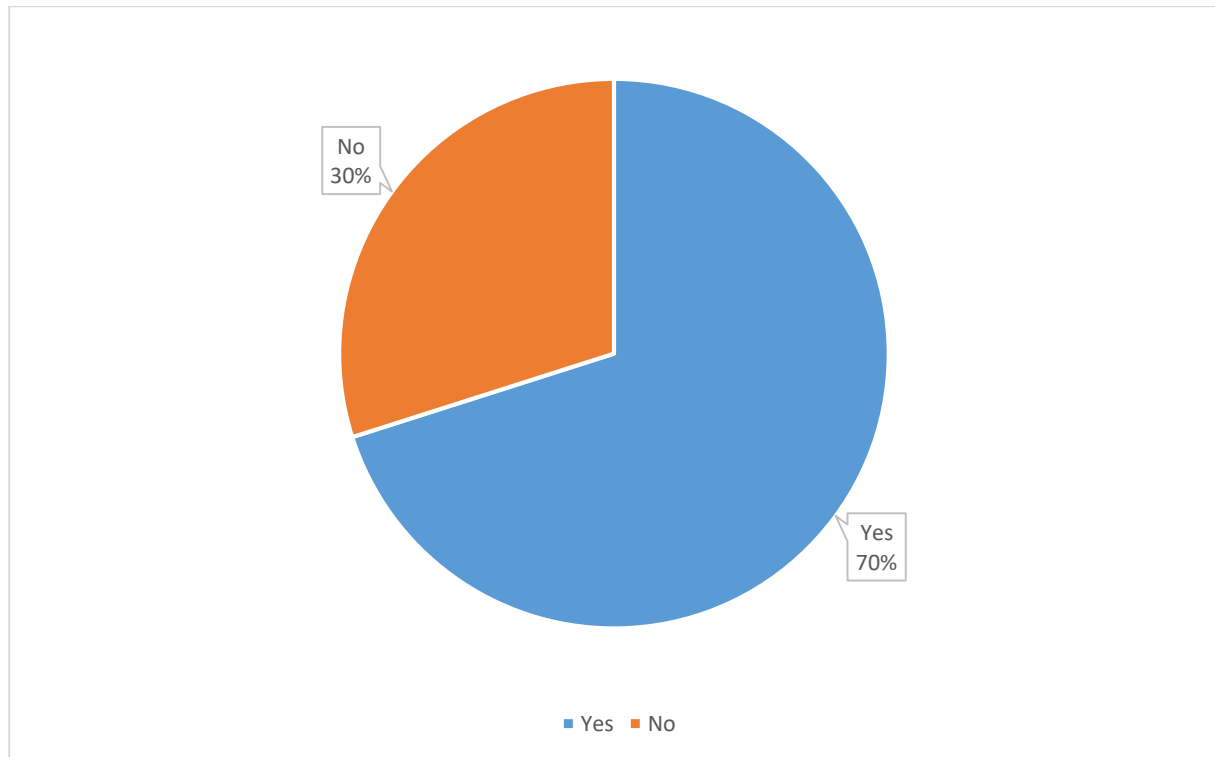


Source: own editing, based on my own questionnaire

64.1% of people use AI to entertain themselves, while 65.8% use it to assist their education, and 52.1% said that they use it for work. Only 5 people, 4.3%, said they never use it, and an even smaller number, 1 person, who is a Millennial, said that they use Robo-advisors. The small number of users can be attributed to relatively high costs, compared to the American counterparts, lack of competition, and also there are more appealing and reputable options like Long-Term Investment Account (TBSZ) or Pension Savings Account (NYESZ), where after holding for 5 years, people are free of taxes, also abroad many robo-advisors support tax-advantaged accounts such as IRAs and 401(k)s, also people withdrawing from these doesn't result in the closure of the account, also TBSZ could not support rebalancing as its composition is fixed after the collecting year, whereas in the US, these supported accounts allow continuous portfolio management. For example, in case of Betterment account with 20,000 USD the annual fee of 0.25% would be 50 USD while in case of a Revolut account it would be as high as 0.75%, thus 150 USD, also Betterment offers progressive fees, above 1 million USD, the annual fee is reduced to 0.15%, and above 2 million USD, the annual fee is as low as 0.1%. The government of the United States of America doesn't levy federal Value Added Tax, and most states do not levy any sales tax on financial services, including investment advisory fees, while most European governments do. Betterment also claims that for nearly 70% of its customers, the

advisory fee was covered by tax-loss harvesting. (Betterment, n.d.) (Revolut, n.d.-b) (Avalara, n.d.)

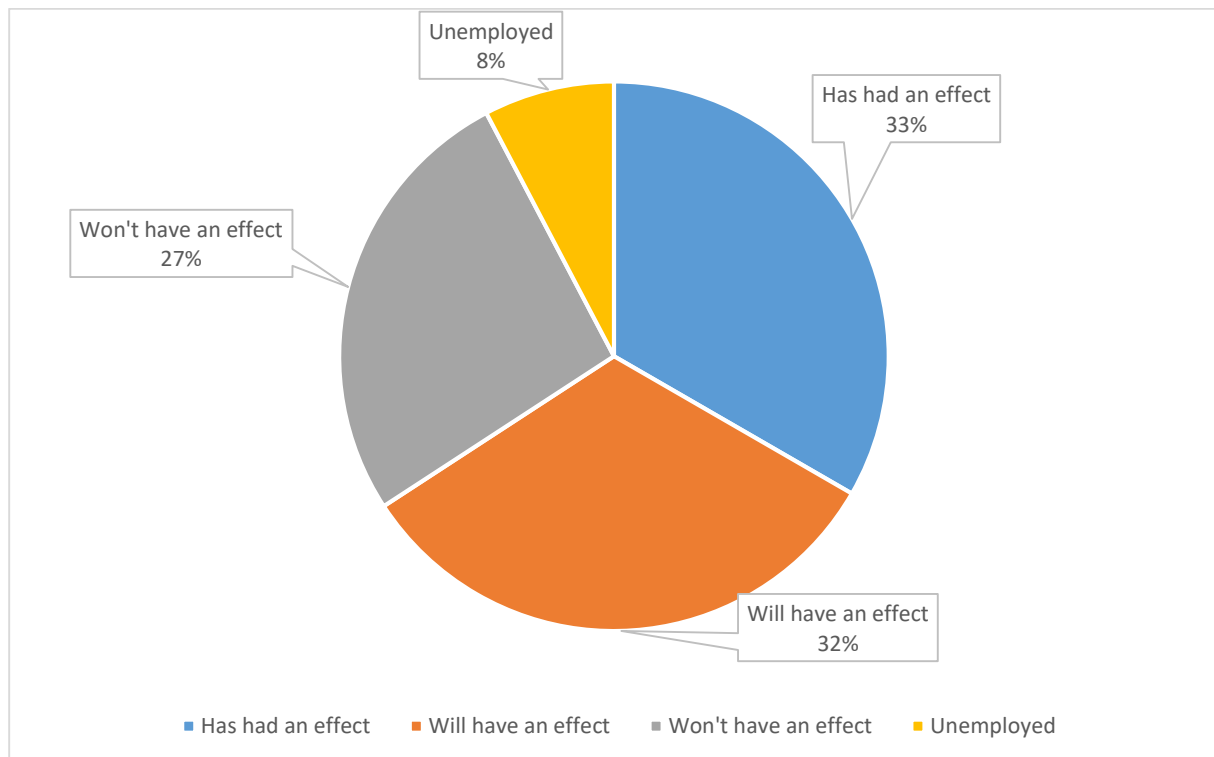
Figure 19: Number of respondents agreeing that AI is better than humans for administrative tasks



Source: own editing, based on my own questionnaire

70% of the respondents agreed with the statement that when it comes to administrative tasks, AI is better than humans, as it is faster, can serve multiple people at the same time, always available and accessible from anywhere, which suggests that younger generations are very adaptable to technological change. 30% of the respondents disagreed, which could mean that those who want to get empathy and understanding perceive AI as still in development, thus shouldn't be the sole option.

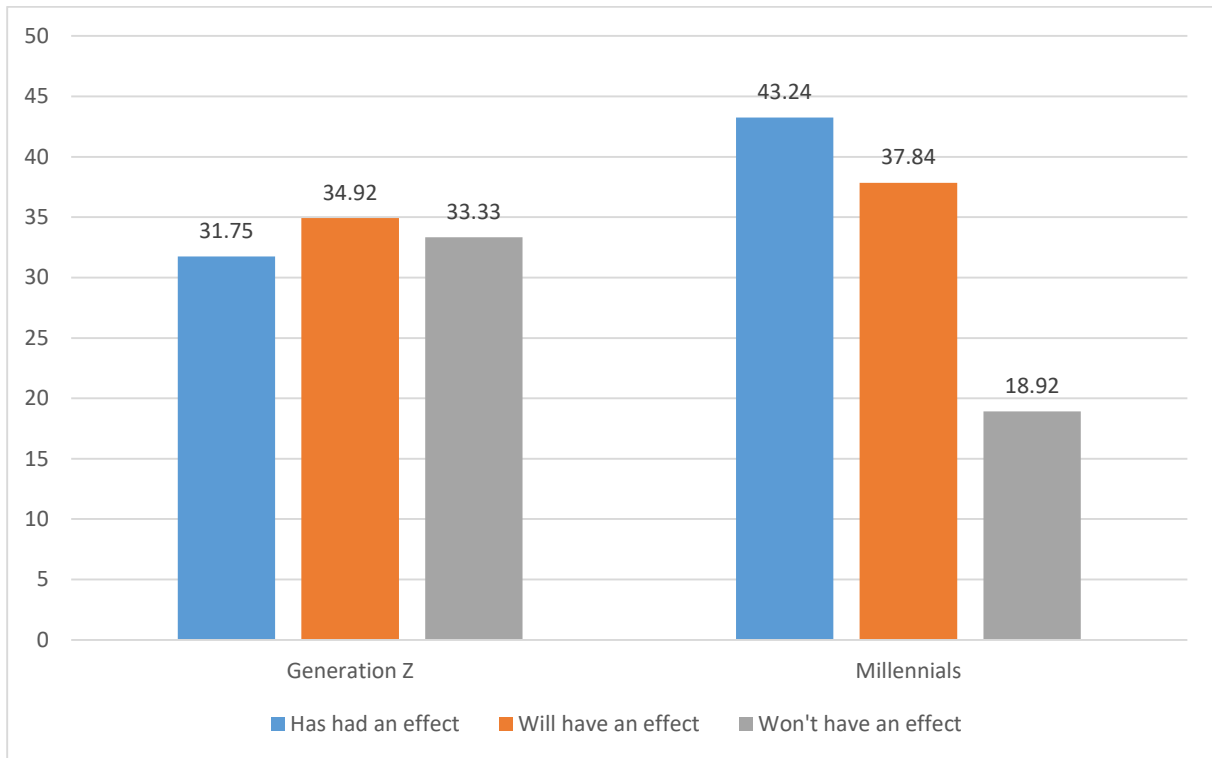
Figure 20: Number of respondent' perception of AI/Automation's impact on their jobs in the following 15 years



Source: own editing, based on my own questionnaire

33% of the respondents said that AI has influenced their job, which is a bit contradictory, because in one of the previous questions, 52.1% said, that they use AI for work, which implies, that for many, AI has only a supporting role, where the presence of AI does not change the workflow, at the same time many think that AI will take an effect on their job in the following 15 years, combined with those who said that it has already taken an effect on their job, and not counting the unemployed respondents 71.3% of the respondents thinks that AI will have an effect on their job in 2040, according to OECD (2024-a), this number should be around 44.7% by the mid-2030s.

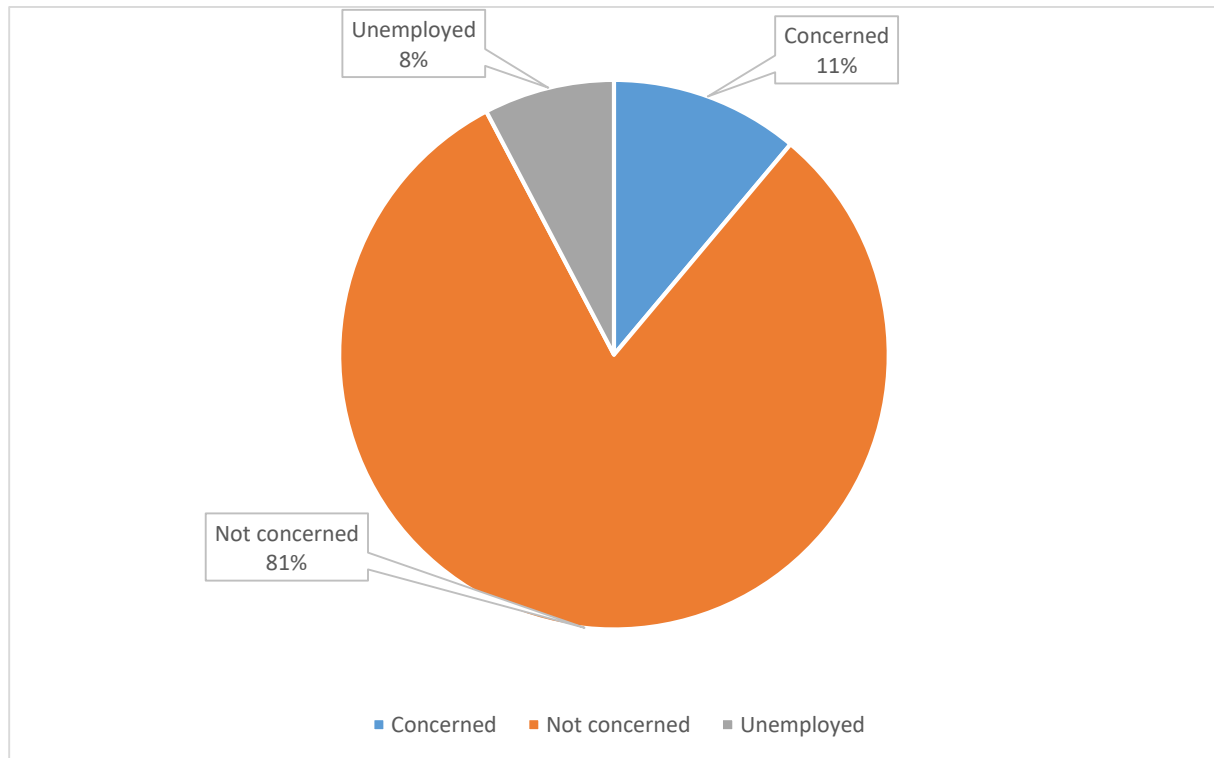
Figure 21: Number of respondent' perception of AI/Automation's impact on their jobs in the following 15 years: Generation Z (without unemployed) vs Millennials (in %)



Source: own editing, based on my own questionnaire

Interestingly, when the Generations were separated, it was shown that a higher portion of Generation Z, 33.33%, think that AI won't affect their jobs. Among Millennials, only 18.92% think the same, so only 66.67% of Generation Z think that AI will have an effect on their job, while in the case of the Millennials, this number is much higher, 81.08%. Also, 43.24% of Millennials reported that it had an effect on their job, while only 31.75% of Generation Z said the same. Overall, both generations have a high awareness of AI's influence, with two-thirds of Gen Z and four-fifths of Millennials believing AI has or will have an effect on them. The differences between the generations may reflect job experience or sector differences, as 18.06% of Gen Z work in Financial Services, and 48.61% of them work in the Other Services sector, other sectors don't reach 10%, while 27.03% of Millennials works in the Information Technology sector, 16.22% of them in the Financial Services sector, and 37.84% of them in the Other Services sector. Millennials are typically further advanced in their careers, likely holding positions more vulnerable to automation or AI, while Gen Z might be just starting their careers and thus experiencing AI's effects more indirectly.

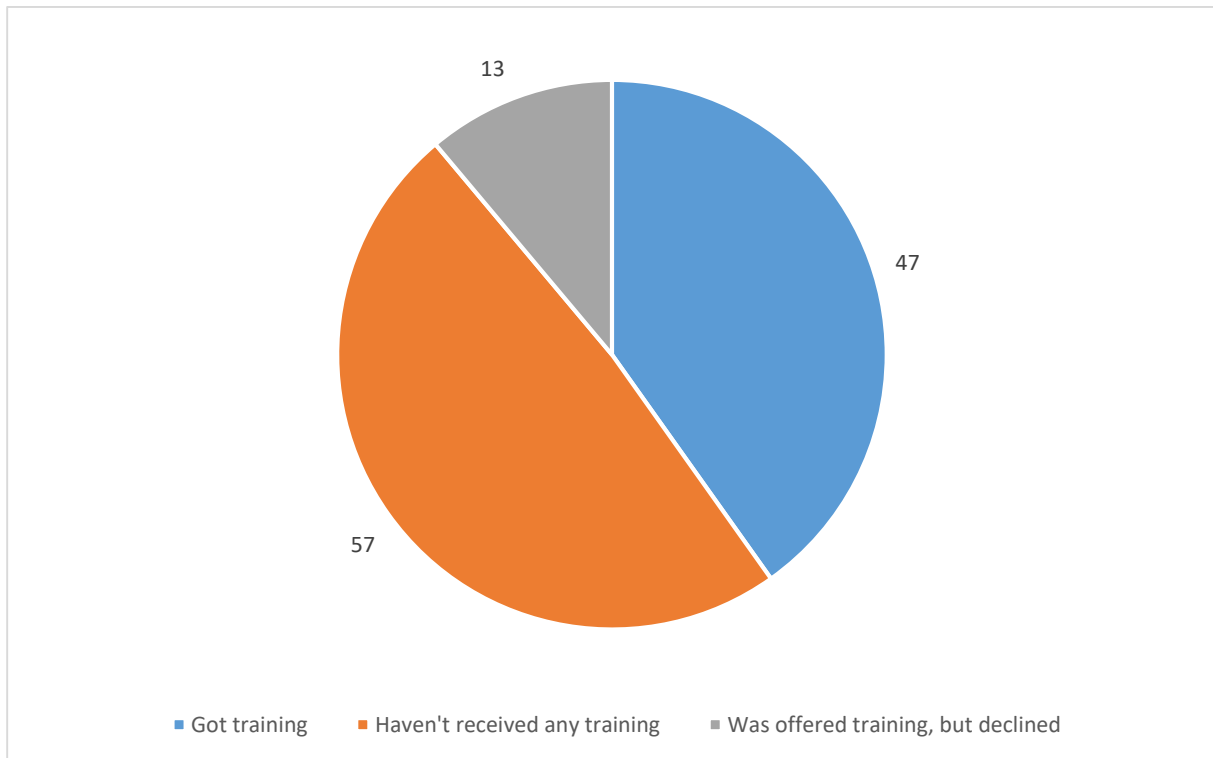
Figure 22: Job loss concerns related to AI/Automation in the following 15 years



Source: own editing, based on my own questionnaire

Out of the 108 employed respondents 13, so 12,0% thinks, that they could lose their job because of change in their job caused by AI or automation, which seems to be quite pessimistic given that most of the respondents are from Budapest and second highest from Southern Great Plains as according to OECD only 4% is at risk in Budapest, and 13.8% in the Southern Great Plains by the mid-2030s, which is a bit higher than that of the respondents concern. Still, given that the questionnaire was mainly filled out by residents of Budapest, that should decrease the average. The job loss concern of Millennials is greater than in the case of Generation Z. Only 5.56% of Generation Z said they are concerned about losing their job, while 18.92%, so almost every 5th Millennial reported concerns, which can be attributed to career stability awareness, as they are not only more experienced in their job, they are also more experienced in how things work at a company and maybe fear of competition from younger generations, who are native adopters.

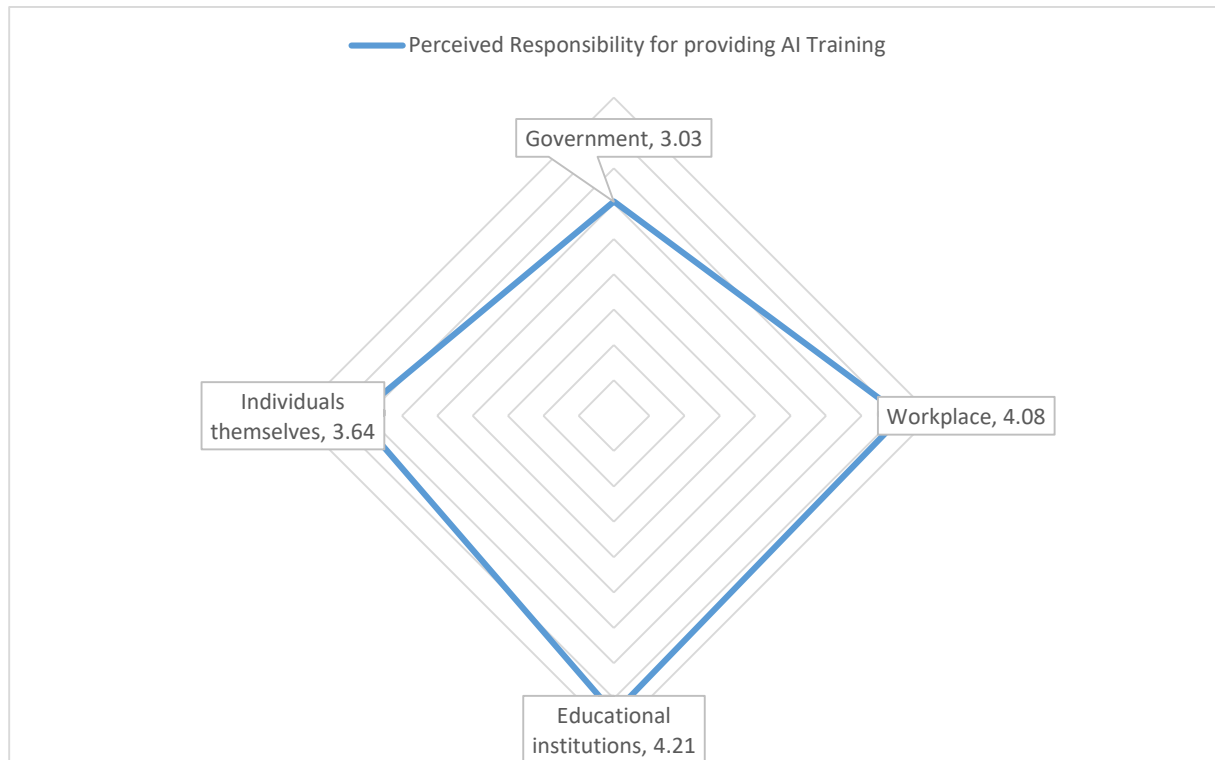
Figure 23: Formal AI training among respondents



Source: own editing, based on my own questionnaire

More than half of the respondent was offered training related to Artificial Intelligence, out of which 78.33% seized the opportunity. 70 people, 59.83%, said that they haven't taken part in formal AI training, so 40.17% of the respondents got formal AI training, which means that more than those who said that AI has taken effect on their job. If we break the results into Generations, it shows that 37.5% of Generation Z reported receiving formal AI training, while 45.95% of Millennials did.

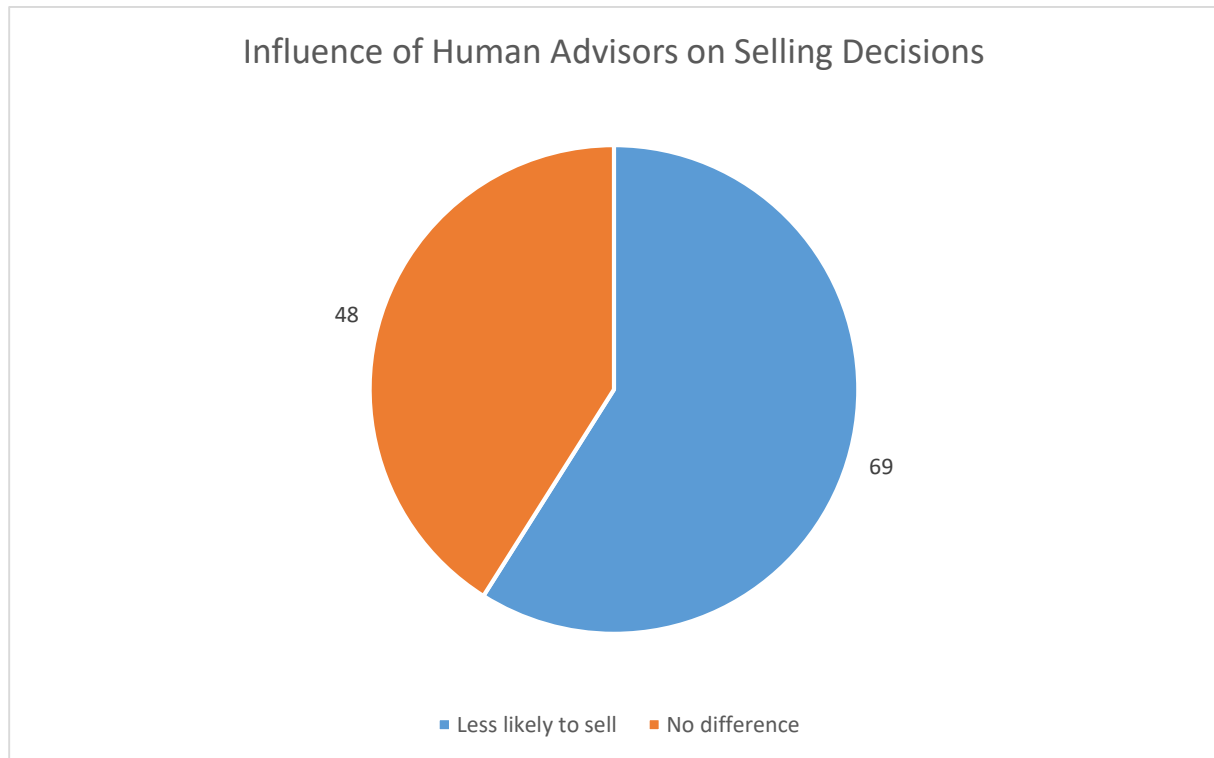
Figure 24: Perceived Responsibility for Providing AI Training



Source: own editing, based on my own questionnaire

Respondents think that to train people about AI, the two most responsible players are educational institutions and workplaces, so the two players with which people are interacting 5 days a week, many also think that individuals should take efforts to train themselves and that are responsible for their own skill acquisition, while they were undecided about the government, which suggest lower trust towards the capabilities of the government or that the government should play only an indirect role in training people, so only regulate.

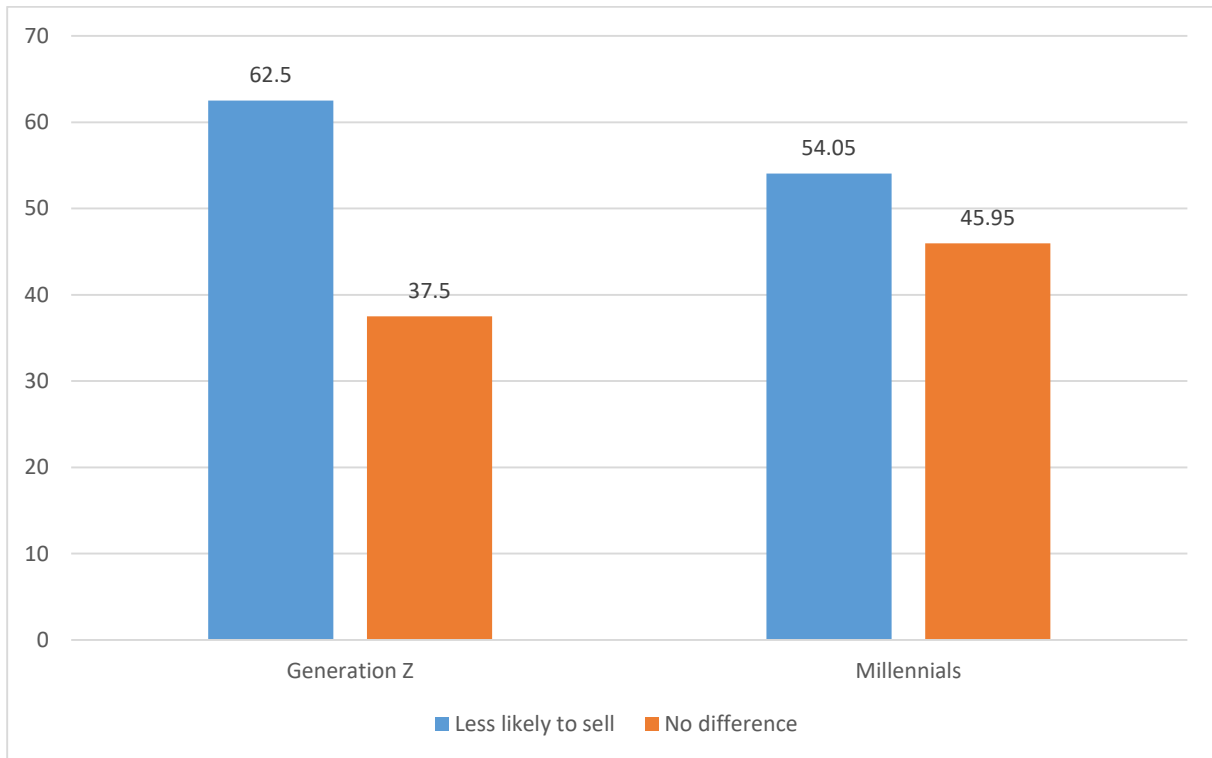
Figure 25: Influence of Human Advisors on Selling Decisions



Source: own editing, based on my own questionnaire

When it comes to investing, 59% of the respondents tend to trust human advisors over AI, as many need comforting in case; their investments lose a significant portion of their value and would be less likely to sell, if a human advised them to hold. There are robo-advisors in the United States of America, which are reported to send out reassuring e-mails in times of increased market volatility to prevent people from selling. (Tan, 2020) 41% said they would act the same as if there were no humans advising them, suggesting that they are confident, know and understand the risk when it comes to investing.

Figure 26: Influence of Human Advisors on Selling Decisions: Generation Z vs. Millennials (in %)

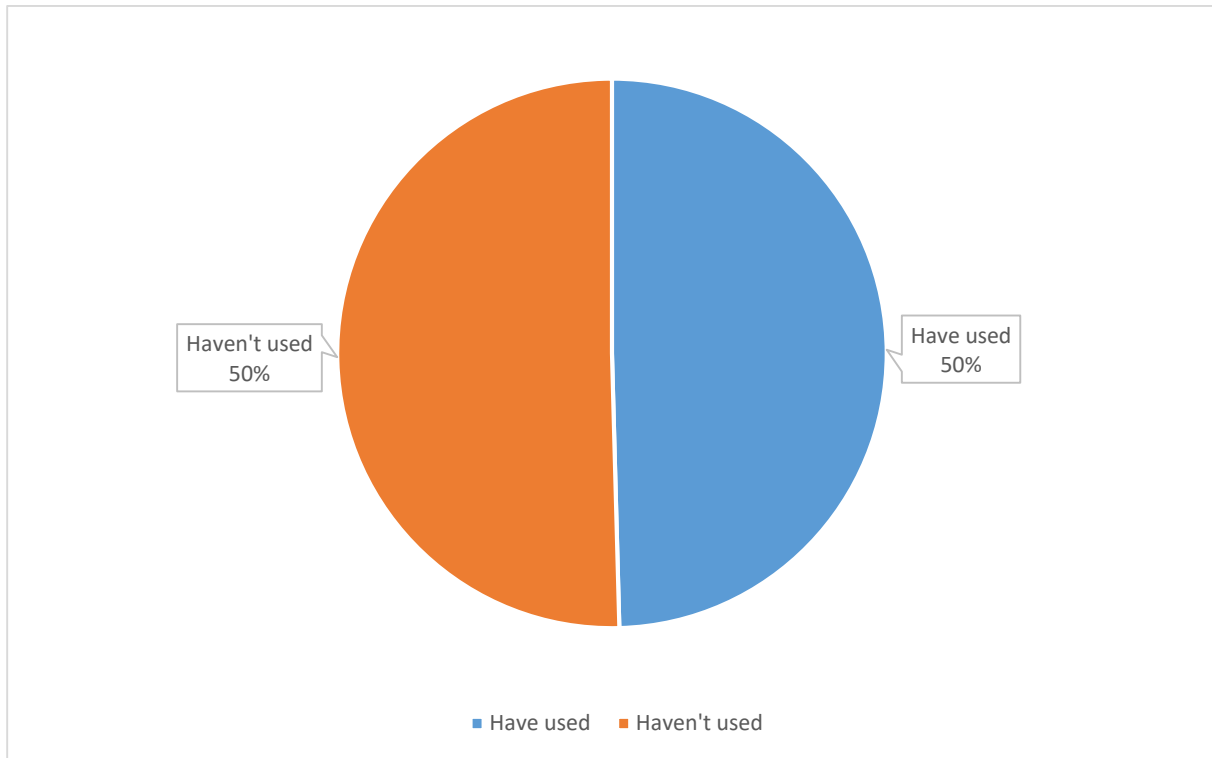


Source: own editing, based on my own questionnaire

While both Generation Z and Millennials are more likely to hold if a human advises them to, the difference seems to be quite large between the Generation Z members and the Millennials.

Generation Z surprisingly show a large need for human reassurance. Although they are very digital and comfortable with technology, they still exhibit a distinct dependence on human validation during uncertain times. Young investors from Gen Z, who are typically less experienced and have only recently started investing, may be more affected by market volatility, which enhances the importance of human reassurance. Millennials also appreciate human reassurance, but to a somewhat lesser degree compared to Gen Z. The split is more balanced for this group: nearly half say human advice would not change their decision. Millennials tend to have more financial experience and investment backgrounds, and may feel more self-assured in making decisions on their own, thus the higher “no difference” percentage.

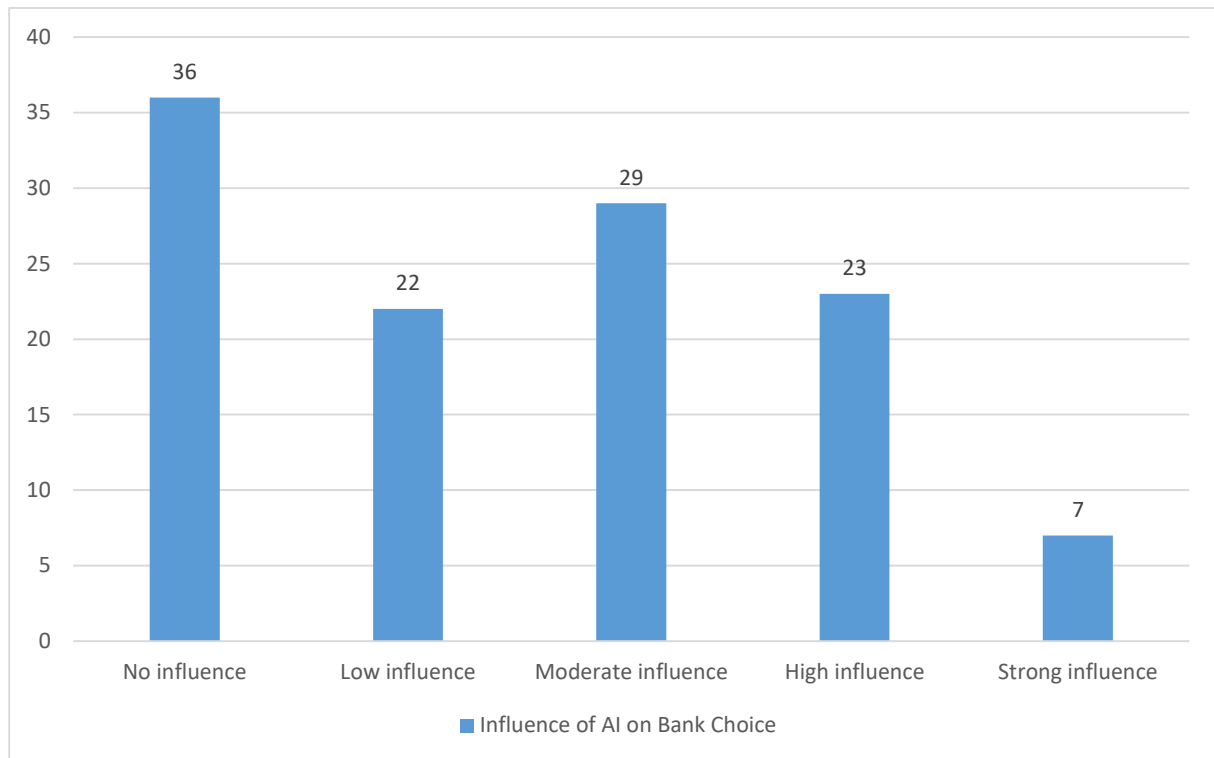
Figure 27: Use of AI banking services



Source: own editing, based on my own questionnaire

58 respondents reported that they have used AI-powered services, provided by their bank, while 59 respondents answered that they haven't used any AI-powered service, which is 49.6% against 50.4%, which suggests that AI adoption in Hungarian retail banking is still in its early or transitional stage, many banks only provide AI to link up with a real human advisor or to present their products, so in many cases there's no real reason to interact with it, it's only serving an assisting role, and caters to those who prefer the chat format instead of the normal document ones, it is likely to help finding information more easily, as AI is usually in the plain sight on website, when documents can sometimes be hard to find. Also, there is no significant difference between Generation Z and Millennials; slightly more Generation Z respondents have used the AI service provided by their bank, 52.78% of Gen Z and 48.65% of Millennials have used it, while in the case of the Generation X respondents, only 25%.

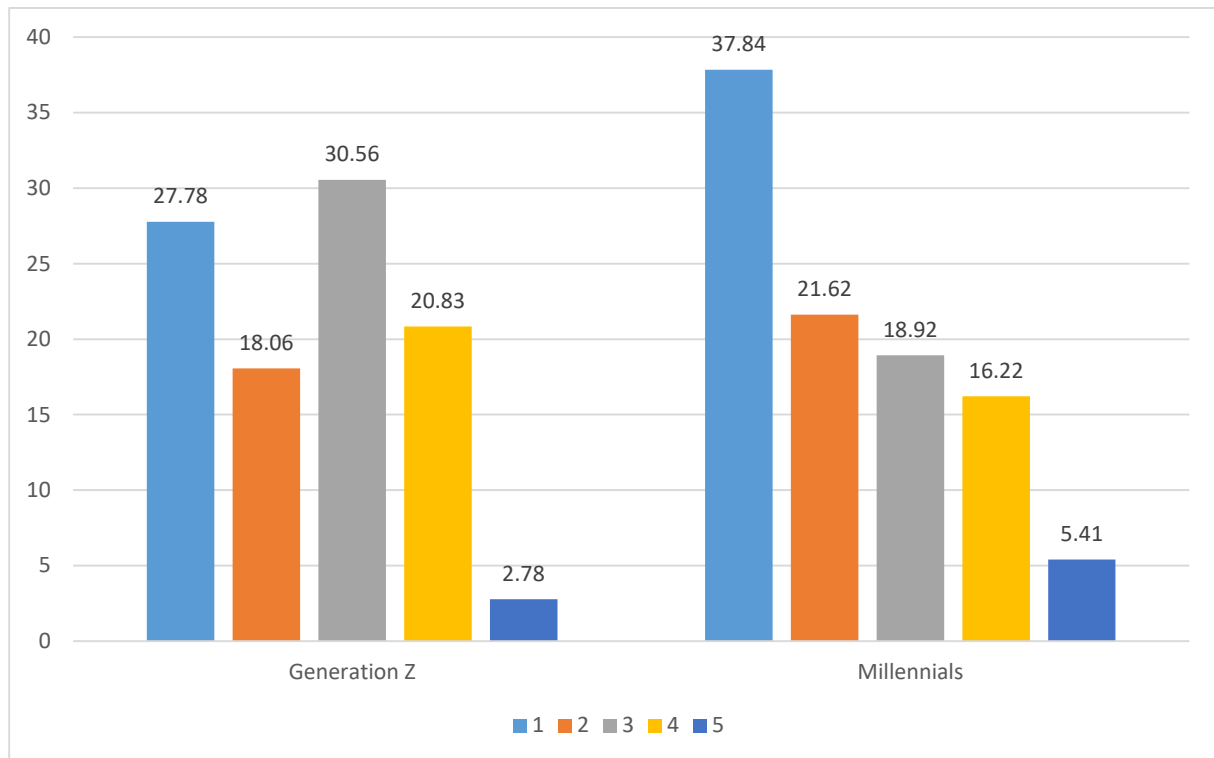
Figure 28: Influence of AI on Bank Choice



Source: own editing, based on my own questionnaire

Only 26.55% of the respondents said that they are highly or strongly influenced to choose or change their bank when the bank has advanced AI technologies. 24.29% said it has a moderate influence on them, and for 49.57% of the respondents, it plays a very small or even no influence.

Figure 29: Influence of AI on Bank Choice: Generation Z vs. Millennials (in %)



Source: own editing, based on my own questionnaire

If we look closer, then we can see that, while only 45.84% of Gen Z said, that the presence of an advanced AI technologies doesn't affect them, a significantly higher portion, 59.46% of the Millennials said the same, while it still doesn't mean, that it would highly affect the choice of Gen Z, when it comes to choose a bank, but it might will if the functions of AI won't be as limited as they are currently. Gen Z peaks at rating 3 with 30.56%, showing openness, but no dependency, while Millennials peak at rating 1 with 37.84%, showing strong scepticism.

7. Conclusion

H1: Gen Z prefer self-service technology over human assistance when it comes to administrative tasks. Hypothesis accepted, as 70% of the respondents said that, when it comes to administrative tasks, AI is better than humans, as it is faster, can serve multiple people at the same time, always available and accessible from anywhere, so they are early adopters, and only 30% didn't agree with it, if we break down the Generations into separate groups, Generation Z

and Millennials are quite similar as in the case of Generation Z 73.61% agreed with the sentence, 70.27% of Millennials agreed with it, and only 3 out of 8, thus 37.50% agreed among Generation X.

H2: Even amongst Gen Z, Revolut's Robo-Advisor is unpopular. Hypothesis accepted, as only 1 respondent said that they use it, who was a Millennial, so no Generation Z user at all, this can be attributed to the following facts; Robo-Advisors doesn't fit into the Hungarian regulatory framework to become popular, because in Hungary there is Value Added Tax on said service, while in the United States of America, there is no federal Value Added Tax, and in most states after providing financial services, there is no sales tax either, which allows Robo-advisory service providers to offer lower fees, also lower fees can be attributed to higher competition. Robo-advisory service can also be integrated with Roth accounts like IRA or 401(k), and not only with normal investment accounts, thus investors can benefit from tax-advantaged growth, unlike in Hungary. Hungarians are rather investing using tax-free services like Long-Term Investment Account (TBSZ) or Pension Saving Account (NYESZ), and in the case of Long-Term Investment Account, its composition after the collecting year is fixed, meaning that one of the main features and benefits of Robo-Advisors, auto-rebalancing, would not be possible.

H3: Most of Gen Z used at least one of the chatbots provided by Hungarian banks. Hypothesis rejected. 58 said they have used AI-based banking services, while 59 of the respondents reported that they haven't; there is no majority, thus the hypothesis must be rejected. This data indicated that Hungarian retail banking services are still in development; many banks use them only for linking up customers with human advisors or to present products to them, if they specifically search for those. These numbers are also very similar if we compare the Generation Z and Millennials, 52.78% of Gen Z have used AI provided by their bank, while 48.65% of the Millennials have, in the case of the Generation X, only 2 out of 8, thus 25.00% have.

H4: Most of Gen Z think that AI will have an effect on their job. The hypothesis is accepted as, the two-third majority of Generation Z thinks that AI will affect their job or has experienced changes in their workplace due to AI, but interestingly, when the Generations were separated, it was shown that a higher portion of Generation Z, 33.33%, think that AI won't affect their jobs. Among Millennials, only 18.92% think the same, so only 66.67% of

Generation Z think that AI will have an effect on their job, while in the case of the Millennials, this number is much higher, 81.08%. Also, 43.24% of Millennials reported that it had an effect on their job, while only 31.75% of Generation Z said the same. Overall, both generations have a high awareness of AI's influence, with two-thirds of Gen Z and four-fifths of Millennials believing AI has or will have an effect on them. The differences between the generations may reflect job experience or sector differences, as 18.06% of Gen Z work in Financial Services, and 48.61% of them work in the Other Services sector, other sectors don't reach 10%, while 27.03% of Millennials works in the Information Technology sector, 16.22% of them in the Financial Services sector, and 37.84% of them in the Other Services sector. Millennials are typically further advanced in their careers, likely holding positions more vulnerable to automation or AI, while Gen Z might be just starting their careers and thus experiencing AI's effects more indirectly.

H5: In the case of portfolio management, the presence of a human advisor is important for younger generations, too. Hypothesis accepted, as, while both Generation Z and Millennials are more likely to hold if a human advises them to, the difference seems to be quite large between the Generation Z members and the Millennials. Generation Z surprisingly show a large need for human reassurance. Although they are very digital and comfortable with technology, they still exhibit a distinct dependence on human validation during uncertain times. Young investors from Gen Z, who are typically less experienced and have only recently started investing, may be more affected by market volatility, which enhances the importance of human reassurance. Millennials also appreciate human reassurance, but to a somewhat lesser degree compared to Gen Z. The split is more balanced for this group: nearly half say human advice would not change their decision. Millennials tend to have more financial experience and investment backgrounds, and may feel more self-assured in making decisions on their own, thus the higher "no difference" percentage.

The Hungarian Artificial Intelligence adoption is lagging behind because the main sector of the Hungarian economy is industrial, and the workforce in the industrial sector is currently untrained to use AI, but there is only a yearly growth of 2.4% of basic digital skill adoption, which suggest that in case of advanced ones there will be a lag too, as the EU average is 4.3% in basic digital skill adoption, and Hungary will likely miss the 2030 target of The Digital Strategy, thus the mass adoption in industrial regions could result in many untrained job seekers and many jobs no one could be hired for.

8. Summary

Hungary possess solid technological infrastructure, for example, placing second when it comes to internet access, which is equal to or faster than 1 Gbps per second, within the European Union and ambitious policies, yet various elements have contributed to the slow adoption of AI. Research indicates that education and skills, regulatory complexity, sectoral structure, and cultural perspectives present significant obstacles, especially in rural areas. Key sectors, such as finance, are starting to embrace AI, but widespread implementation is still years off. By comparing Hungary to EU averages and objectives, it becomes evident that the country currently lags in multiple areas, even as it sets 2030 targets to bridge the gap. Addressing the lag will take more than just funding or regulations; it will require enhancing digital literacy, minimising institutional resistance, and establishing market conditions such as competition and tax incentives that promote innovation.

Although robo-advisors may not affect the Hungarian retail banking as of now, an attempt has already been made to incorporate robo-advisors into the private banking sector.

Only through coordinated efforts among government, industry, and educational institutions can Hungary advance from its current position towards alignment with its EU counterparts; otherwise, many in rural areas could experience job loss.

I created a questionnaire, the primary outcome of said survey indicates that Generation Z is open to innovations in the retail banking sector, but not dependent on it. Only half of Generation Z and Millennials have used AI services provided by their bank; Generation Z is more concerned about losses affecting their portfolios. More Millennials reported a change in their work, which can be attributed to working in different industrial sectors than Generation Z, who answered the survey. Also, more Millennials reported receiving formal training, and their job loss concern is also greater than Gen Z's. Most respondents hold the workplaces and educational institutions more responsible for teaching AI than the government or themselves.

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8. Attachments

I. Questions used for the quantitative and qualitative survey

1. In which region do you work?

- ☐ Budapest
- ☐ Pest county
- ☐ Northern Hungary (Nógrád, Heves, Borsod-Abaúj-Zemplén counties)
- ☐ Northern Great Plains (Jász-Nagykun-Szolnok, Hajdú-Bihar, Szabolcs-Szatmár-Bereg counties)
- ☐ Southern Great Plains (Bács-Kiskun, Csongrád, Békés counties)
- ☐ Central Transdanubia (Komárom-Esztergom, Veszprém, Fejér counties)
- ☐ Southern Transdanubia (Somogy, Tolna, Baranya counties)
- ☐ Western Transdanubia (Győr-Moson-Sopron, Vas, Zala counties)
- ☐ Currently, I am unemployed.

2. In what sector do you work?

- ☐ Manufacturing
- ☐ Construction
- ☐ Financial Services
- ☐ Information Technology
- ☐ Education
- ☐ Healthcare
- ☐ Transportation and Logistics
- ☐ Other Services
- ☐ Currently, I am unemployed

3. What is your gender?

- ☐ Female
- ☐ Male
- ☐ Prefer not to say

4. To which generation do you belong?

- ☐ Generation Z (Age 18-28)

- Millennials (Age 29-44)
 - Generation X (Age 45-60)
5. What is your highest level of education?
- Primary School
 - High School
 - College
 - Bachelor's degree
 - Master's degree
 - PhD degree
6. What is your current occupation?
- Employed (not a student)
 - Self-employed
 - Student (not employed)
 - Student and employed
 - Unemployed
7. On average, how much do you invest per month?
- I do not invest any money.
 - ≤5,000 HUF
 - 5,001-20,000 HUF
 - 20,001-50,000 HUF
 - 50,001-100,000 HUF
 - 100,001 HUF+
8. How frequently do you use Artificial Intelligence tools?
- Daily
 - Several times a week
 - Once a week
 - Several times a month
 - Once a month or less
 - Never
9. What do you use AI tools for?
- Investing (Robo-advisor)
 - Entertainment
 - Education
 - Work

- I do not use AI tools

10. Do you agree with following statement? When it comes to administrative tasks, AI is better, than humans, as it is faster, can serve multiple people at the same time, always available and accessible from anywhere

- Yes
- No

11. Do you think that Artificial Intelligence/automation will have an effect on your job in the following 15 years?

- It has already had an effect on my job
- Yes
- No
- Currently, I am unemployed

12. Are you concerned that you could lose your job in the future because of AI/automation in the following 15 years?

- Yes
- No
- Currently, I am unemployed

13. Have you received any formal training or courses related to artificial intelligence?

- Yes
- No
- I was offered, but didn't take the opportunity

14. In your opinion, who should be responsible for providing training and education about artificial intelligence, and at what extent? (1 is not at all responsible, 5 is completely responsible)

	1	2	3	4	5
Government	○	○	○	○	○
Workplace	○	○	○	○	○
Educational institutions	○	○	○	○	○
Individuals themselves	○	○	○	○	○

15. If your investment portfolio suddenly lost a significant portion of its value, would you be less likely to sell if you had a human financial advisor advising you to hold?
- Less likely to sell
 - No difference
16. Have you ever used any AI-powered services provided by your bank?
- Yes
 - No
17. To what extent does the presence of advanced AI technologies influence your decision when choosing or changing your bank?
- Not at all
- 1
 - 2
 - 3
 - 4
 - 5
- It is very important for me

II. Table containing questionnaire results

Summary Table		
1. In which region do you work?		
	#	%
Budapest	67	57.3%
Pest county	4	3.4%
Northern Hungary (Nógrád, Heves, Borsod-Abaúj-Zemplén counties)	3	2.6%
Northern Great Plains (Jász-Nagykun-Szolnok, Hajdú-Bihar, Szabolcs-Szatmár-Bereg counties)	1	0.9%
Southern Great Plains (Bács-Kiskun, Csongrád, Békés counties)	20	17.1%
Central Transdanubia (Komárom-Esztergom, Veszprém, Fejér counties)	3	2.6%
Southern Transdanubia (Somogy, Tolna, Baranya counties)	7	6.0%

Western Transdanubia (Győr-Moson-Sopron, Vas, Zala counties)	3	2.6%
Currently, I am unemployed	9	7.7%
2. In what sector do you work?		
	#	%
Manufacturing	5	4.3%
Construction	5	4.3%
Financial Services	19	16.2%
Information Technology	17	14.5%
Education	6	5.1%
Healthcare	1	0.9%
Transportation and Logistics	4	3.4%
Other Services	51	43.6%
Currently, I am unemployed	9	7.7%
3. What is your gender?		
	#	%
Female	65	55.6%
Male	52	44.4%
4. To which generation do you belong?		
	#	%
Generation Z (Age 18-28)	72	61.5%
Millennials (Age 29-44)	37	31.6%
Generation X (Age 45-60)	8	6.8%
5. What is your highest level of education?		
	#	%
Primary School	1	0.9%
High School	54	46.2%
College	3	2.6%
Bachelor's degree	47	40.2%
Master's degree	11	9.4%
PhD degree	1	0.9%
6. What is your current occupation?		
	#	%
Employed (not a student)	48	41.0%

Self-employed	3	2.6%
Student (not employed)	8	6.8%
Student and employed	57	48.7%
Unemployed	1	0.9%
7. On average, how much do you invest per month?		
	#	%
I do not invest any money.	26	22.2%
≤5,000 HU	9	7.7%
5,001-20,000 HUF	37	31.6%
20,001-50,000 HUF	30	25.6%
50,001-100,000 HUF	6	5.1%
100,001 HUF+	9	7.7%
8. How frequently do you use Artificial Intelligence tools?		
	#	%
Daily	55	47.0%
Several times a week	43	36.8%
Once a week	4	3.4%
Several times a month	7	6.0%
Once a month or less	3	2.6%
Never	5	4.3%
9. What do you use AI tools for?		
	#	%
Investing (Robo-advisor)	1	0.9%
Entertainment	75	64.1%
Education	77	65.8%
Work	61	52.1%
I do not use AI tools	4	3.4%
10. Do you agree with following statement? When it comes to administrative tasks, AI is better, than humans, as it is faster, can serve multiple people at the same time, always available and accessible from anywhere		
	#	%
Yes	82	70.1%
No	35	29.9%

11. Do you think that Artificial Intelligence/automation will have an effect on your job in the following 15 years?		
	#	%
It has already had an effect on my job	39	33.3%
Yes	38	32.5%
No	31	26.5%
Currently, I am unemployed	9	7.7%
12. Are you concerned that you could lose your job in the future because of AI/automation in the following 15 years?		
	#	%
Yes	13	11.1%
No	95	81.2%
Currently, I am unemployed	9	7.7%
13. Have you received any formal training or courses related to artificial intelligence?		
	#	%
Yes	47	40.2%
No	57	48.7%
I was offered, but didn't take the opportunity	13	11.1%
14. In your opinion, who should be responsible for providing training and education about artificial intelligence, and at what extent? (1 is not at all responsible, 5 is completely responsible)		
Government	3.03	
Workplace	4.08	
Educational institutions	4.21	
Individuals themselves	3.64	
15. If your investment portfolio suddenly lost a significant portion of its value, would you be less likely to sell if you had a human financial advisor advising you to hold?		
	#	%
Less likely to sell	69	59.0%
No difference	48	41.0%
16. Have you ever used any AI-powered services provided by your bank?		

	#	%
Yes	58	49.6%
No	59	50.4%
17. To what extent does the presence of advanced AI technologies influence your decision when choosing or changing your bank?		
	#	%
No influence	36	30.8%
Low influence	22	18.8%
Moderate influence	29	24.8%
High influence	23	19.7%
Strong influence	7	6.0%