1. Introduction to the EdTech market

1.1. Introduction

In this book I would like to take a look at the fast evolving market of skills pertaining to programing and computer science and their significance in contemporary world which has been going through a demanding time since, unexpectedly, the world got caught in the completely new situation of the COVID-19 emergency in March 2020. It is now obvious that even though, with the progress of vaccination and slowly growing herd immunity, there are some positive outlooks for coming out of the pandemic crisis, the situation on the job market will be a "new normal" and that there will be clear winners and losers. Amongst the latter, we will find low-skill and medium-skill jobs which will be decreasing slowly and no growth in these types of jobs is predicted in most labor market analyses and reports. Service-related jobs in many sectors were under lock-down and the situation of its workers deteriorated. At the same time, technology-related jobs were in many reports and ratings at the top as regards the number of job postings and also in terms of salaries offered. Technology jobs are one of the most important options worldwide, available not only for youth, as a guarantee of secure employment, but also for people who are aiming at their second career or sometimes the ultimate one.

The scenario for the future of work is promising for high-skill jobs, while the prospects for low-skilled employees are quite grim. Before the pandemic, the occupations that were hit most were mid-income jobs, mostly white-collar employees in offices and production workers.[1] But now, during the Covid-19 pandemic, we can see that the groups which have been affected the most were those in the service sector and low-skill jobs. As McKinsey Institute predicts: "More than half of the low-wage workers in currently declining occupations may need a shift to occupations requiring different skills in higher wage brack-

[1] "The future of work after Covid-19", McKinsey Institute 18.02.2021, link: https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19#, retrieved: 5.05.2021, p. 14.

ets to remain employed."[2] The usual solution, i.e. transfer to another type of "low-skill job" might not be feasible as this type of jobs will be disappearing. Therefore, the post-pandemic situation raises a challenge of upskilling masses of people who move from the low-skill backgrounds to high-skill ones. The numbers are strikingly high as around 25% of all the workforce might be in need of upskilling before 2030. As the McKinsey report shows, only in 8 advanced economies (China, France, Germany, India, Japan, Spain, the UK and the US) around 100 million of people will need to shift their occupations and upskill by 2030.[3] In those 8 countries which constitute 62% of the global GDP, in the next decade, almost the whole expected growth is in high-skill jobs, while low-skill and medium-skill ones will be on zero on net decline depending on the individual country.[4] As far as hard skills are concerned, the most important skills required on the job market will be tech skills as they are of utmost importance in the context of high-paid jobs. If we look at the statistics, there are some sectors which will clearly be on the rise when it comes to the number of jobs till 2030. In all of the 8 countries, jobs will increase in the following sectors: health sector, tech sector, creative sector, business sector and, surprisingly, transportation. In this book my focus is on the tech sector as the one which is experiencing an astonishing growth not only in the time of pandemic, but has been doing so for the last 70 years. The tech industry is also the sector which stands out in terms of salaries compared to the most of the professions with constant growth and demand for the employees which is almost all the time exceeding the supply. The impact and the privileged position of tech jobs can be seen in the most advanced economies. Recent research conducted by labor market analytics company Burning Glass Technologies provided results showing that tech jobs postings in New York City took the first place regarding the number of postings, even comparing to medical positions which are especially important during pandemic.[5] Between April and November 2020, there were advertised 21,268 new jobs in the tech industry in New York City, which is almost twice as many as the number of postings for physicians.[6] Not only are tech jobs leading the way (although even in tech where there was a 37% job posting there was a decline at that time), but the majority of remaining jobs also require strong digital skills, even for the frontline clerks who are now expected to be fluent at

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[2] Ibidem.

[3] Ibidem, p. 1.

[4] Ibidem, p. 16.

[5] Plagianos I., "Tech Jobs lead the way in New York City's Covid-19 Pandemic Hiring", link: https://www.wsj.com/articles/tech-jobs-lead-the-way-in-new-york-citys-covid-19-pandemic-hiring-11619956802?st=2299yjmnswbhymp&reflink=desktopwebshare_permalink, retrieved: 11.05.2021.

[6] Ibidem.

using multitude of digital platforms.[7] People without digital skills are not only excluded from stable well-paid jobs which are offered by the Tech industry, but also can have problems even in low-paid or middle-paid jobs, since they require more and more digital skills as most professions are shifting into digital operations to a greater and greater extent (for example, in the educational industry or restaurant industry).

If we take a look at the number of people who will need re-skilling (100 million) in only 8 advanced economies, it looks obvious that traditional routes of campus offline studies are not an option for the masses of people. More and more employers take out the requirement of the degree in the hiring process, putting more focus on skillset of the candidates. Amongst companies which dropped the degree requirement we can name Tesla, Google, Hilton Hotels or IBM.[8] While the degrees can disappear from "must-have" requirements from the companies, the new type of credentials will be evolving. Another important aspect of upskilling of masses of people is the question of which approach to apply with reference to training and educating of people who are beginning their journey from low-skilled workforce towards high-skilled workers. There are many various ways of upskilling these groups of people and in this book, I will discuss the market of non-standard educational approaches to education and training in programing education and computer studies. These non-standard educational approaches are especially important for people who are coming from disadvantaged backgrounds with a limited access to standard on-campus education. While there might be many groups who can be classified as disadvantaged, including disabled, NEETs, domestic violence victims, former prison inmates, former drug and alcohol-addicts, people from poverty-stricken socio-economic backgrounds, immigrants, asylum seekers and – in many countries – also people of color, women or minorities. Most of these groups have limited access to the tech industry which is predominantly white and male. The diversity in tech is a global problem and can be perceived both as a pipeline and endpoint problem.[9] If we assume that people who want to shift from the low-skill jobs are mostly people from disadvantaged backgrounds, we have to realize that such a transition will need non-standard educational approaches. It is not because of lower educational attainment of such groups (which is often the case due to lesser opportunities), but also because of the everyday difficulty in accessing stationary on-campus education. If you enroll

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[7] Ibidem.

[8] "The future of work after Covid-19", McKinsey Institute 18.02.2021, link: https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19#, retrieved: 5.05.2021, p. 20.

[9] Windley K., Pan E., "Diversity in Tech: Endpoint Problem", Stanford PIT Lab 28.10.2020, link: https://medium.com/swlh/diversity-in-tech-the-endpoint-problem-77f3265b6aab, retrieved: 5.05.2021.

on studies or even on a stationary course, you must keep to the schedule, do the commuting and be able to balance your work with everyday life. For people from the lowest quintile of society, earning one's living often requires following two jobs simultaneously and taking care of other members of family. Clearly, availing themselves of standard educational opportunities can be not a feasible option for many of them. Even if we look at the current statistics applicable to Tech, we will see a grim picture regarding the representation of people from disadvantaged backgrounds and minorities in this branch. In most of the Tech-related companies, tech jobs are chiefly occupied by workers from white and Asian backgrounds. For example, in 2018, in Apple, around 49% of tech employees were white and 35% Asian.[10] In Facebook, it was respectively 40% whites and 52% Asian in 2019, while in Google, in the same year – 48% white and 43% Asian.[11] The Latinx, Black Americans and Native Americans composed around 10% or lower in the case of leading companies such as Apple, Facebook, Google and Microsoft.[12] Similar underrepresentation is also observable with regard to gender. Women's share in tech roles is 23% at Apple, Facebook, Google and 20% at Microsoft.[13] The reasons behind that situation are complex, yet one of them is a pipeline, while women make only 18% of bachelor's degree graduates in Computer Science in the United States.[14] Historically, the situation with regard to education was not always so bad. The best result so far was attained in 1984, when women accounted for 37% of alumni of bachelor degree studies in Computer Science in the United States.[15] Unfortunately, the numbers have dropped more than twice since that year.

1.2. Selected research on the topic

EdTech innovation in programing online has been developing only recently and the research so far on the topic has been limited. I would like, however, to point out some important publications which dealt with the topic before.

Pomerol et al. discussed the phenomena of MOOC profoundly, with the focus on their development and financing.[16] When presenting the business models of the MOOC providers, the authors predict a rather grim scenario: "In conclu-

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[10] Harrison S., "Five years of tech diversity reports – and little progress", 10.01.2019, link: https://www.wired.com/story/five-years-tech-diversity-reports-little-progress/, retrieved: 5.05.2021.

[11] Ibidem.

[12] Ibidem.

[13] Ibidem.

[14] Writers S., "Women in Computer Science: Getting Involved in STEM", 5.05.2021, link: https://www.computerscience.org/resources/women-in-computer-science/, retrieved: 5.05.2021.

[15] Ibidem.

[16] Pomerol J.C., Epelboin Y., Thoury C., "MOOCs: Design, Use and Business Models", Wiley Online Library 2015, DOI:10.1002/9781119081364.