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GENDER-SENSITIVE ANALYSIS OF THE STATE OF THE IT INDUSTRY IN UKRAINE

The article considers the issue of gender equality in the IT field. A gender analysis of IT education was conducted, as well as a gender portrait of the IT industry as a whole. The analysis of the gender distribution by IT specialties showed that the largest share of girls is concentrated in the specialties “Applied Mathematics” and “System Analysis”, the smallest one is in the specialty “Computer Engineering”. A survey of female students of higher education institutions specializing in the field of knowledge 12 “Information technologies” is conducted and main reasons for choosing a IT specialty by girls are defined. Measures at the state level aimed at achieving gender equality are identified, in particular joining the Biarritz Partnership initiative, adoption of the National Strategy for Bridging the Gender Pay Gap for the period up to 2030. Activities in secondary and higher schools aimed at popularizing of STEM fields among girls are systematized. It is established that the achievement of gender equality is key Goal 5 for IT companies according to the Sustainable Development Goals (also known as the Global Goals, key tracks of country development adopted at the UN Summit on Sustainable Development), according to which diversity, equity & inclusion strategy is implemented in IT companies. The activities of professional women communities in IT industry are considered (ACM Women, WomenENCourage initiative, Women Who Code, W.Tech, STEM Girls, SheLeadsTech initiative from ISACA Kyiv, etc.), as well as STEM Girls as a community of active girls in schools, colleges and universities in Ukraine. Studies noting a positive relationship between gender, racial and cultural diversity and the financial results of organizations are highlighted. Recommendations for achieving gender equality were formed. Object of research is the gender analysis in the IT-industry. The purpose of the research is to consider gender status of training in IT specialties, gender portrait of an IT specialist and the measures to ensure the gender parity.

Key words: gender equality, IT-industry, education, corporate social responsibility initiatives, Sustainable Development Goals, STEM.

Introduction. There is no gender parity in technical sciences, in particular in the IT field. This issue is raised both at the state level within the framework of the Biarritz Partnership initiative and other state programs, and at the level of sectoral corporate social responsibility initiatives. Achieving of gender equality is a priority for IT companies according to the Sustainable Development Goals. Within the framework of achieving this key goal, the company conducts various activities, including popularization of STEM among girls and career guidance meetings of IT professionals with teenage girls, implementation of equal conditions and opportunities in the workplace, cooperation with Women who code and internal projects aimed at the development of women in companies. However, the origins of gender inequality lie at school and are

clearly expressed in the choice of a major for study. Therefore, it is important to study the issue of gender equality, starting with educational institutions.

Task statement. *Object of research* is the gender analysis in the IT-industry. *Purpose of research* is to consider gender status of training in IT specialties, gender portrait of an IT specialist and the measures to ensure the gender parity.

Analysis of recent research and publications. The problem of gender equality is considered in works of different Ukrainian and foreign authors. These works can be classified according to the topics: gender gap in different subjects areas, in different countries, factors influencing such gap, gender balance in secondary and higher education in STEM courses, differences in perception and self-assessment of different genders, gender inequality

in career opportunities, new models to evaluate and predict gender gap.

Outline of the main material of the study.

High education in IT. A survey conducted by GlobalLogic among its specialists showed that 20% of specialists believe that it is enough to have a high IT education to start a career in IT, and the other 80% of specialists believe that additional training and practice are necessary [1].

The analysis of the gender distribution by IT specialties shows that the largest share of girls is concentrated in the specialties “Applied Mathematics” and “System Analysis” (35% for bachelor’s degree and 20% for master’s degree), the smallest one is

in the specialty “Computer Engineering” (12% for bachelor’s degree and 9% for master’s degree). The possible reason is that “Computer Engineering” is traditionally considered as male specialty not interesting for women. The average girl percentage for IT specialties: bachelor’s degree – 19%, master’s degree – 12%. The largest number of all entrants chooses the “Computer Science” specialty for admission.

The majority of IT specialists with high IT education graduated in the following specialties: “Computer Science”, “Software Engineering”, “Information Systems and Technologies”, “Computer Engineering”.

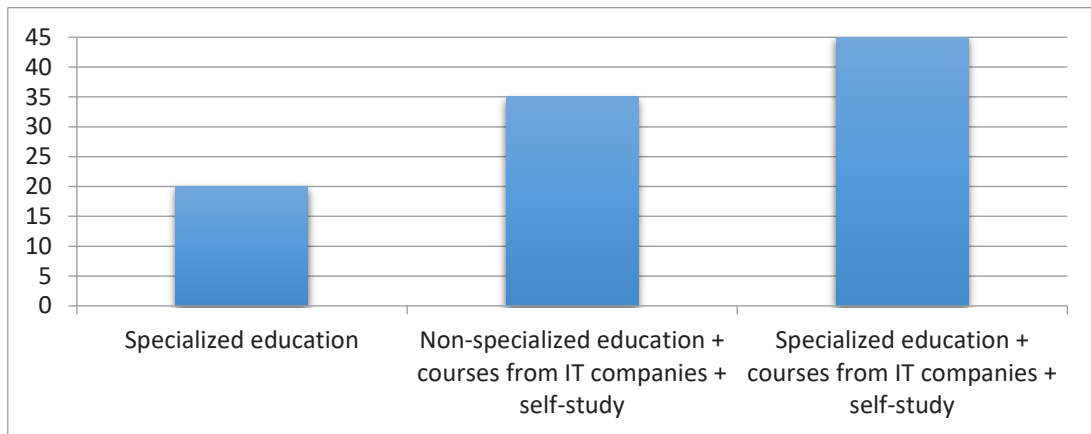


Fig. 1. Necessary background to start a career in IT

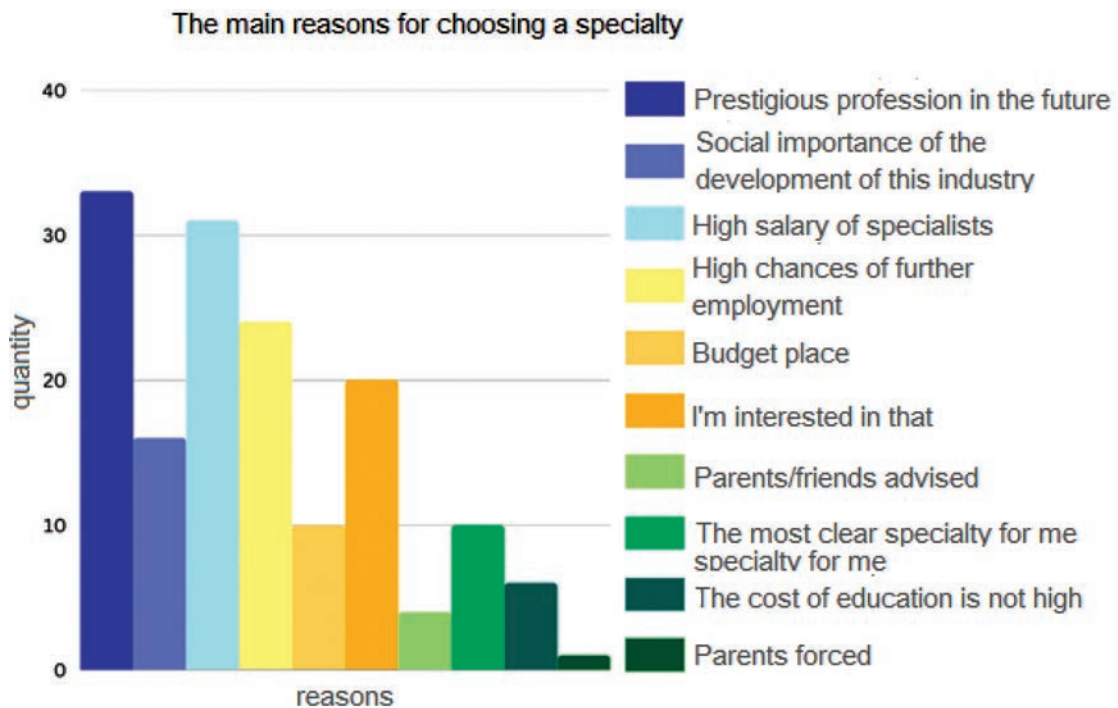


Fig. 2. The main reasons for choosing a IT specialty by girls

A survey of female students of higher education institutions specializing in the field of knowledge 12 “Information technologies”, conducted by the authors of this study, showed that the vast majority of female students chose the specialty for study due to the prestige of the profession and the high salary of specialists.

Indices of gender parity among students of higher educational institutions of Ukraine for bachelor’s and master’s degrees before the start of martial law is shown in fig. 3 [2]. As shown in the figure, the percentage of girls is higher at the master’s degree.

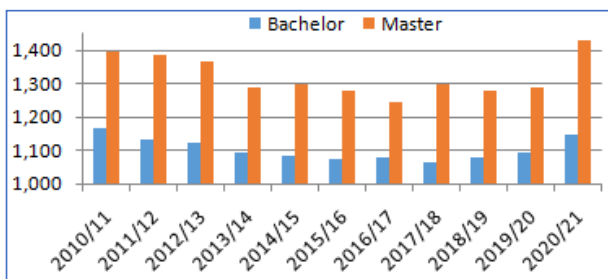


Fig. 3. Indices of gender parity among students of higher educational institutions

Source: ukrstat.gov.ua

Labor market in IT. As O. Zelenska noted, while presenting the National Strategy for Bridging the Gender Pay Gap for the period up to 2030 at the UN General Assembly, the average pay gap between men and women is 18.6%. In the IT sector, this gap reaches 75%. The main reasons are the gender gap, less experience of women in IT, working in non-technical positions with lower salaries. However, this indicator is on average of 13% in favor of men in EU countries [3].

According to O. Zelenska, the main factor in reducing the gender gap is Ukraine’s joining the Biarritz Partnership international initiative. However, a significant role in the IT industry is also given to the cooperation with foreign companies for which gender balance is a key issue.

According to the salary survey conducted by a specialized portal for the IT industry DOU, the share of women in the IT industry is 23% (71,8 thousand women against 240,5 thousand men) [4]. This number correlates with the ratio in other EU countries and the USA. Thus, in the USA, the share of women in the IT industry in 2020 was 26% [5]. Every year the number of women in IT increases, so over the past 10 years the number of women has doubled [4].

A slight decrease in the woman share in 2023 may be due to the departure of women abroad because of the full-scale invasion of Russia. But taking into

account the possibility of remote work in the IT field, the trend is expected to continue. According to UNIAN, 41% of IT specialists who left the country after the full-scale invasion plan to return to Ukraine.

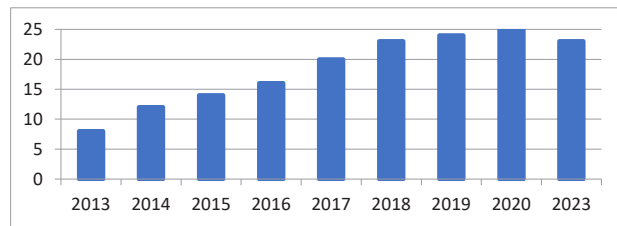


Fig. 4. Percentage of women in IT in 2013–2023 years

Despite the fact that more women than men in IT have a higher education (78% versus 74.5% according to the DOU survey), there is an advantage of men in technical specialization and women in creative ones in IT. The majority of women work in non-technical positions (75%). Among technical specialties, the largest number of women is 36% in QA, which can be explained by a lower entry threshold in manual testing, less desire of men to occupy this position due to the existence of stereotypes about the preference of developers over testers, and lower salaries. Among software developers, who make up half of all IT professionals, only 8% are women. However, it should be noted that the number of female developers has doubled over the past five years. Absolute higher number of women in HR/Recruiting categories – 92% and Customer Success – 73% [4].

Measures to ensure gender equality.

– Measures at the state level, in particular joining the Biarritz Partnership initiative, adoption the National Strategy for Bridging the Gender Pay Gap for the period up to 2030. In September 2020, Ukraine has gained the status of a Biarritz Partnership member, an international initiative of equal rights and opportunities for all. Ukraine adopted a number of laws, joined the EPIC international partnership on wage equality and conducts the initiatives aimed at achieving gender equality within the framework of Biarritz Partnership.

In September 2023 the Cabinet of Ministers of Ukraine approved the National Strategy for Bridging the Gender Pay Gap for the period up to 2030 [3], which involves overcoming stereotypes and discrimination based on gender (conducting an educational campaign to increase women’s awareness of their rights and opportunities, gender audits and exchange of best practices for implementing gender equality in the workplace), improving legislation on equal pay, creating conditions for a convenient combination of family and professional duties.

Ukraine is implementing the National project “Diia. Cifrovaosvita” by Ministry of Digital Transformation of Ukraine, which provides the National Online Edutainment Platform “Diia. Osvita” for development of the digital literacy and mastering the new profession [6]. Digital Education Project aims to master digital skills and reduce the digital gap. It is very actual project taking into account more than 5 million displaced people, people who have lost their jobs, and the opportunity to become a switcher in the IT sector. Ministry of Digital Transformation of Ukraine is the organizer and partner of a set of events in gender equality, in particular, the conference “Girls in ICT Day”.

– *Activities in secondary and high schools aimed at popularizing of STEM courses among girls.* The gender gap is caused by stereotypes about male and female occupations that are instilled starting from school. Therefore, measures in secondary and higher education, aimed at getting girls interested in IT education and refuting stereotypes related to programming and technologies, to ensure gender balance in general, are particularly relevant (tab. 1–3).

– *Events and professional holidays for women in IT.* Perspektywy Women in Tech Summit (Warsaw, Poland) is an international summit where women – representatives of technical industries

Table 1

Gender events in secondary education

Workstreams	Examples	Benefits
<ul style="list-style-type: none"> • Development of STEM lessons • Development of gender-sensitive lessons • STEM events for school children • Vocational and career guidance events for girls 	<ul style="list-style-type: none"> • Teachers’ Competition “Best STEM lesson” • All-Ukrainian Teachers’ Competition “Best Gender-Sensitive STEM Lesson Online” • STEM Girls Camp for school girls • Courses “Python programming”, “UX/UI design” for school girls from "Girls in Tech" • STEM-challenges for institutions that are branches of STEM Girls • Vocational and career guidance meetings with teenage girls from EPAM 	<ul style="list-style-type: none"> • Popularization of STEM education through the development of integrated lessons/activities, the evaluation criteria of which include gender sensitivity and compliance with the principles of STEM education. • Support of using creative methods in education • Girl promotion in the technologies

Table 2

Gender events in higher education

Workstreams	Examples	Benefits
<ul style="list-style-type: none"> • STEM events for students (competitions, Olympiads, hackathons) • Scholarships • Initiatives to raise awareness on gender equality (meetings, webinars, lectures, tours to companies) • Participation in professional associations 	<ul style="list-style-type: none"> • Professional hackathons: FTI_HACK 2022, IT-Revolution’22, std.:hackathon • Three-day Hackathon for female students “Hack4Good: how to get girls interested in tech” • Meetings with female students within “Girls in ICT Day” • Kharkiv Information & Communication Technologies ACM-Women Chapter (ACM Student Membership) • Scholarship support for female students and post graduate students in Computer Science to participate in scientific conferences 	<ul style="list-style-type: none"> • Professional development of students in STEM courses • Girl promotion and awareness in technologies • Access to the platform of free communication with community, to online courses, e-books and videos, digital scientific library, to the center of career and employment, scholarship support

Table 3

Gender events in professional education

Workstreams	Examples	Benefits
<ul style="list-style-type: none"> • Courses in gender equality • Free professional courses • Educational institutions are branch offices of STEM Girls 	<ul style="list-style-type: none"> • Course “Gender equality in educational institution: theory and practice of implementation” from Educational Platform Vseosvita • Course “Women and men: gender for all” (Educational Platform Prometheus) • Educational Platforms Coursera, Udemy, Prometheus, • Training courses of EPAM, SoftServe, QATestLab, etc. • Program Wildau-Kharkiv IT Bridge “Digital Ukraine: Ensuring academic success in times of crisis (2022) – access to the IT-courses of 60 best Ukrainian teachers • Course “Introduction in IT” for women from Beetroot Academy. 	<ul style="list-style-type: none"> • Theoretical background of gender equality and practical mechanisms of creating a gender-sensitive educational institution • Mastering hard skills in IT for all genders for greater competitiveness in the labor Possibility to become IT switcher • Possibility for women to grow and realize their potential in IT field.

Table 4

Gender diversity strategy in the workplace

Workstreams	Examples	Benefits
<ul style="list-style-type: none"> • Implementation of equal conditions and opportunities in the workplace. • Continuous collection and analysis of statistical data on age and gender of employees in order to ensure diversity and improve inclusion. • Cooperation with professional associations • Internal projects aimed at women development in company • Individual participation in professional associations 	<ul style="list-style-type: none"> • Companies in the “IT Ukraine” Association, that have joined gender equality goal ensure equal conditions and opportunities within company 	<ul style="list-style-type: none"> • Ensuring gender diversity in IT companies • Increasing the number of women in IT • Financial benefits of women involvement in IT companies

can communicate, attend lectures of authoritative speakers and thematic workshops, meet with leaders of the world’s leading high-tech companies, and also hear inspiring success stories from the most influential women in technology. Female IT students from Ukraine can receive a grant for free participation in the summit, travel and accommodation.

International Girls in ICT Day is a global initiative to raise awareness among girls about the importance of digital skills and encourage them to get education and build career in ICT. “STEM Girls” joined the celebration of the “International Girls in ICT Day” in Ukraine and held an online conference “Girls in ICT Day” to encourage increase in number of girls in information and communication technologies. During the online conference, the stories of successful inspiring women were demonstrated, an interactive workshop, quizzes and competitions were held, and recommendations were given on training, career and leadership in ICT. “Girls in ICT Day” took place within the framework of the project "Springboard to Equality", the joint Swedish-Ukrainian project supported by UNFPA, the UN fund and implemented to withdraw from gender stereotypes in education and at work. “Girls in ICT Day” contributes to overcome the gender digital gap and gender stereotypes when choosing a future career [7].

– *Implementation of diversity, equity & inclusion strategy in IT companies.*

In March 2021, the Association “IT Ukraine”, which brings together the largest Ukrainian IT companies, joined the implementation of the Sustainable Development Goals (SDGs) adopted by the United Nations, in particular Goal 5: Gender Equality. Members of the Association, including Luxoft, EPAM, Sigma Software, TECHIIA, Intellias, SoftServe, Infopulse, ELEKS, Itera, Beetroot, implement corporate social responsibility projects, educational and social projects focused on the gender diversity issue. For instance, ERAM conducts vocational and career guidance meetings with teenage girls, Sigma Software popularizes the STEM (science,

technology, engineering and math) field among girls, Beetroot ensures constant women promotion in the technologies through scholarships and a wide range of initiatives to increase gender awareness. All companies that have joined the gender equality goal ensure introduction of the equal conditions and opportunities within the company (tab. 4). Some of them publish reports on the gender ratio in their teams and events aimed at gender equality [3].

Research on gender diversity conducted by the MacKinsey Institute [8] and the Peterson Institute for International Economics [9] demonstrated a positive relationship between gender, racial and cultural diversity and performance of the organization. In particular, MacKinsey analyzed the data of 366 companies from Canada, Latin America, the United Kingdom, and the USA and noted a 15% improvement in financial indicators for companies in the top quartile with a high level of gender diversity. Peterson Institute researchers based on data analysis of 21,980 firms from 91 countries suggest that the presence of women in corporate leadership positions may improve firm performance. However, it should be noted that recruitment in IT based on the principle of diversity and vacancies "for women only" as well as any quotas, carry the threat of discrimination, reluctance of quality specialists to be hired according to quotas, etc. Research by the Peterson Institute also found no impact of board gender quotas on company performance.

Women unite in professional communities (ACM Women, WomenENCourage initiative, Women Who Code, W.Tech, STEM Girls, SheLeadsTech initiative from ISACA Kyiv), where women inspire and support each other to advance in technical majors. The main goals of professional communities are women engagement into computing, opportunity to become a part of professional associations, free communication platform for the community, collaboration of IT business and education representatives, coordination of activities, additional employment opportunities, scholarship support for women students and post



Fig. 5. Likelihood of financial performance by diversity quartiles, %
 Source: MacKinsey diversity database

graduates in IT, access to educational and scientific resources, access to the best IT-events.

STEM Girls is a community of active girls in schools, colleges and universities in Ukraine, which unite in order to attract more and increase the number of girls in STEM fields. The main goals of the “STEM Girls” branches are contribution of the educational institution to the development of STEM in Ukraine; involvement the girls of educational institution in STEM movement (participation in events initiated by STEM Girls, organization of STEM activities); informing the public and the STEM community about their achievements.

Conclusions. The work considers the analysis of the state of the IT industry in Ukraine in the context of gender equality ensuring. Despite the positive trend towards an increase of the quantity of women in Ukrainian IT field the gender gap still persist.

In order to achieve gender parity in Ukraine, a number of activities aimed at overcoming gender stereotypes,

popularizing STEM disciplines among girls, attracting women to the field of computer technology, promoting women’s knowledge and interest in science and IT are being held. There are IT companies and organizations that promote the involvement of women in computing at the university level and offer student events and projects aimed at improving the working and learning environment for women in computing. Participation in such events motivates women to join initiatives and develop professionally.

To decrease gender gap one should note such recommendations: more active career guidance and popularization of STEM courses among girls; increase of number of Ukrainian IT companies that join the implementation of the Sustainable Development Goals and their involvement in the initiatives aimed at popularization of women in tech; demonstration of the stories of successful women in tech as example for their young colleagues; equal gender work and salary conditions.

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Гайтан О.М., Курилех А.С., Гаврилко Д.Д. ГЕНДЕРНОЧУТЛИВИЙ АНАЛІЗ СТАНУ ІТ ГАЛУЗІ В УКРАЇНІ

У статті розглядається питання гендерної рівності в ІТ-сфері. Проведено гендерний аналіз ІТ-освіти, побудовано гендерний портрет ІТ-індустрії в цілому. Аналіз гендерного розподілу за ІТ-спеціальностями показав, що найбільша частка дівчат зосереджена на спеціальностях «Прикладна математика» та «Системний аналіз», найменша – на спеціальності «Комп'ютерна інженерія». Проведено опитування студенток вищих навчальних закладів галузі знань 12 «Інформаційні технології» та визначено основні причини вибору дівчатами ІТ-спеціальності. Визначено заходи на державному рівні, спрямовані на досягнення гендерної рівності, зокрема приєднання до ініціативи «Біарріц партнерство», прийняття Національної стратегії подолання гендерного розриву в оплаті праці на період до 2030 року. Систематизовано діяльність у середній та вищій школах, спрямовану на популяризацію STEM-дисциплін серед дівчат. Встановлено, що досягнення гендерної рівності є ключовою метою 5 для ІТ-компаній відповідно до Цілей сталого розвитку (відомих як Глобальні цілі, ключові напрямки розвитку країни, прийняті на саміті ООН зі сталого розвитку), згідно якої в ІТ-компаніях реалізується стратегія різноманітності, справедливості та інклюзії. Розглянуто діяльність професійних жіночих спільнот в ІТ-галузі (ACM Women, ініціатива WomenENCourage, Women Who Code, W.Tech, STEM Дівчата, SheLeadsTech ініціатива від ISACA Київ тощо), а також діяльність STEM Дівчат як спільноти активних дівчат у школах, коледжах та університетах України. Виділено дослідження, які відзначають позитивний зв'язок між гендерною, расовою та культурною різноманітністю та фінансовими результатами діяльності організації. Сформовано ряд рекомендацій щодо досягнення гендерної рівності. Об'єктом дослідження є гендерний аналіз в ІТ-індустрії. Мета дослідження – розглянути гендерний статус підготовки ІТ-спеціальностей, гендерний портрет ІТ-фахівця та заходи щодо забезпечення гендерного паритету.

Ключові слова: гендерна рівність, ІТ-індустрія, освіта, ініціативи корпоративної соціальної відповідальності, цілі сталого розвитку, STEM.