Acta Catallactics

časopis za ekonomska i opšta društvena pitanja

GODINA V · Broj 1 · Tuzla, 2024. · ISSN 2744-1296

Časopis „Acta Catallactics, časopis za ekonomska i opšta društvena pitanja“ od autora očekuje najviše standarde integriteta u istraživanju. Radovi koji su primljeni za razmatranje za objavu u časopisu trebaju sadržavati dovoljno informacija kako bi svaki kvalificirani istraživač mogao ponoviti rezultate.

Acta Catallactics
Acta Catallactics časopis za ekonomska i opšta društvena pitanja

Poštovani,

Pred Vama je deveti broj naučnog časopisa "Acta Catallactics, časopis za ekonomska i opšta društvena pitanja" koji je osnovan 2019. godine i izlazi dva puta godišnje u izdanju udruženja "Multi" i Visoke škole "Internacionalna poslovno-informaciona akademija" Tuzla. Nakon pet godina djelovanja, sada već možemo navesti da je riječ o vrijednoj tradiciji izdavaštva, posebno razumijevajući da u Bosni i Hercegovini nema puno naučnih časopisa koji se bave tematikom ekonomskih i drugih društvenih pitanja.

"Acta Catallactics" je usmjeren prema naučnicima i stručnjacima koji se bave istraživanjem ekonomskih i opštih društvenih pitanja. Objavljuje radove koji doprinose teorijskom, metodološkim i empirijskim spoznajama u svim ekonomskim oblastima, kao i drugim oblastima koje pokrivaju društvene nauke. Radovi se mogu temeljiti na kvalitativnim i kvantitativnim analizama, mogu predstavljati sinteze dosadašnjih istraživanja i ukazivati na otvorena pitanja u izdvojenim područjima društvene i ekonomske prakse. Prihvaćaju se radovi različitih nivoa istraživanja (od pojedinačnih slučajeva do manjih ili velikih uzoraka) i različitih kontekstualnih okvira (od mikro jedinica do širih društvenoekonomskih okvira). Radovi se objavljuju na engleskom, ali i bosanskom/srpskom/hrvatskom jeziku.

Časopis pruža mnoge koristi za autore poput besplatnog printanog izdanja časopisa u kojem je objavljen članak autora i popusta na učešće na naučnim i stručnim konferencijama u organizaciji uredništva časopisa. Također, određeni autori će na poklon dobiti aktuelna izdanja udruženja Multi i Visoke škole "Internacionalna poslovno-informaciona akademija" Tuzla.

Pozivamo sve zainteresovane da pošalju svoje radove za novi broj časopisa koji izlazi krajem 2025. godine.

Svako dobro,
dr. sc. Admir Čavalić
glavni i odgvoroni urednik

IZDAVAČI
Udruženje "Multi" i
Visoka škola "Internacionalna poslovno-informaciona akademija" Tuzla
Damira Hadžibeganovića 115,75.000 Tuzla, Bosna i Hercegovina
E-MAIL: udruzenjemulti@yahoo.com

Online izdanje
https://actacatallactics.ba/index.html

Acta Catallactics

Sadržaj / Contents

AI IN HIGHER EDUCATION: DEVELOPMENT OF A COMPREHENSIVE MODEL

***Anida Zahirović Suhonjić, PhD*[1]**
***Adnana Beganlić, MA*[2]**

Abstract

Artificial intelligence (AI) technology is increasingly gaining importance in various fields, as it has the potential to drive innovation, enhance efficiency and revolutionize processes. The integration of AI into higher education institutions is transforming the landscape of teaching, learning, research, and administrative functions. This paper presents a comprehensive model designed to include the diverse aspects of AI adoption within the higher education ecosystem. The model includes the following components: AI, infrastructure, ethical and legal considerations, students, teaching staff, management and administration, research and innovation and evaluation. Every component plays an important role in enabling the integration of AI technologies across different areas of higher education. Additionally, the paper outlines various activities and goals for the implementation of AI technology in higher education for different stakeholders. Implementing AI in higher education offers the potential to optimize resource allocation, improve management efficiency, advance scientific research, enhance teaching materials, personalize learning experiences, and enrich the educational journey for both students and faculty members. AI's ability to analyze vast amounts of data and support decision-making processes can greatly improve educational quality and operational efficiency in academic institutions.

***Key words**: Artificial Intelligence, Comprehensive Model, Higher Education, AI Tools, Educational Technology.*

1 Professor at International Business Information Academy Tuzla, Kulina bana 2, 75000 Tuzla, Bosnia and Herzegovina, anida@ipi-akademija.ba

2 Lecturer at International Business Information Academy Tuzla, Kulina bana 2, 75000 Tuzla, Bosnia and Herzegovina, adnana@ipi-akademija.ba

1. Introduction

Artificial intelligence (AI) seeks to replicate human intelligence in machines, enabling them to learn from past experiences and make decisions accordingly. The applications of AI are rapidly growing across diverse fields such as agriculture, industry, healthcare, and education (Hooda et al., 2022). In higher education, the use of AI has risen quickly (Chu, Tu & Yang, 2022), driven by the rapid increase in the availability of new AI tools (Crompton & Burke, 2023).

AI is increasingly transforming various aspects of higher education, offering new opportunities to enhance teaching, learning, and administration (Crompton & Burke, 2023). Its integration presents potential benefits such as personalized learning, automated grading, predictive analytics, and more efficient administrative processes. AI can also support research through the analysis of large datasets and improve accessibility for students with disabilities (Shan, 2024). However, the application of AI brings challenges, including ethical concerns (Shan, 2024), the digital divide, and the need for additional teacher training. Despite these challenges, AI has the potential to significantly improve the quality and accessibility of higher education if implemented thoughtfully and inclusively.

This paper introduces a comprehensive model designed to address the different aspects of AI adoption in higher education. The model encompasses key components such as AI technology, infrastructure, ethical and legal considerations, students, teaching staff, management and administration, research and innovation, and evaluation. Additionally, the paper outlines specific activities and objectives for implementing AI, customized for various stakeholders within the education sector.

2. AI in Higher Education

One of the most important applications of AI is in education. AI enhances face-to-face teaching and smart online learning, and it is particularly impactful in e-learning. E-learning leverages AI to enable direct and customized learning processes using dynamic learning, computer vision, ontologies, conceptual systems, computational linguistics, and deep learning (Gligorea et al., 2023).

With AI, educational institutions can provide tailored learning experiences that adapt to individual student needs, helping to bridge gaps in knowledge and skills (Bajaj & Sharma, 2018; Improvitz, 2023). AI-powered tools and platforms enable instructors to gain deeper insights into student performance, allowing more informed decisions and personalized interventions. Moreover, the automation of administrative tasks through AI can lead to increased efficiency and cost savings for institutions, freeing up resources to enhance the educational experience. AI also has the capacity to revolutionize research by using advanced data analysis techniques to uncover patterns and insights that were previously difficult to detect (Abbadia, 2023). Furthermore, AI-driven solutions can facilitate collaboration among researchers by providing tools for data sharing, analysis, and visualization.

AI offers promising solutions to ensure that higher education is inclusive for all students, including those with disabilities (Shan, 2024). Technologies such as speech-to-text, text-to-speech, and real-time translation services can make educational content more accessible and inclusive, thereby promoting equal opportunities for learning. However, it is crucial to critically assess the potential drawbacks and risks of AI, emphasizing the importance of incorporating ethical considerations into its design and deployment (Shan, 2024).

Although the implementation of AI in higher education has numerous benefits, it must be approached with caution. Ethical considerations such as data privacy, algorithmic bias, and transparency in AI decision-making are critical to address (Shuford, 2024). To fully realize the benefits of AI in higher education, it is essential to provide adequate training and support for educators, ensuring they are equipped to effectively integrate AI tools into their teaching practices. Furthermore, the role of management in the successful integration of AI cannot be understated (Crompton & Burke, 2023). Institutional leaders and administrators must be willing and acting towards creating a supportive environment that encourages the adoption of AI technologies. This involves developing strategic plans that align AI initiatives with the institution's goals and ensuring that the necessary infrastructure and resources are in place.

3. The Comprehensive AI Model for Higher Education

The proposed comprehensive AI model for higher education is presented in Figure 1. It illustrates the integration of AI within higher education, emphasizing its core components and considerations. At the center, AI is supported by infrastructure and ethical and legal considerations, which are critical for its effective implementation. Surrounding the core, four key areas are highlighted: students, teaching staff, management and administration, and research and innovation, indicating the primary stakeholders and domains impacted by AI. Each of these areas interacts with AI to enhance educational processes, administration,

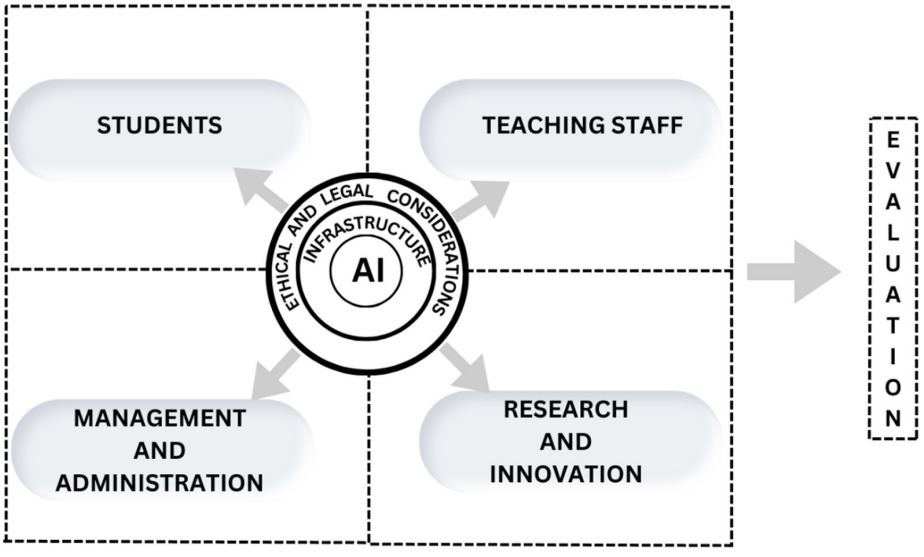


Figure 1. The Comprehensive AI Model for Higher Education

and research outcomes. Finally, the model includes an evaluation component, ensuring continuous assessment and improvement of AI applications in higher education.

The technical infrastructure for AI in higher education refers to essential components necessary to support the development, deployment, and utilization of AI technologies across academic and administrative functions. It should include powerful servers and high-performance computing systems. Institutions may also need to invest in specialized AI hardware, such as GPUs and TPUs, which are crucial for training and running AI models efficiently (Gcore, 2024). Networking infrastructure should include high-speed internet and reliable Wi-Fi. Software infrastructure is needed to ensure effective utilization of AI technology. This includes scalable cloud-based platforms for data storage and processing, enabling the handling of large datasets generated by educational activities. Additionally, sophisticated learning management systems (LMS) augmented with AI tools can personalize learning experiences and provide predictive analytics (Subbarao, 2023). Integration of AI-driven virtual assistants and chatbots within these systems enhances administrative efficiency and student support, offering real-time responses (Goyal, Minz & Sha, 2023). It is also crucial to have security measures and protocols in place to protect sensitive data and make sure everything complies with privacy regulations.

The proposed model prioritizes responsible AI use by incorporating a dedicated layer that addresses ethical and legal considerations, fostering compliance and ethical implementation in higher education. Activities regarding this part of the model include organizing workshops and seminars to educate stakeholders on ethical principles and guidelines related to AI, as well as fostering discussions on issues like algorithmic bias and privacy concerns (Shuford, 2024). There are many concerns about the implementation of AI within higher education, e.g. one of the primary concerns when it comes to students is that students might utilize AI tools to cheat or plagiarize their academic assignments and exams, as evidenced by a recent survey showing nearly one-third of university students have done so (Chen, 2023). Despite worries that AI might harm students' creativity and critical thinking, some educators view it as a chance to transform teaching and learning, even though AI can produce inaccurate and biased information (Xiao, Chen & Bao, 2023).

Institutions need to create comprehensive guidelines and policies to ensure the ethical use of AI in research, teaching, and administrative practices. These guidelines should address a wide range of issues, including data privacy, algorithmic fairness, and transparency (Shuford, 2024). They should outline clear protocols for data collection, storage, and usage, ensuring that all AI applications comply with privacy laws and protect sensitive information. By setting these comprehensive standards, institutions can promote responsible AI use, fostering trust and accountability in the integration of AI technologies in higher education.

Table 1 (Ahmad et al., 2022; Crompton & Burke, 2023; George & Wooden, 2023) provides the list of potential activities and implementation goals for management and administration.

Table 1. Activities and goals for management and administration

DOMAIN	ACTIVITIES	GOALS
Management and administration	• Data-driven decision making • AI-supported workflow automation • Implementing AI solutions for automated scheduling and logistics • Utilizing predictive analytics • Financial planning and forecasting • Implementing AI-driven academic advising and counseling • Utilizing AI chatbots for 24/7 student support • Risk management • Strategic planning and institutional advancement	• Improved operational efficiency • Enhanced decision support • Improved resource allocation • Enhanced student services • Accurate forecast of enrollment trends, student outcomes and financial projections • Improved financial planning accuracy and effiency

Activities and goals for teaching staff are presented in Table 2 (Ahmad et al., 2022; Bond et al., 2024; Crompton & Burke, 2023; George & Wooden, 2023; Seo, Tang, Roll, Fels & Yoon, 2021).

Table 2. Activities and goals for teaching staff

DOMAIN	ACTIVITIES	GOALS
Teaching staff	• Providing AI-supported tutorials and mentoring • Designing and implementing AI-enhanced curriculum • Integrating AI tools for classroom management and student engagement • Using AI tools for grading and feedback • Utilizing AI for content creation and resource recommendations • Engaging in continuous professional development	• Improve the quality and effectiveness of teaching • Enhance personalized learning experience for students • Increase efficiency in grading and providing feedback • Save time on administrative tasks to focus more and teaching and mentoring • Encourage innovative teaching practices and content delivery • Proficiency of teaching staff in using AI technologies

Table 3 outlines a list of potential activities and goals specifically aimed at implementing AI in higher education for students (Ahmad et al., 2022; Bond et al., 2024; Crompton & Burke, 2023; George & Wooden, 2023; Seo, Tang, Roll, Fels & Yoon, 2021) . These activities and goals are designed to enhance personalized learning, provide academic support, and improve overall student outcomes through the effective use of AI technologies.

Table 3. Activities and goals for students

DOMAIN	ACTIVITIES	GOALS
Students	• Engaging in personalized learning • Participating in AI-supported tutorials and mentoring • Utilizing AI tools for research • Utilizing AI tools for academic advising and planning • Receiving AI-driven career guidance • Accessing 24/7 AI chatbots for academic and administrative support	• Improve academic performance and learning outcomes • Enhance personalized educational experiences • Academic and career guidance • Increase accessibility to support services and resources • Enhance research capabilities • Improve readiness for the job market and career success

Table 4. Activities and goals for research and innovation

DOMAIN	ACTIVITIES	GOALS
Research and innovation	• Automating data collection, analysis and processing • Utilizing AI tools for literature review • Assisting in identifying and writing grant and funding opportunities • Collaboration and networking • Experimentation and simulation • Innovation hubs and incubators • AI research labs and centers	• Increase research productivity and quality • Improve funding success • Promote knowledge exchange and networking opportunities within the AI research community • Enhance experimental design, accuracy and precision • Offer programs that encourage entrepreneurship and the commercialization of AI research • Advancing AI knowledge and technologies

The list of potential activities and goals aimed at enhancing research and innovation through the implementation of AI in higher education is presented in Table 4 (Abbadia, 2024; Bond et al., 2024; George & Wooden, 2023). These activities collectively aim to increase research productivity, enhance funding success, promote knowledge exchange, improve experimental accuracy, encourage entrepreneurship, and advance AI technologies in higher education.

The evaluation component of the comprehensive AI model for higher education ensures continuous assessment and improvement of AI usage and applications. This includes establishing performance metrics, feedback mechanisms and regular ethical audits to assess the impact and effectiveness of AI tools.

4. Conclusion

The comprehensive model presented in this paper serves as a foundational framework for the integration of AI into higher education, encompassing key components such as AI technology, infrastructure, ethical considerations, and stakeholder engagement. It outlines potential activities and goals to optimize educational processes and

management efficiency, emphasizing the potential of AI in enhancing teaching, research, and administrative functions. It is important to note that while this model provides a structured approach, it has not been empirically tested in real-world educational settings. Therefore, its applicability and effectiveness may vary across institutions. Future research should focus on empirical validation and addressing potential challenges such as resource constraints and technological readiness in implementing AI solutions in higher education.

References

1. Abbadia, J. (2023). Exploring the Role of AI in Academic Research. Available at: https:// mindthegraph.com/blog/ai-in-academic-research/ (last visited: 29.06.2024.)
2. Ahmad, S. F., Alam, M. M., Rahmat, M. K., Mubarik, M. S. & Hyder, S. I. (2022). Academic and Administrative Role of Artificial Intelligence in Education. Sustainability. 14(3):1101. https:// doi.org/10.3390/ su14031101
3. Bajaj, R. & Sharma, V. (2018). Smart Education with artificial intelligence based determination of learning styles. Procedia Computer Science 132, 834-842.
4. Bond, M., Khosravi, H., De Laat, M. et al. (2024). A meta systematic review of artificial intelligence in higher education: a call for increased ethics, collaboration, and rigour. International Journal of Educational Technology in Higher Education Educ 21, 4. https://doi.org/10.1186/ s41239-023-00436-z
5. Chen, C. K. Y., (2023). A comprehensive AI policy education framework for university teaching and learning. International Journal of Educational Technology in Higher Education. 20:38 https://doi.org/10.1186/s41239-023-00408-3
6. Chu, H., Tu, Y & Yang, K., (2022). Roles and research trends of artificial intelligence in higher education: A systematic review of the top 50 most-cited articles. Australasian Journal of Educational Technology. https://doi.org/10.14742/ajet.7526
7. Crompton, H, & Burke, D., (2023). Artificial Intelligence in higher education: the state of the field, International journal of Educational Technology in higher education. https://doi. org/10.1186/ s41239-023-00392-8
8. Gcore (2024). Understanding AI as a Service (AIaaS): Exploring Its Types and Applications. Available at: https://gcore.com/learning/aiaas-types-benefits/ (last visited: 28.06.2024.)
9. George, B. & Wooden, O. (2023). Managing the Strategic Transformation of Higher Education through Artificial Intelligence. Administrative Sciences 13: 196. https://doi.org/10.3390/ admsci13090196
10. Gligorea, I., Cioca, M., Oancea, R., Gorski. A-T., Gorski, H., Tudorache, P (2023). Adaptive Learning Using Artificial Intelligence in e-Learning: A Literature Review. Education Sciences, 13(12):1216. https://doi.org/10.3390/educsci13121216
11. Goyal, P, Minz, N. K. & Sha, A. (2023). Chatbots and Virtual Assistants in Education: Enhancing Student Support and Engagement. In book: Education Unleashed: AI Era, Edition: 1, Chapter: 6. Publisher: Book Rivers.
12. Hooda, M., Rana, C., Dahiya, O., Rizwan, A., Hossain, M. S. & Kumar, V., (2022). Artificial Intelligence for Assessment and Feedback to Enhance Student Success in Higher Education. https://doi.org/10.1155/2022/5215722
13. Improvitz (2023). Bridging the Skill Gap: A Comprehensive Analysis for AI in Education. Available at: https://impactum.mx/bridging-the-skill-gap-a-comprehensive-analysis-for-ai-in-education/ (last visited: 29.06.2024.)

14. Seo, K., Tang, J., Roll, I., Fels, S. & Yook, D. (2021). The impact of artificial intelligence on learner-instructor interaction in online learning. Int J Educ Technol High Educ 18, 54 (2021). https://doi.org/10.1186/s41239-021-00292-9
15. Shan, R. (2024). The Role of AI in Enhancing Accessibility for People with Disabilities. Journal of Artificial Intelligence General Science JAIGS. 3. 125-142. 10.60087/jaigs.vol03.issue01.p142.
16. Shuford, J. (2024). Examining Ethical Aspects of AI: Addressing Bias and Equity in the Discipline. Journal of Artificial Intelligence General Science JAIGS, 3(1), 103-124.
17. Subbarao, S. (2023). Augmenting Employee Performance With an AI-Powered LMS. Available at: https://elearningindustry.com/augmenting-employee-performance-with-an-ai-powered-lms (last visited: 29.06.2024.)
18. Xiao, P, Chen, Y., Bao, W. (2023). Waiting, Banning, and Embracing: An Empirical Analysis of Adapting Policies for Generative AI in Higher Education Available at SSRN: https://ssrn. com/abstract=4458269

THE STRUCTURE OF PARTICIPANTS IN HALF-YEAR EDUCATION PROGRAMS COMPARED WITH STUDENTS IN HIGHER PROFESSIONAL PROGRAMS AT THE FACULTY OF INFORMATION STUDIES AND RELATED STUDY PROGRAMS IN SLOVENIA AND EUROPE

Nuša Erman, PhD[1]
Nika Robida[2]
Katarina Rojko, PhD[3]

Abstract

Rapid technological development changes labour market needs, requiring lifelong learning the constant upgrading of employees' skills and knowledge. One of the goals of the European Commission under the Recovery and Resilience Plan is therefore also the adaptation of the tertiary education system. As part of these efforts, pilot projects in higher education are being funded in Slovenia, offering shorter forms of education, and within Faculty of Information Studies in Novo Mesto offers half-year education programs in the fields of informatics and computer science. Since this is a new form of education, we compared the structure of participants in these half-year programs with the structure of 1st Bologna cycle professional study program students at the faculty based on enrolment data. We found that women predominate among the participants in the half-year programs, which differs from the situation in study programs, where males constitute the majority of enrolled students. Participants in the half-year programs are also, on average, significantly older than the students at the faculty. Additionally, we compared these data with data for Slovenia and Europe. It is evident that interest in education in the fields of information and communication technologies is increasing. Moreover, women's interest in this area of education is slowly growing, although this is still a male-dominated field, on which students of the younger age group mainly enrol. These findings highlight the need to adapt the education system to different groups of learners to become more responsive to labour market needs and enable greater inclusion of more heterogeneous social groups.

1 Asst. Prof. Nusa Erman, PhD, Faculty of Information Studies in Novo mesto, Slovenia, nusa.erman@fis.unm.si

2 Nika Robida, researcher, Faculty of Information Studies in Novo mesto, Slovenia, nika.robida@fis.unm.si

3 Assoc. Prof. Katarina Rojko, PhD, Faculty of Information Studies in Novo mesto, Slovenia, katarina.rojko@fis.unm.si

***Key words**: Lifelong Learning, Tertiary Education, Informatics And Computer Science, Demographic Diversity, Trends In Education.*

1. Introduction

Rapid technological development changes labour market needs, requiring constant upgrading of employees' skills and knowledge. Therefore, one of the goals of the European Commission under the Recovery and Resilience Plan (RRP) is also the adaptation of the education system, including the tertiary level. As part of these efforts, pilot projects in higher education (HE) are being funded in Slovenia at public higher education institutions, offering shorter forms of education, considered life-long education. One of these pilot projects is being implemented at the Faculty of Information Studies in Novo Mesto (FIS), where within the »Advanced Computer Skills« (ACS) project half-year education programs are offered.

The RRP pilot project ACS aims to modernize the curricula of higher education professional programs (1st Bologna cycle) with an emphasis on the green and digital transition. As part of the project, half-year education programs are conducted at FIS for two educational fields: Digitalization, Internet of Things and Industrial Automation (DITIA), which is content related to the higher education professional study program Informatics in Contemporary Society (ICS HE), and Programming and Application Development (PAD), which is related to the higher education professional study program Computer Science and Web Technologies (CSWT HE).

Since this is a new form or format (half-year) of education in the higher education system, this paper presents the findings of a comparison of data on gender and age structure among participants in the half-year education programs within RRP pilot project ACS (DITIA and PAD) and the profile of newly enrolled students in higher education programs at FIS (ICS HE and CSWT HE), as well as in Slovenia and European countries in the academic years 2022/23 and 2023/24.

Upon preliminary comparison of the data, we observed noticeable deviations. Therefore, we set a goal to examine the differences in more detail and formulated two hypotheses, which are presented in the Research Goal and Hypotheses chapter. In the following chapter of the paper, in the first part of the literature review, we examine gender inequality in education and employment. Studies highlighting the underrepresentation of women in STEM, particularly in the ICT field, are described. In the second part of the literature review, we focus on the age structure of ICT professionals and students in the EU. The Methodology chapter describes the process of data collection and the analysis for the research. In the Results chapter, we compare the demographic variables of age and gender across different forms of education at the faculty, in Slovenia and Europe. The results are presented with statistical data and graphs. In the Discussion, we interpret the results and relate them to the hypotheses. Research highlights the success of the RRP project in attracting women and the difference in gender and age structure between the participants in the half-year education programs within the RRP pilot project ACS, FIS

students, and students at the Slovenian and European levels. At the end of the paper, the conclusion presents the limitations of the research and provides final thoughts.

2. Literature Review

The gender gap in the fields of Science, Technology, Engineering, and Mathematics (STEM) has become a major concern for the research and academic communities. Recent studies indicate that women enrol in STEM studies at a lower rate compared to men and are more likely to leave their jobs. Addressing this issue requires continuous efforts from educational institutions, public entities, professionals, and families. (Lopez-Inesta, Botella, Rueda, Forte in Marzal, 2020) Gender equality in education and the labour market is a prerequisite for a sustainable society and a more efficient economy. (Krchova, Hoesova, 2021) The gender ratio in education and the workplace has changed over the past decades: women have made progress in representation, fair pay, and recognition through awards, scholarships, and publications. However, despite these overall changes, disparities in STEM fields persist. (Charlesworth, Banaji, 2019) Although great efforts have been made, and social and political measures have been promoted to create gender equality in STEM, inequalities towards women are still evident in both higher education and industry. (Parmaxi et al., 2024)

Women in industry and higher education face challenges in STEM fields, such as pay disparities, sexism, sexual harassment, bias, stereotypes, discrimination, the need to constantly prove themselves, exclusion from decision-making, difficulties in balancing work and private life, and a lack of women in leadership positions; and they usually have to work harder to achieve the same recognition as men. (Parmaxi et al., 2024) The lower number of women in the ICT field leads to low expectations regarding the inclusion of girls in ICT. (Corneliussen et al., 2021) Research has shown that the lack of gender balance in male-dominated environments creates several challenges for women, including feeling "out of place" and difficulties regarding their sense of belonging. (Riegle-Crumb, Morton, 2017) Additionally, it is concerning that the proportion of women earning degrees in computer science in Europe is decreasing. This indicates that efforts and interventions to attract, recruit, and retain girls and women in ICT and STEM are either not succeeding or need to be strengthened. (Kamberidou, Pascall, 2020) Even more concerning is the trend that shows that as the number of women in ICT education increases, the number of men in ICT increases even more, leading to an even wider gender gap in ICT. (Simonsen, Corneliussen, 2020)

Proposals and recommendations to overcome gender equality challenges recommend raising awareness of gender inequality through public events and promotions, empowering and supporting women to participate and stay active in all STEM fields, and recognizing women's achievements and presenting them as role models for young women to engage and remain active despite the many challenges and barriers.

Suggestions and recommendations for overcoming gender equality challenges include raising awareness about gender inequality through public events and promotions,

empowering and supporting women to participate and remain active in all STEM fields, and recognizing women's achievements and presenting them as role models to young women to engage and stay active despite the numerous challenges and obstacles. (Parmaxi et al., 2024)

It is important to increase diversity in STEM education by incorporating the gender dimension, as gender stereotypes and social biases begin in early childhood. (Kamberidou & Pascall, 2020) Digital transformation can contribute to greater equality between women and men, as the internet, digital platforms, and digital financial services enhance employment opportunities and access to knowledge and general information. (OECD, 2018)

Regarding age, the latest available data show that in 2022, slightly more than two-thirds (67.8% or 2.018.700 out of a total of 2.975.400) of employed people in the EU with an ICT education were aged 15 to 34 years, and additionally, young people in this age group accounted for the majority of employed people with an ICT education in all the EU Member States; the highest proportions were recorded in Slovakia (84%) and Romania (82%). (Eurostat, 2022)

Between 2016 and 2022, the number of young employed people (aged 15-34 years) with an ICT education in the EU increased by just over 4% on average per year, while the corresponding increase for people aged 35-74 years was just under 4% per year. During this period, the total number of employed people aged 15-34 years with an ICT education increased by approximately 450.000, while the number of people aged 35-74 years increased only by slightly less than 200.000. As a result, the share of young people aged 15-34 years in the total number of employed people with an ICT education in the EU increased by just under 1 percentage point between 2016 and 2022. At the level of individual countries, the highest rates of young ICT-educated people were observed in Ireland (with an average of 22% per year), followed by Luxembourg and Slovenia. In most EU countries (19), both age groups progressed in synchronicity. (Eurostat, 2022)

3. Research goal and hypotheses

The goal we set for this research is to identify the discrepancies between the demographic structure of participants in the half-year education programs within the RRP pilot project ACS, which are part of the so-called lifelong learning, and traditional higher education study programs. In this context, we formulated the following two hypotheses:

H1: Similar to Slovenia and Europe, where men predominantly enrol in higher education study programs in the ICT field, men also predominantly enrol in the half-year education programs within the RRP pilot project »Advanced Computer Skills« and in the higher education study programs at the Faculty of Information Studies in Novo Mesto.

The reasons for formulating this hypothesis are based on the past and current situation in the ICT sector. According to Eurostat (2024), in 2022, men accounted for 84% of the 3 million people in the EU, who were employed and had an ICT education, while women accounted for the remaining 16% of those employed with ICT education. This gender gap was present in all EU Member States in 2022, with Slovenia recording the highest share (93%) of men in the total number of employed people with an ICT education. In most of the other EU Member States, this share ranged between approximately 70% and 90%. (Eurostat, 2022)

Although women in the EU have, on average, a higher level of education than men, only a fraction of women's potential is being used in STEM professions, especially in ICT (European Commission, 2017). As a result of a series of policy initiatives taken across the EU to promote the study in the ICT field among women, statistics reveal, that the number of employed women with an ICT degree increased between 2016 and 2022, rising by an average of just under 4% per year, while the number of employed men with a degree in ICT field increased by an average of just over 4% per year. (Eurostat, 2022)

H2: Participants enrolled in the half-year education programs within the RRP pilot »Advanced Computer Skills« project are, on average, significantly older than newly enrolled students in higher education study programs at the Faculty of Information Studies in Novo mesto and on general in higher education study programs in the ICT field in Slovenia.

The reasons for formulating this hypothesis stem from the very nature of the educational and study programs themselves. Education programs, such as those within the RRP pilot project ACS, are part of lifelong learning. They therefore attract individuals who already have work experience and wish to upgrade their skills in specific areas, or who already have a degree in higher education. Compared to traditional higher education study programs, this can include older participants, who may seek retraining or career advancement. Meanwhile, higher education study programs are aimed at attracting younger adults who have recently completed secondary education. As presented in the Literature Review, in 2022, slightly more than two out of every three (68%) employed people with an education in ICT in the EU were aged 15-34 years. Moreover, young people in this age group represented the majority of employed persons with an ICT education in all EU Member States. (Eurostat, 2022)

4. Methodology

The data for this research were obtained from the enrolment information for both, participants enrolled in the half-year education programs within the RRP pilot project ACS and newly enrolled students in higher education study programs at FIS. To calculate the age of the participants and students, we followed specific guidelines regarding the reference date. The age information for participants in the half-year education programs within the RRP pilot project ACS in 2023 and 2024 is based on the reference date of October 1, 2022, and October 1, 2023, respectively. The age of FIS students for the academic year

2022/23 is determined by using the reference date of September 1, 2022, and the age of students for the academic year 2023/24 is determined by using the reference date of September 1, 2023.

Data on students in higher education study programs in Slovenia are available on the website of the Statistical Office of the Republic of Slovenia (SORS). The unit described by the published data is a student enrolled in a publicly recognized study program at a higher education institution in a given (observed) academic year. We analysed the data on newly enrolled students in higher education professional institutions in the field of information and communication technologies (ICT). Due to data protection regulations, some data are withheld. Nevertheless, we analysed data for 499 out of 509 students available for the academic year 2023/24 (98% of the total data) and for 495 out of 511 students for the academic year 2022/23 (97% of the total data). This means that only a small proportion of data is missing, which does not significantly affect the integrity of the analysis and research.

In analyses based on the age data of students enrolling in higher vocational institutions in the ICT field, we followed the methodology of official institutions (e.g., Eurostat) and used the age range of 15-19 years as the initial age group, even though individuals in the Slovenian educational system typically enrol in higher education at the age of 19. We adopted the 15-19 age range to maintain consistent age group widths (5 years), which allows more consistent data categorization. There is also a limitation of SORS data for Slovenia, that the official age data defines the highest age group as 40+ years, but since there have been only 5 students in this age group over the last 2 years, this does not affect the credibility of the research results.

For analysis of the demographic structure of participants in half-year education programs within the RRP pilot project ACS and students at FIS, we first pre-processed the data using Python, and after that, Microsoft Excel was used for effective comparison and identification of differences between participants and students. For additional comparison and analysis, also some other calculations were included, such as the average age of participants and students, the Compound Annual Growth Rate (CAGR), and the Average Annual Growth Rate (AAGR) of the number of students in Slovenia.

5. Results

Related to H1, we first examined the gender structure among newly enrolled undergraduate or equivalent professional education students in the ICT field between Slovenia and Europe. According to Eurostat (2022), a total of 18.711 students enrolled for the first time in ICT programs at the undergraduate or equivalent professional education level in European countries[4] in 2022. These data indicate a predominance of male students (86%).

4 Research included the following European countries: the Netherlands, Belgium, Poland, Germany, Slovenia, Switzerland, Lithuania, Croatia, Luxembourg, Bulgaria, Serbia, Malta, North Macedonia, Denmark, Greece and Latvia

We conducted a similar analysis for Slovenia, where a total of 490 students enrolled in higher professional study programs in the field of ICT in 2022. (SORS, 2024) Out of these, 87% were men. The percentage of male students in Slovenia was therefore even slightly higher compared to Europe in 2022. In 2023, 509 students enrolled in higher professional ICT study programs, of which 84% were men, which is a lower percentage of men compared to the latest data at the European level.

The long-term data for Slovenia (SORS, 2024) in Figure 1 show an increase in the number of students in the ICT field from the academic year 2017/18 to 2022/33. with a slight decrease noted in the last year. The largest increase in the number of newly enrolled students occurred In 2021/22, with nearly 100 more students compared to the previous academic year. The total number of students increased from 356 in 2017/18 to 509 in 2023/24. During the observed period, the proportion of women also grew. In 2017/18, the proportion of women was 6%, which increased to 16% by 2023/24. The increase in the number of women among newly enrolled students is most pronounced between the academic years 2020/21 and 2021/22, when the proportion increased by 4 percentage points.

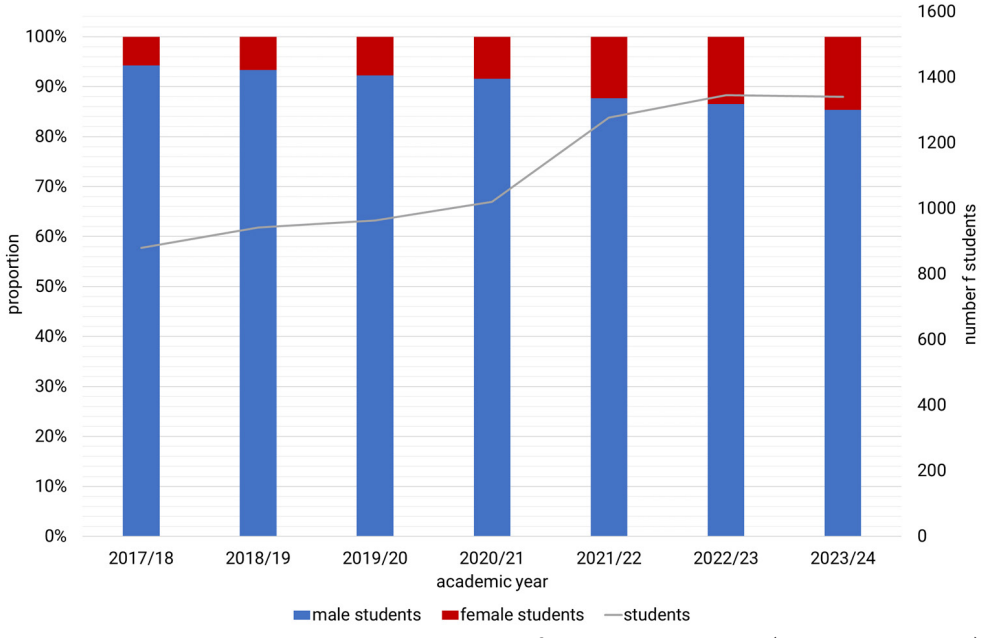


Figure 1. Newly enrolled students in higher professional education (1st Bologna level) in the ICT field by gender, Slovenia, annually (source: SORS, 2024)

The compound annual growth rate (CAGR) for men is 6%, indicating stable and moderate growth over the analysed period. The average annual growth rate (AAGR) is slightly higher, but still 6%, implying constant growth without major fluctuations.

For women, the growth rates are notably higher. The CAGR is 25%, indicating a relatively rapid growth in the number of women in these programs. The AAGR is even slightly higher, at 27%, implying that in some years there have been significant jumps in the number of women enrolled. These values clearly show that the efforts to encourage more women to enrol in technical study programs have been successful. While the growth for men is stable, the growth for women has been more rapid, indicating important shifts

in the demographic structure of students in these higher professional education study programs.

In the continuation, we focused on the comparison of the gender structure of the enrolled participants in the half-year education programs within the RRP pilot project ACS and the newly enrolled students in higher education study programs at FIS in the academic years 2022/23 and 2023/24.

The data in Figure 2 show that women predominate among the participants in the half-year education programs within the RRP pilot project ACS. In both years, 2023 and 2024, they represent approximately 60% of all participants. The educational field DITIA has a slightly higher proportion of men in both years, while in the PAD educational field, women dominate with approximately 75%.

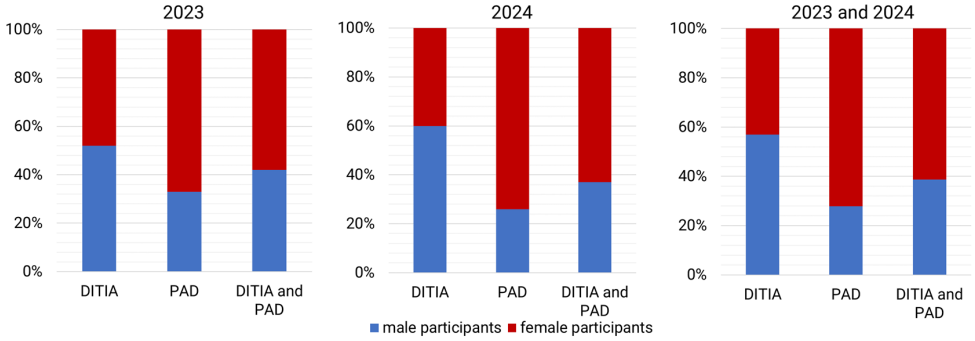


Figure 2. Gender structure of participants in the half-year education programs within the RRP pilot project ACS

On the other hand, Figure 3 shows that the proportion of women in higher education study programs at FIS is considerably lower, around 20%. Despite a slight increase between the academic years 2022/23 and 2023/24, men still constitute the majority of students.

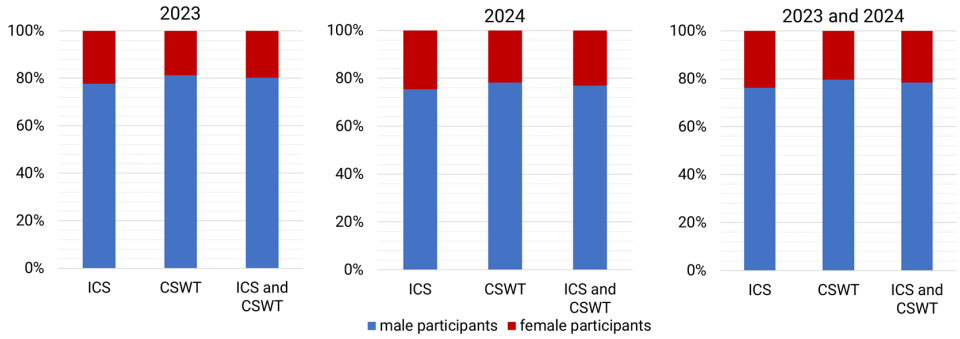


Figure 3. Gender structure of newly enrolled students in higher professional education programs at FIS

Figure 4 shows a slight increase in the proportion of women between 2023 and 2024 in both, within the RRP pilot project ACS and FIS. The situation within the RRP pilot project ACS stands out due to the exceptionally high proportion of women compared to general data for the ICT field. On the other hand, the proportion of women in higher education

study programs at FIS is considerably lower and more consistent with the situation in Slovenia and European countries, but with a slightly higher share of women. Despite the slight increase in the proportion of women between 2023 and 2024, men still represent the majority of students.

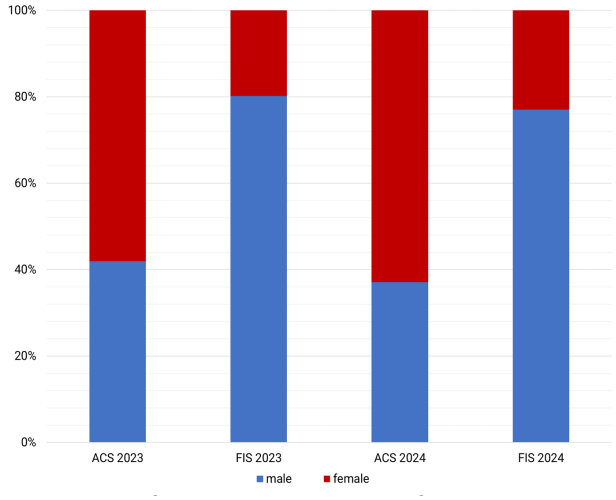


Figure 4. Gender structure of participants in the half-year education programs within the RRP pilot project ACS and of newly enrolled students in higher professional education programs at FIS, 2023 and 2024

Based on the collected data, it is clear, that hypothesis HI about the majority of men among the participants in the half-year education programs within the RRP pilot project ACS and newly enrolled students in higher education study programs at FIS, in Slovenia and Europe, is only partially confirmed. The RRP pilot project ACS stands out for its high proportion of women participants. This reveals the success of the project in attracting women to the field of advanced computing skills and can serve as an example of good practice for promoting gender equality in these professional programs.

Related to H2, we then examined the age structure of the enrolled participants in the half-year education within the RRP pilot project ACS, newly enrolled students in higher education study programs at FlS and in Slovenia in the academic years 2022/23 and 2023/24.

As shown in Figure 5, none of the participants in the half-year educational field DITIA were under 20 years old. This is in complete contrast to the higher education study programs, which have the highest proportion of students in the 15-19 and 20-24 age groups (Figure 7). The largest number of participants is in the 35-39 age group. The 25-29, 35-39, and 45-49 age groups have a slightly higher predominance of men, while the 30-34 and 50-54 age groups show a higher predominance of women.

The age pyramid for participants in the half-year educational field PAD (Figure 6) for 2023 shows a slightly higher proportion of participants in the 30-34 and 35-39 age groups, especially among women. The 20-24 and 25-29 age groups also have a considerable share, with a higher percentage of males in the 25-29 age group. In 2024, there is a clear female predominance in almost all age groups. The highest proportions of women are in the 30-

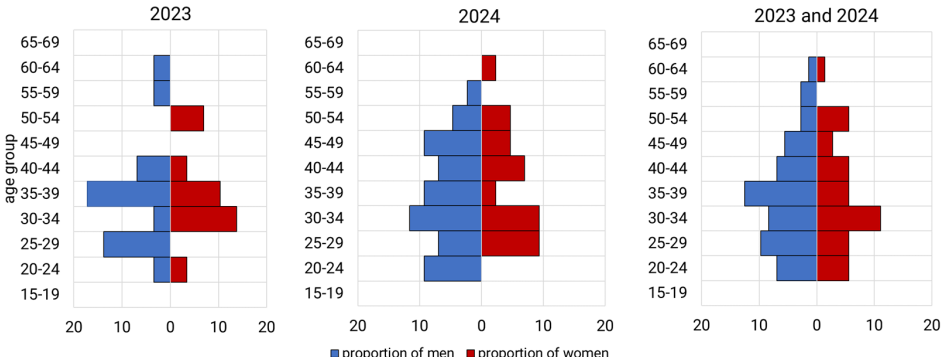


Figure 5. Age structure of participants in the educational field DITIA within the RRP pilot project ACS

34 and 35-39 age groups. The 25-29 age group has a higher share compared to 2023, with more female participants than male. Younger age groups (15-19 and 20-24) and older age groups (55-59 and over) show a lower share of the population compared to the middle age groups. The graphs therefore show the predominance of the middle age group (especially 30-39 years) in the population structure for both years. Certain age groups exhibit gender imbalance, with women generally having a higher share in the middle age groups.

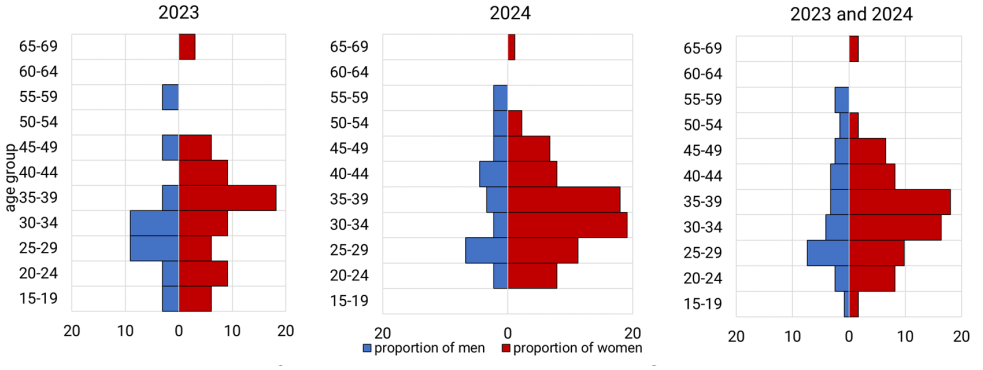


Figure 6. Age structure of participants in the educational field PAD within the RRP pilot project ACS

The graphs in Figure 7 show that the largest share of newly enrolled students is in the 15-19 and 20-24 age groups, with men being much more represented in both years. The 25-29 age group has a somewhat more balanced proportion between men and women.

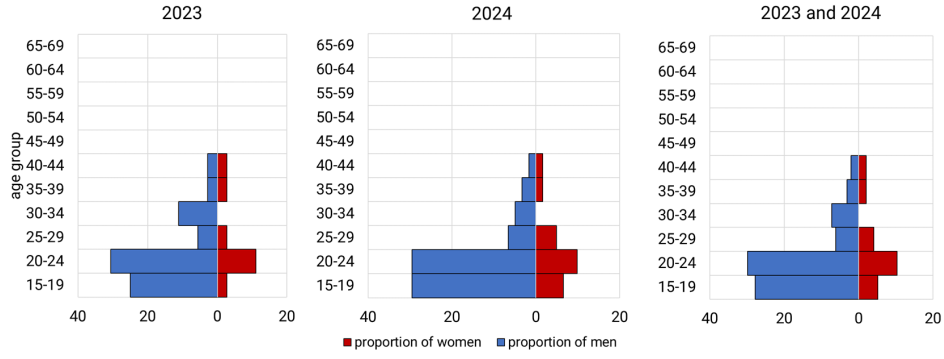


Figure 7. Age structure of students in the higher professional education study program ICS HE at FIS

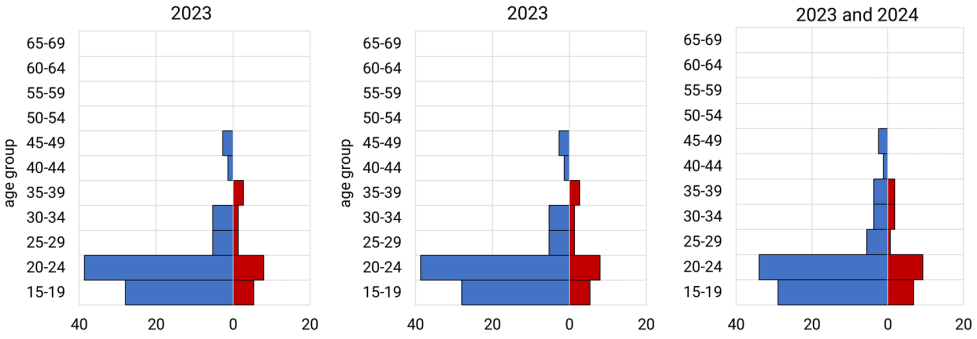


Figure 8 Age structure of students in the higher professional education study program CSWT HE at FIS

When comparing the age pyramids for the RRP pilot project ACS and the age pyramids of newly enrolled students in study programs at FIS, two distinct features can be observed. The first is the evident predominance of men in the student population. The second feature is the majority of students in the 15-19 and 20-24 age groups, which proves, that most students enrol in study programs at FIS directly from high school and/or are in their early twenties. These data are similar to those at the Slovenian level (Figure 10).

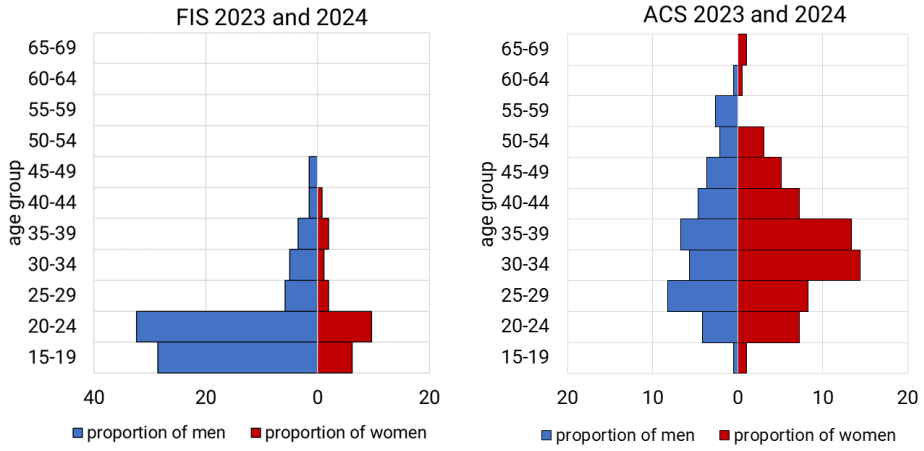


Figure 9. Age structure of newly enrolled students in the higher professional education programs at FIS and of participants in education programs within the RRP pilot project ACS

The largest proportion of students at FIS is in the 15-19 and 20-24 age groups, which reflects young population. Here again, a gender difference is obvious with a large proportion of male students. This trend continues into the higher age groups, where a larger share of the student population is male. Women are less represented in all age groups. A slightly higher proportion of women is observed in the 20-24 age group. It is important to note that individuals, who have recently completed secondary education, typically enrol in higher education programs; usually at the age of 18 or 19. This case is known as continuous further education.

The graph for the RRP pilot project ACS shows data with significant differences compared to the one for FIS. The majority of participants in the RRP pilot project ACS belong in the range of 25 to 40 years, indicating a somewhat older student population

compared to FIS and also a greater age diversity among participants. The RRP pilot project ACS has a more even gender distribution, with more women in the 30-34 and 35-39 age groups. In contrast, the FIS program has a distinctly more male population, with the highest concentration in the 2024 age group, whereas in the RRP pilot project ACS education programs women predominate. The main finding is that higher professional study programs at FIS primarily attract younger male students, whereas the RRP pilot project ACS attracts a more diverse and somewhat older population of participants.

In the graphs in Figure 10, which depict the gender ratio at the Slovenian level and for FIS (Figure 8), a similar pattern in the proportion of men and women across different age groups is evident. In addition to these similarities, the differences are apparent for the ACS project, as the age structure is quite different (Figure 7), more dispersed and denser around an average age of 36 years.

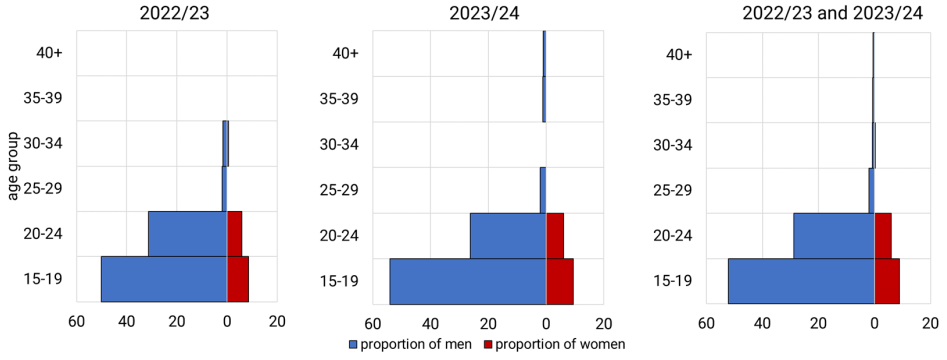


Figure 10. Age structure of newly enrolled students in higher professional study programs in the ICT field for the academic years 2022/23 and 2023/24, Slovenia (source: SORS, 2024)

Figure 11 shows that the average age of students at FIS for the academic years 2022/23 and 2023/24 does not differ much and is slightly above 23 years. The same is true for Slovenia, but the average age is much lower than for FIS, slightly above 20 years. The average age of newly enrolled students in higher education programs in the ICT field in Slovenia is the lowest among all the groups analysed, at 20.3 years. This indicates a relatively young student population and where the average age of newly enrolled students suggests a direct transition from secondary to tertiary education. The average age of participants in the RRP pilot project ACS is significantly higher than that of the FIS and at the Slovenian level, at 35.6 years. We can conclude that the RRP pilot project ACS attracts older students, whereas newly enrolled students at FIS and in ICT study programs in Slovenia are considerably younger. This confirms hypothesis H2.

Since data for newly enrolled students in higher education programs in the ICT field programs in Europe are not freely available, we could only compare data for all new entrants and those findings are presented below. We still conducted the comparison to identify age differences across European countries. Based on data for Slovenia (Figure 10), where there is a clear predominance of the 15-19 and 20-24 age groups, the figure below shows data for these two age groups.

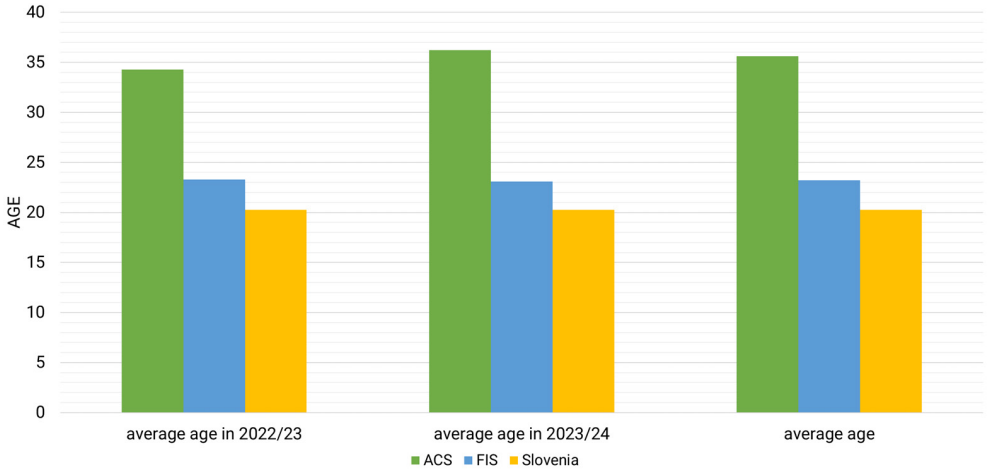


Figure 11. Average age of participants in the RRP pilot project ACS, newly enrolled students in higher education programs at FIS and newly enrolled students in higher education programs in the ICT field in Slovenia (source: SURS, 2024)

Following Figure 12, Slovenia (48%) for the 15-19 age group is above the European average (42%), which is calculated from the countries listed in Figure 12. Similarly, for the 20-24 age group, Slovenia (37%) is also above the average (34%) for those countries. This shows that a higher proportion of students in Slovenia enrol immediately after completing high school.

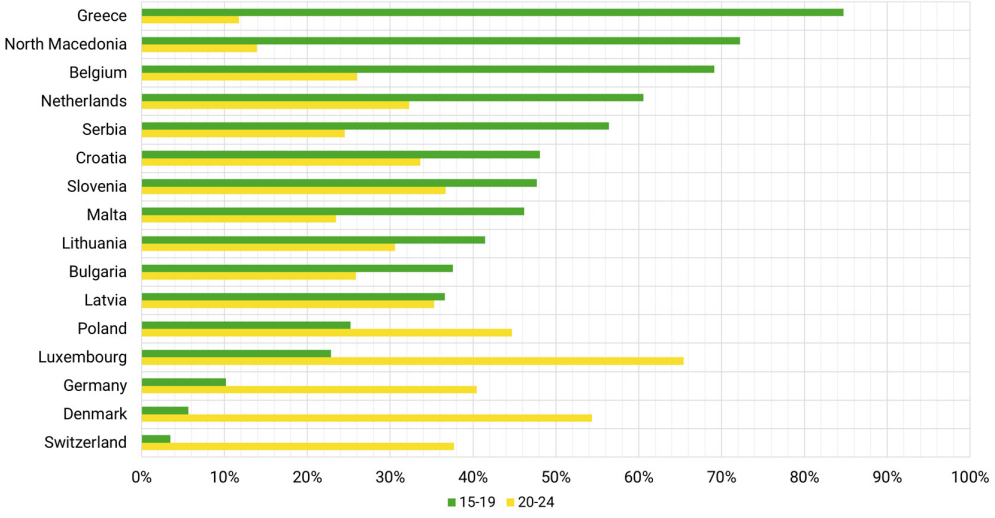


Figure 12. Percentage of newly enrolled students in undergraduate or equivalent professional programs in the age groups 15-19 and 20-24, 2022 (source: Eurostat, 2024)

6. Discussion

Based on the collected information, the first hypothesis (H1: Similar to Slovenia and Europe, where men predominantly enrol in higher education study programs in the ICT field, men also predominantly enrol in the half-year education programs within the RRP pilot project "Advanced Computer Skills" and in the higher education study programs at the Faculty of Information Studies in Novo Mesto.) is only partially confirmed.

The data for the RRP pilot project ACS does not support the H1 hypothesis, but instead, it shows that women constitute the majority of participants in the education programs, contrary to the assumption that men would dominate. Specifically, in 2023 and 2024, women represent approximately 60% of all participants in the education programs within the RRP pilot project ACS. This demonstrates the success of the RRP pilot project ACS in attracting women to the field of advanced computing skills, serving as an example of good practice for promoting gender equality in these professional education programs.

On the other hand, H1 is confirmed by the data for higher education study programs at FIS. In the academic years 2022/23 and 2023/24, men constituted the majority of students, although the proportion of women was slightly higher than at the European level. In 2022/23, women made up 20% of the student population at FIS, increasing to 23% in 2023/24. Nevertheless, men still represent 77% of the student population.

The data for Europe and Slovenia in 2022 show an even more pronounced predominance of male students in the ICT study programs. In Europe, men represent 86% of all enrolled students, while in Slovenia, they represent 87%. This indicates that the gender structure of students at FIS is somewhat more balanced than in the broader European context, but still with a significantly higher representation of men.

However, our research does not confirm the "worrying trend" identified by Simonsen & Corneliussen (2020), which states that as the number of women in ICT education increases, the number of men in ICT increases even more, thereby widening the gender gap. Data for Slovenia reveal that over the past 7 years, the CAGR of male students enrolled in ICT programs is 6%, while for women, it is as high as 25%.

The second hypothesis (H2: Participants enrolled in the half-year education programs within the RRP pilot project "Advanced Computer Skills" are, on average, significantly older than students enrolled for the first time in higher education study programs at the Faculty of Information Studies in Novo mesto and on general in higher education study programs in the field of ICT in Slovenia.) is confirmed. The analysis of the age structure of the participants in the RRP pilot project ACS and the newly enrolled students at the FIS shows distinct age differences between these two groups. The average age of participants in the RRP pilot project ACS is significantly higher than the average age of newly enrolled students at FIS. The average age of the RRP pilot project ACS participants is 35.6 years, with the highest proportion of participants in the 30-39 age group. On the other hand, the average age of newly enrolled students at FIS is slightly over 23 years, while in Slovenia, it is slightly over 20 years, indicating a younger population that transitions much more directly from secondary to tertiary education. Lastly, the comparison of enrolments in all higher education programs in Slovenia with other European countries also showed that Slovenia has a more pronounced direct transition from secondary to tertiary education compared to the average for European countries.

7. Conclusion

We have encountered several limitations in our research and data analysis. Data for participants in the half-year education programs within the RRP pilot project ACS are only available for two years since the project has only been running for two years, which limits the possibility of analysing trends over a longer period. In the research and interpretation of the results for Slovenia (SORS data), it is also important to mention that ICT study programs encompass a broader spectrum than just informatics and computer science, which is covered by the higher professional education programs at FIS. Although computer science and informatics predominate, ICT study programs also include data from fields such as telecommunications and digital media. Moreover, even though Eurostat data did not provide data for all European countries, significant deviations in the comparison could still be identified.

Despite the mentioned limitations, the data analysis provides current and interesting insight into the present state of higher education in the ICT field and allows the identification of differences and key changes in recent years. Our research also shows that the RRP pilot project ACS has managed to attract a larger number of women to its half-year educational programs, which is in contrast to the proportion in higher education study programs at FIS, and as regards ICT study fields also in Slovenia and Europe. Furthermore, we observed that there are distinct age differences, with the participants in the education programs within the RRP pilot project ACS being on average significantly older.

These findings confirm that policies, that aim to attract more women to the ICT field and emphasize lifelong learning, are indeed effective. In addition, they highlight the need to adapt the traditional education system to different groups of students to become more responsive to labour market needs and allow greater inclusion of more heterogeneous social groups.

Acknowledgements

The research presented in this paper is a part of the research activity of the RRP pilot project »Applied Computer Skills« financed by the Slovenian Ministry of Higher Education, Science and Innovation, and the European Union −Next GenerationEU.

References

1. Charlesworth, T., Banaji, M. (2019). Gender in Science, Technology, Engineering, and Mathematics: Issues, Causes, Solutions. The Journal of Neuroscience, 39(37), 7228-7243.
2. Corneliussen, H., Seddighi, G., Urbaniak-Brekke, A. M., Simonsen, M. (2021). Factors Motivating Women to Study Technology: A quantitative survey among young women in Norway. Proceedings for the International Conference ICT, Society, and Human Beings 2021, IADIS Press, 202-206.
3. European Commission (2017). Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee — EU action plan 2017-2019-Tackling

the gender pay gap, COM (2017). https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52017DC0252&from=EN (21.6.2024).

4. Eurostat (2022). ICT education a statistical overview. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=ICT_education_-_a_statistical_overview (21.6.2024).
5. Eurostat (2024). New entrants by education level, programme orientation, sex and field of education. https://ec.europa.eu/eurostat/databrowser/view/educ_uoe_ent02/default/table?lang=en&category=educ.educ_part.educ_uoe_ent (17.5.2024).
6. FIS (2023). POLLETNA IZOBRAZEVANJA Brezplacni polletni izobrazevalni programi v sklopu projekta NOO piloti »NAPREDNEJSA RACUNALNISKA ZNANJA« 2023, 2024, 2025. https://www.fis.unm.si/studijski-programi/polletna-izobrazevanja/ (17.5.2024)
7. Kamberidou, I., Pascall, N. (2020). The Digital Skills Crisis: Engendering Technology-Empowering Women In Cyberspace. European Journal of Social Sciences Studies, 4(6), 1-33.
8. Krchová, H. & Hoesová, K. S. (2021). Selected determinants of digital transformation and their influence on the number of women in the ICT sector. Journal of Entrepreneurship and Sustainability Issues, 8(4), 524-535.
9. López-Iñesta, E., Botella, C., Rueda, S., Forte, A., Marzal, P. (2020). Towards Breaking the Gender Gap in Science, Technology, Engineering and Mathematics. IEEE Revista Iberoamericana de Tecnologias del Aprendizaje, 15(3), 233-241.
10. Parmaxi, A., Christou, E., Fernández Valdés, J., Hevia, D. Perifanou, M., Economides, A.,
11. Mazaj, J., Manchenko, M. (2024). Gender equality in science, technology, engineering, and mathematics: industrial vis-a-vis academic perspective. Discover Education, 3(3).
12. OECD (2018). Bridging the digital gender divide. Paris: OECD. http://www.oecd.org/internet/ bridging-the-digital-gender-divide.pdf (21.6.2024).
13. Riegle-Crumb, C., Morton, K. (2017). Gendered Expectations: Examining How Peers Shape Female Students' Intent to Pursue STEM Fields. Front. Psychol. 8:329.
14. Simonsen, M., Corneliussen, H.G. (2020). What Can Statistics Tell About the Gender Gap in ICT? Tracing Men and Women's Participation in the ICT Sector Through Numbers. Human-Centric Computing in a Data-Driven Society. HCC 2020. IFIP Advances in Information and Communication Technology, vol. 590.
15. SORS (2024). Studenti visokošolskega dodiplomskega izobraževanja in enovitega magistrskega študija 2. stopnje, ki se prvič vpisujejo na visokošolske zavode, po načinu študija, spolu, starosti in vrsti izobraževanja, Slovenija, letno. https://pxweb.stat.si/SiStatData/pxweb/sl/Data/-/0955206S.px (17.5.2024).

ANALYSIS OF STUDENT'S ENTREPRENEURIAL INTENTIONS IN BOSNIA AND HERZEGOVINA

Ahmed Seferović[1]
Irfan Đedović[2]
Dino Arnaut[3]
Malcolm Duerod[4]

Abstract

Entrepreneurship has a deep impact on several components which can affect one another. This paper is going to pay attention to the entrepreneurial intention as dependent variable. The other variables in this cycle are access to finance (A2F), entrepreneurial education (EE), personal attitudes (PA), social norms (SN), perceived behavioural control (PBC). Following the association between A2F and El, we will see the impact of entrepreneurial education (EE). Influence on education can correlate with the intention of young entrepreneurs. Also, this paper mentions key elements that affect individuals in their decisions to become entrepreneurs. Moreover, personal attitudes (PA) will be investigated as part of the cycle. Attitudes play an important part in decision-making for youths. In addition, attitudes relate to social norms (SN) which together have the supremacy to change people's behaviour, and approach in life. Their attitudes could lead to potential positive or negative opinions about entrepreneurship. The paper gives attention to the perceived behavioural control (PBC) which is a piece of the puzzle in this cycle. The research covers students from several universities in Bosnia and Herzegovina and their responses on this topic through structured questionnaire. Research follows literature of the similar titles and its results and evaluation impact opportunities and possibilities that could be achieved in Bosnia and Herzegovina. Institutions in Bosnia and Herzegovina need to recreate policies and simpler conditions for the future of entrepreneurship in order to increase entrepreneurial intention among students.

Key words*: Entrepreneurship, Entrepreneurial Intention, Access to Finance, Entrepreneurial Education, Personal Attitudes, Social Norms, Perceived Behavioural Control.*

1 BA of History, Student of Management, International Burch University, Francuske Revolucije bb, Sarajevo, ahmo.seferovic@gmail.com

2 Assist. Prof. Dr., International Burch University, Francuske Revoolucije bb, Sarajevo, irfan.djedovic@ibu.edu.ba

3 Assoc. Prof. Dr., University of Zenica, Fakultetska 3, Zenica, arnaut.dino@gmail.com

4 Assist. Prof. Dr., International Burch University, Francuske Revolucije bb, Sarajevo, malcolm.duerod@ibu.edu.ba

1. Introduction

Many fields of economy had their part in explaining the field of entrepreneurship. Going into generalization, Jablanka and Stawska introduced entrepreneurship as a phenomenon which covers multi-faces of research with countless academic fields (Malgorzata & Stawska, 2020). As the government start to influence privatization for individual businesses, the cultural environment affects different people in different ways. In many countries, entrepreneurship is part of economic growth. Going through general knowledge, theories, and the importance of finance, the main problem that we face today is the low presence of entrepreneurship in other economies in the world. As some countries recognise entrepreneurial activity as a benefit, others are still in the process of implementing it. The Balkans are one of them. The government should be a big support at the beginning of entrepreneurial development. Failing to step in the early stages of any business can lead to less interest in engaging in this sector of the economy. As Cassar (2004) said at the beginning of any activity important critical part is finances which affect the endurance of a business (Umihanic, Donlagic, & Piplica, 2016). According to Learner (2009) the government has a positive role in starting an entrepreneurship business.

The development of entrepreneurship was recognized in the European Union. The market will grow with labour, and entrepreneurship is a boost to it. Influence through the educational process has positive outcomes. In addition, to create more new jobs in society European Education Policy (EEP) actively impacts the factors which will make entrepreneurship attractive to young people and their careers (Bico Car, Sestic, Softic, & Stupar, 2019). However, the situation of entrepreneurs in Bosnia and Herzegovina is still in progress to achieve a satisfactory level. The concept of entrepreneurial intention was explained as a conscious awareness of the entrepreneur and conviction by an individual that they intend to set up a new business venture and plan to do so in the future. A person has attention on his special goal which he wants to achieve creating his own idea and executing it (Urban & Ratsimanetrimanana, 2019). On top of that, Ajzen's theory about intention is one of the most popular for the entrepreneurial sector. His definition of entrepreneurial intention was connected with personal attitudes and social norms. The theory explains that behaviour has an impact on intention and behaviour is a general ability which can influence different situations and decisions (Ajzen, 1985).

Every business has to have a planning process which includes finance, behaviour, level of education, and attitudes. However, everything is at some point a risk. Access to finance in many ways brings the problem to the front door of an entrepreneur. Even if finances can be internal (our own money, family, friends) and external (investors, loans, potential clients, partners), it has its pros and cons. Financial resources are the key segment of entrepreneurial intention. However, the government can influence the level of interest. Policies can provide support or block for an individual who has an intention to start or create a business. In this research it will be covered how access to finance affects students in Bosnia and Herzegovina, and what is the impact of entrepreneurship in this country.

Following the literature, many authors interpret that entrepreneurial education affects intention and its impact on finances. Regarding education, new studies show

us that Universities are the modern way to improve the skills and awareness for entrepreneurship (Ahmed, Chandran, & Klobas, 2017). Young people who have basic experience and training in entrepreneurial intention should be a real investment. The government or universities should focus on impacting students with many programs related to educational entrepreneurship. Different regions and countries have their impact on social norms and entrepreneurship is one of them. In this paper, we are going to evaluate student perception and the influence of social norms on intention in Bosnia and Herzegovina. However, experience and awareness could bring a whole new recognition of entrepreneurial intention. Through time society adapts to new approaches and new ways of business cycle. Therefore, social norms can be influenced to change their opinion about any kind of new process in the community.

Regarding politics or poor economic position in the country students could see entrepreneurship as hard and difficult to achieve. The effect of society and, the attitudes of others could bring their feelings positively or negatively. Also, we have to consider self-efficacy and abilities to maintain behaviour toward entrepreneurship. Self-efficacy is the belief to perform engagement in business with abilities to control their outcome (Svotwa, Jaiyeoba, Roberts-Lombard, & Makanyeza, 2022). Also, access to finance connected with attitudes will contain abilities and self-efficacy as a common chain leading to entrepreneurial intention. The next figure introduces their significance through research that was proven (Svotwa, Jaiyeoba, Roberts-Lombard, & Makanyeza, 2022). Perceived behaviour control affects students in their will to become an entrepreneur based on other influences such as access to finance, education or social norms. They can directly cause a behavioural attitude toward entrepreneurial intention. A positive attitude toward entrepreneurship will impact a person's behavioural control. Access to finance has a positive relationship with perceived behaviour control. It can happen when a person gets information and all the necessary data about his project, so he can evaluate his chances and progress (Urban & Ratsimanetrimanana, 2019). The main key to success in these circumstances is the possibility to have an educational background. Education has a positive relationship with perceived behavioural control. Knowing how to respond in a decision-making position is a key element of controlling the situation. In addition, it can help a person to control their behaviour and intuition.

The main goal of this study is to evaluate students' opinions about the possibilities and opportunities that entrepreneurship demands. Visual variables and graphic tables will be presented through this research. Certain demographic variables will be a part of comparing results between different groups of students, different faculties, and different departments. Also, we are going to see many conditions about entrepreneurship that exist or are in the process of achieving a satisfied level.

2. Literature review

Entrepreneurship is a modern activity in the world of business. People use their opportunity to gain a profit Shane and Venkataraman (2000) spoke about entrepreneurship as the identification, evaluation, and exploitation of opportunities (Tur & Soriano, 2018). To

contribute to the factors that affect intention we have to consider political, economic, and social influences on entrepreneurs. Their motivation is driven by controlling behaviour, attitude toward entrepreneurship, and perception of the norms that society performs (Ajzen, 1991).

Every intention in business needs optimism. Entrepreneurs through their planning process must include financial self-esteem or confidence. Wherever they find their financial confidence, they can continue with their process to perform the execution of the plan (Khazaei & Sadeghi, 2022). Intending to discover their possibilities entrepreneurs are in the middle of a cycle of opportunities and elements of required capabilities. The environment can influence attitudes for difficult procedures, such as culture, nationality, social norms, values or politics. Many countries have different approaches and behaviours for the intention of an entrepreneur (Rusu, 2022).

Entrepreneurs need to establish their decision-making process in very risky ways. Access to finance can be difficult to get. Limitations are the main problem that entrepreneurs face themselves with. Their finance can be provided by many associates. However, research shows us that finance can be internal and external. Both sides have their advantages and disadvantages, but risk is the first used word for entrepreneurs. Without risk, finance would be obstructed which would stop any forward step (Junoh, Hidthiir, & Basheer, 2019). Supporting entrepreneurship with institutional policies for creating new business has to be priority for future economic growth. Entrepreneurship Indicators Programme (EIP) highlighted 2006, main determinants for boosting entrepreneurship. There was six of them: regulatory framework, market conditions, access to finance, creation and diffusion of knowledge, entrepreneurial capabilities, and culture (Anton, 2017).

Some authors through their research show that universities are modern ways to provide needed education for students to improve their awareness and skill set (Ahmed T. C., 2017). Other researchers accept the importance of educational teaching as a positive income for entrepreneurial intention in the future (Bergmann, 2016). Education can easily predict that entrepreneurs will have the intention to create their ideas. Many young people, students, by having courses or educational startups will be more interested in entrepreneurship. When researching new ideas for a business, male and female students are equal in deciding to be entrepreneurs (Rusu, 2022).

Social norms can be defined as guidance to people's behaviour within the community which has different beliefs and is affected by social class, career, age, and environment on a daily basis (Tarapuez-Chamorro, Parra-Hernandez, & Gil-Giraldo, 2020). It is crucial to have unity and cohesion in the society. Ajzen (1991) introduced social norms as a reference to pressure and control of behaviour on certain topics or perceptions. An interesting fact about social norms is that regional tradition is affected by domestic politics and economic situation. That would lead us to the positive or negative position of financial access to entrepreneurship (Tarapuez-Chamorro, Parra-Hernandez, & Gil-Giraldo, 2020).

Each person has a different attitude in the life. Attitudes have a key impact on our opinions about something. In this research, attitudes are common words to use when describing

entrepreneurs. The perspective of entrepreneurial intention by individual attitude is followed by behavior which a person shows with his characteristics. Entrepreneurship has a specific role with specific attitudes toward entrepreneurial intention (Khazaei & Sadeghi, 2022). Individual behaviour influences entrepreneurial intention with different segments. Through self-esteem, confidence, and perceived persistence, the entrepreneur will conclude which steps to take to make his idea acceptable. Therefore, different attitudes that a person possesses will help us to stabilise our intentions (Khazaei & Sadeghi, 2022). Attitude toward an entrepreneur is defined as «attitude as the tendency to react positively or negatively to an object, person, organization, or moment» (Phan, 2021).

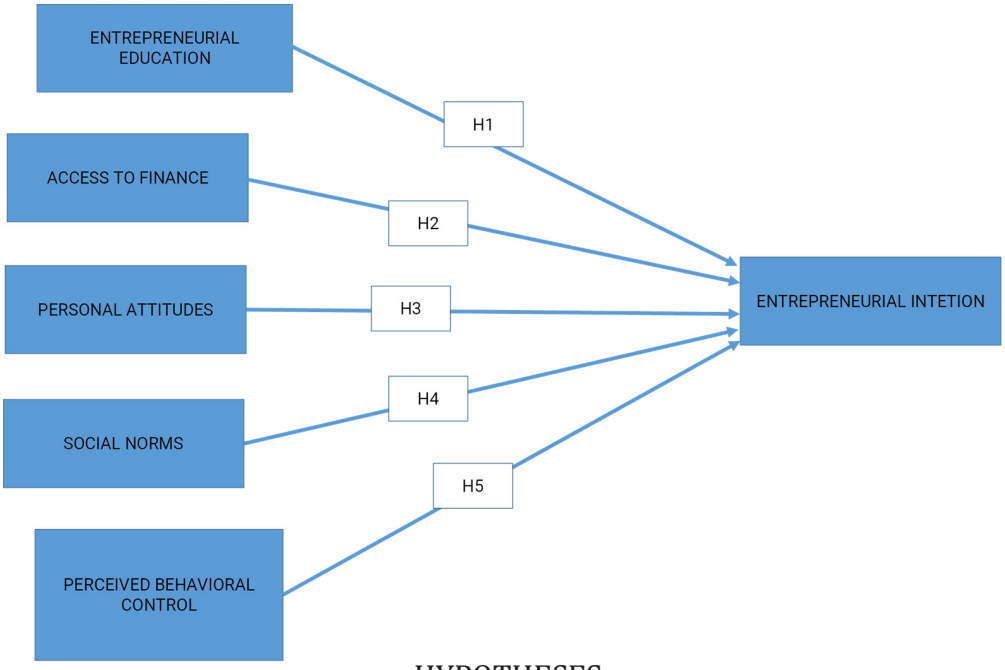
Personal behavioural control (PBC) is the personal ability to perform behaviour according to the expected attitude toward entrepreneurship. It is related to self-awareness, confidence, and motivation to conceptualize activity that an individual person needs for the entrepreneurial intention (Khazaei & Sadeghi, 2022). Perceived behaviour control is the belief about factors that affect behaviours. Through the research of (Wong, Lee, & Leung, 2006) and other authors behaviour control is the main element of entrepreneurial intention. perceived behaviour control is related to the theory of planned behaviour. As planned behaviour intends to show its part when a person has a positive attitude toward his personal assessments, we can say that this model has a positive relationship with behavioural control (Urban & Ratsimanetrimanana, 2019). Moreover, control is a key part of entrepreneurs when they find themselves in difficult positions. Perceived behaviour control refers to the evaluation of a person to perform his attitudes in specific situations. It would mean that access to finance or intention can impact his decision according to an experienced individual (Ajzen, 1991).

3. Methodology

Processing data was conducted with an original basis of entrepreneurship and its components. Questions were constructed with the basics of entrepreneurial intention, access to finance, entrepreneurial education, personal attitudes, social norms, and perceived behavioural control. Topics in the survey covered all areas of research and will be shown in the study through tables, graphs, and figures. The online survey was sent to different universities in Bosnia and Herzegovina and touched different departments. The sample has initiated students from all three study cycles, different generations and even entrepreneurs who tried to become one or already are. Instruction was clear and precise about the topics covered in the research.

A total number of 250 participants from private and public universities expressed their opinions about entrepreneurship and research models. The universities included in the survey were: Private universities (International Burch University (IBU), International University of Sarajevo (IUS), Sarajevo School of Science and Technology (DST), University in Travnik (UNT), Banja Luka College (BLC), College of economics and informatics (VSEIP)). Public universities (University of Sarajevo (UNSA), University of Tuzla (UNTZ), University in Bihać, (UNBI), FINRA University Tuzla (FINRA), and University in Zenica (UNZE)).

After completion of the survey, data was processed with gender percentages and evaluation of all collected information into an Excel file. Demographic measures will be introduced and shown in the research-finding model. Also, all data will be analyzed and any misunderstanding will be fixed. In addition, the evaluation of survey collection will be tested as variables with the Software Package for Social Sciences (SPSS) where we will check the descriptive, correlation, regression, reliability, and validity of all analyses.



HYPOTHESES

H1: Entrepreneurial Education (EE) has a significant influence on Entrepreneurial intention (EI)

H2: Access to Finance (A2F) has a significant influence on Entrepreneurial intention (EI)

H3: Personal Attitudes (PA) has a significant influence on Entrepreneurial intention (EI)

H4: Social Norms (SN) has a significant influence on Entrepreneurial intention (EI)

H5: Perceived Behavioural Control (PBC) has a significant influence on Entrepreneurial intention (EI)

Figure 1. Research model

4. Data findings

Demographic part of the sample was evaluated in the table with gender, age, study program, and university type. We can see results in the table below.

Table 2 clarifies some answers between gender positioning and universities. Since many participants were from private universities in Bosnia and Herzegovina, we can see that

private universities invest more into entrepreneurial awareness and intention. However, since 151 students didn't have any touch with entrepreneurship we have to consider that this economic branch needs to be better supported by institutions in B&H.

The questionnaire from the survey shows us that most students didn't have an entrepreneurial experience in any way. Blue colour represents a positive answer, while orange is negative. The conclusion to the next graph is that 66% of 250 students didn't have any previous experience neither with subjects, programs or similar activities about entrepreneurship. The same graph leads us to the attitude that educational institutions and the government have to concentrate more attention on those activities and invest in education about entrepreneurs and their advantages. Question for table 5 was related to the evaluation of the same question: Have you had any entrepreneurial experience up until now? Here is a graphical presentation of the data:

Continuing with the analysis, reliability was tested and the results were mostly positive. Since Entrepreneurial education (EE) was first in line, Cronbach's alpha was 0,518. Even if the score is not above 0,6 this variable is quite questionable and can be used even if it is poor (Remeikiene, 2013) Next in line are personal attitudes (PA) and social norms (SN). PA score was 0,908 which is a perfectly reliable measure and SN was acceptable with Cronbach alpha of 0,740. However, even if the data wasn't excellent, we can use the data as a positive outcome.

Table 1. Demographics of sample

VARIABLE	**PERCENTEGES**
GENDER	
MALE	48,4%
FEMALE	51,6%
AGE (MEAN VALUE)	26,32
STUDY PROGRAM	
IT	15,4%
ECONOMICS AND MANAGEMENT	18%
PEDAGOGY AND PSYCHOLOGY	20,4%
OTHERS	45,2%
UNIVERSITY TYPE	
PUBLIC	28%
PRIVATE	72%

Table 2. Experience between Gender and University type

Category		Yes	No	Total
Gender	Male	55	66	121
	Female	44	85	129
Total		**99**	**151**	**250**
Type of University	Private	78	102	180
	Public	21	49	70
Total		**99**	**151**	**250**

Perceived behavioural control (PBC) had a flawless reliability score of 0,900. The same was true with the entrepreneurial intention (EI) 0,958. Confirmed as good data was access to finance (A2F) with Cronbach alpha of 0,706. The measures, even if not in the same shape can be used to interpret the trustworthiness of data. In table 6, we can see the visual reliability of hypothesis items and Cronbach alpha results.

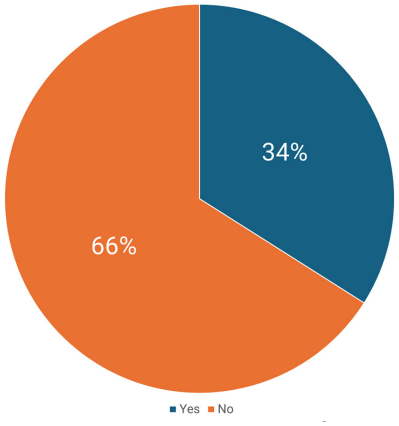


Figure 2. Entrepreneurial experience of students in B&H

After testing the reliability of variables, a change in items was made. After evaluation of social norms which rate was 0,677, we deleted one Cronbach alpha item to get the best outcome. The question was: Entrepreneurship is more a male than a female thing. Also, the same approach was used with access to finance where one item of Cronbach alpha was deleted so that we can get 0,706 as represented in the table below.

With Table 4 interpretation, a validity test was divided into convergent and discriminant. As we can see, entrepreneurial education has moderate convergent with personal attitudes with a 0,454 score. That would mean their relationship is related to each other. Form other side, access to finance and entrepreneurial education are not highly related. Their connection isn't that much close as their score is 0,210. The same is true with personal attitudes and perceived behavioural control or entrepreneurial intention. They are relatively related. Discriminant social norms do not have much of a connection

with personal attitudes. However, in the upcoming analysis, more details will be covered regarding correlation and regression and the relationship between all variables.

Table 3. Reliability construct

Variables	Items	Crollback alpha
EE	2	0,518
PA	6	0,908
SN	4	0,740
PBC	7	0,900
EI	7	0,958
A2F	7	0,706

Table 5 represent us correlation between dependent variable entrepreneurial intention (EI) and other independent variables. With the correlation analysis we can see that all variables are statistically significant with EI, expect social norms which p-value is higher the 0,05 with 0,267. Evaluation of the regression analysis is in the table 6.

As we can see the R-value is 0,821 which indicates that 82% of the variance in the dependent variable is explained by the variance in the independent variables. Therefore, 67% of Adjusted R Square interprets a good relationship between independent and dependent variables, and 67% of the variance in the dependent variable (EI) is explained by the independent variables adjusted for additional added variables. The higher percentage the better. ANOVA model indicates a statistically significant ($p< 0,001$) model. In the next table, the coefficient will be explained.

Table 4. Validity

Variable	Convergent Validity	Discriminant Validity	Interpretation
EE	PA = 0,454	A2F = 0,210	Solid convergent Good discriminant
PA	PBC = 0,603 EI = 0,608	SN = 0,140	Good convergent Good discriminant
SN	A2F = 0,271	EI = 0,071	Solid convergent Strong discriminant
PBC	EI = 0,796	SN = 0,134	High convergent Solid discriminant
EI	PA =0,608 PBC = 0,796	SN = 0,071	Strong convergent Good discriminant
A2F	SN = 0,271 PBC = 0,429 EI =0,430	EE = 0,210	Solid convergent Solid discriminant

Table 5. Correlation between EI and other variables

		EE	PA	SN	PBC	El	A2F
EI	Pearson Correialion	.304**	.608**	.071	.796**	1	.430**
	Sig. (2-uiltd)	<001	<.001	.267	<.001		<.001
	N	250	250	250	250	250	250

If entrepreneurial education changes by one unit, then the dependent variable will increase by 0.005 units. This impact is not statistically significant with a p-value greater than 0,05. If personal attitudes change by one unit then the dependent variable will increase by 0.242, and this impact is statistically significant as indicated by the p-value of 0.001 being lower than 0,05. If social norms change by one unit, then the dependent variable will decrease by 0.144.

Furthermore, going with the perceived behavioural control which changes by one unit, the dependent variable entrepreneurial intention will increase by 0,837. So, when PBC changes by one unit, EI will increase. These two variables are statistically significant as the p-value is 0,001. the same situation is with access to finance. If we increase access to finance by unit, the dependent variable will increase by 0,230 and this impact is statically significant since p<0,003. As shown in the table, (personal attitudes (p<0,001), perceived behavioural control (p<0,001), and access to finance (p<0,003) are statistically significant with the dependent variable EI and we accept them, while SN and EE are rejected. It means as these three variables increase, entrepreneurial intention will increase too. Data from the tables above represent hypothesis testing for five variables from the research model shown previously:

HI: Entrepreneurial Education (EE) is not statistically significant on Entrepreneurial Intention (EI)
H2: Access to Finance (A2F) is statistically significant on Entrepreneurial Intention (EI)
H3: Personal Attitudes (PA) is statistically significant on Entrepreneurial Intention (EI)
H4: Social Norms (SN) is not statistically significant on Entrepreneurial Intention (EI)
H5: Perceived behavioural control (PBC) is statistically significant on Entrepreneurial Intention (EI)

Table 6. Regression analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
I	.821	.674	.667	1.0868983636
a. Predictors: (Constant). A2F, EE, SN, PA, PBC				

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig
I	Regression	594.827	5	118.965	100.703	<.001[b]
	Residual	288.249	244	1,181		
	Total	883.076	249			

a. Dependant Variable: EI

b. Predictors: (Constant), A2F, EE, SN PA, PBC

Coefficients[a]

Model		Unstandardized B	Coefficients Std, Error	Standardized Coefficient Beta	t	Sig.
I	(Confiant)	-1.157	.411		-2.815	.005
	EE	.005	.049	.004	.092	.927
	PA	.242	.058	.203	4.159	<.001
	SN	-.144	.075	.077	-1,908	.058
	PBC	.837	.065	.630	12.887	<.001
	A2F	.230	.078	.123	2.955	.003

a. Dependent Variable: El

5. Discussion

Analysing the hypothesis of entrepreneurial intention, we introduce tables with the connection between hypotheses one, two, three, four, and five. Since all of them want to prove the significance between five variables (EE, PA, SN, PBC, and A2F) and dependent variable EI. Different factors affected the given results. Following the coefficient of Table 6, we noticed statistically significant variables between three out of five. Those three are personal attitudes, perceived behavioural control, and access to finance since their significant level is below 0,05. Entrepreneurial education and social norms are rejected as they are not significant with entrepreneurial intention. Analysing results from the literature, Linan (2009) and Arnaut (2022), show us questions used for the mentioned variables. Entrepreneurial education results were tested by Zhao (2005) and tested by (Remeikiene, 2013). Remeikiene scale results in regression analysis were slightly better with 0,679 than our Cronbach alpha for EE with 0,518. That leads us to the conclusion that our model can be used even if it is lower than previous research, but the model is questionable between EE and EI. However, the coefficient is not significant as the EE p-value is above 0,05. These factors can seriously affect students in Bosnia and Herzegovina and their approach to this economic branch.

The relationship between personal attitudes and entrepreneurial intention in the regression study proved their statistical significance as the p-value is 0,001. In addition, even if B is 0,242, the impact of personal attitudes has an effect on entrepreneurial intention. Krueger (2000) explains that attitudes have an important effect on entrepreneurial intention. Questions were taken from Linan and Chen (2009) as support between those two variables.

On the other side, social norms have their impact on the hypothesis data with entrepreneurial intention. Following the results of regression analysis, we conclude that social norms are not statistically significant with EI. The results show that if social norms increase their unit by one, the entrepreneurial intention will decrease. The B value is -0,144 and the p-value is 0,058 as we mentioned in the data findings. Krueger (2000) proved the same relationship between those variables. The results of social norms in the article by Tarapuez-Chamorro, Parra-Hernandez, & Gil-Giraldo (2020) explain the possibility of influencing intention in the future since society can affect people's approach to entrepreneurship. However, in lower development countries social norms will lose their capacity to explain entrepreneurial intention. This statement is connected with Bosnia and Herzegovina since support for entrepreneurship is not on the wanted level, and our hypotheses proves this relationship. The same results are found in the Teixeira et al. (2018)

Perceived behavioural control was a significant variable with independent entrepreneurial intention. On top of that, if behavioural control increases, Entrepreneurial intention will increase as well. As we found data significance we can confirm a positive relationship between those two variables. The beta value was the best among all variables with 0,837, which indicates a very good explanation of EI. Results were accepted form the authors (Remeikiene, 2013).

The last independent variable was access to finance. Since the p-value in the coefficients table was 0,003 we can say that access to finance significantly influences entrepreneurial intention. even if the B value is 0.230, we can conclude a positive relationship, as we explained in the data findings. Finance is an important part of entrepreneurship and evidence of literature was found in Urban & Ratsimanetrimanana (2019) where we have significance between A2F and EI for both genders' sides. In the model summary table of all six variables, the R-value is 0,821 and indicates 82,1% of the variance in the independent variables which explains the variance of the dependent variable. R Square with 67,4% explains a good relationship between variables and gives us positive insight.

6. Conclusion

The summary of our research model did explain how we used variables as predicted relationships. Entrepreneurial intention as the dependent variable for entrepreneurship as a whole study area is a top variable which defines the rest of the variables and their influence on EI, while access to finance was our main goal to interpret since there are not many financial topics connected to this research in Bosnia and Herzegovina. Moreover,

Bosnia and Herzegovina have a lack of information about entrepreneurship among youths and the development of this economic branch. In addition, our research investigated many different areas which contribute to this topic and gathered them as strengths of this model.

Table 7. Summary of tested hypotheses

H1: Entrepreneurial Education (EE) has significant influence on Entrepreneurial intention (EI)	REJECTED
H2: Access to Finance (ATF) has significant influence on Entrepreneurial Intention (EI)	ACCEPTED
H3: Personal Attitudes (PA) has significant influence on Entrepreneurial intention (EI)	ACCEPTED
H4: Social Norms (SN) has significant influence on Entrepreneurial Intention (EI)	REJECTED
H5: Perceived Behavioural Control (PBC) has significant influence on Entrepreneurial Intention (EI)	ACCEPTED

The hypotheses were explained with tables and compared with the results. Walking through the research steps we manage to show the hypothesis acceptance or rejection. As we can see from table 7 entrepreneurial intention had three hypotheses accepted and two rejected. The influence of social norms and entrepreneurial education didn't have statistical significance with dependent variable entrepreneurial intention. The following results of other researchers' social norms didn't match with the intention which indicates that they do not explain each other very well. Also, since more participants from Bosnia and Herzegovina (66%) didn't have any experience or education in entrepreneurship before, we can assume that the need for investing in entrepreneurial activities has to be on a better level. Going through different stages of the requirement for increasing intention among youth, institutions in Bosnia and Herzegovina need to recreate policies and simpler conditions for the future of entrepreneurship. Potential in this economic branch can improve the growth of unemployed people in Bosnia and Herzegovina.

References

1. Ahmed, T. C. (2017). Specialized entrepreneurship education: does it really matter? Fresh evidence from Pakistan. 23 (1). . International Journal of Entrepreneurial Behavior & Research,, 4-19.
2. Ahmed, T., Chandran, V. G., & Klobas, J. (2017). Specialized entrepreneurship education: does it really matter? Fresh evidence from Pakistan. 23 (1). International Journal of Entrepreneurial Behavior & Research,, 4-19.
3. Ajzen, I. (1985). From intention to actions: A theory of planned behavior. J. Khul & J. Beckman (EDS.) Action control: From cognition to behavior, 11-39.
4. Ajzen, I. (1991). The theory of planned behaivor. Organ BehavHum Dcis Process 50 (2) pp, 179-211.
5. Anton, S. G. (2017). The Role of Access to Finance in Explaining Cross-National Variation in Entrepreneurial Activity: A Panel data Approach. 1-16.
6. Arnaut, D. S. (2022). Exploring entrepreneurial alertness and entrepreneurial intention in times of the COVID-19 pandemic. . Management 27 (1),, 237-249.

7. Bergmann, H. H. (2016). What makes student entrepreneurs? On the relevance (and irrelevance) of the university and the regional context for student start-ups. Small Business Economics, 47(1),, 53-76.
8. Bico Car, M., Sestic, M., Softie, S., & Stupar, S. (2019). Entrepreneurial Education at Universities in Bosnia and Herzegovina. Education for Entrepreneurship Vol. 9, nr. 2., 101-118.
9. Cassar, G. (2004). The financing of business start-ups. Journal of business venturing, 261283.
10. Junoh, M. Z., Hidthiir, M. M., & Basheer, M. F. (2019). Entrepreneurial Financial Practices in Pakistan: The Role of Access to Finance and Financial Literacy. International Journal of Innovation, Creativity and Change, Volume 7, Issue 9,, 210-231.
11. Khazaei, M., & Sadeghi, G. (2022). Effect of Personal Characteristics in Field of Finance on Entrepreneurial Intention of Students of Faculty of Entreprenuership. University of Tehran, volume 2, Issue 1., 1-17.
12. Krueger, N. R. (2000). Competing model of entrepreneurial intentions. Journal of Business Venturing, 15, Issue 5-6, 411-432.
13. Lerner, J. (2009). Boulevard of broken dreams: why public efforts to boost entrepreneurship and venture capital have failed--and what to do about it. Princeton University Press.
14. Linan, F. C. (2009). Development and Cross-Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions. Entrepreneurship Theory and Practice. . Sage Journals 33 (3),, 593-617.
15. Malgorzata, J., & Stawska, J. (2020). The key factors affecting entrepreneurship: a comparative analysis. Zbornik radova Ekon. fak. Rij. vol 38, no 1,, 139-160.
16. Phan, T. L. (2021). Factors Affecting Entrepreneurial Intention: A Case Studay of University Students in Vietnam. Journal of Asian Finance, . Economics and Business Vol 8, No 12,, 203-210.
17. Remeikiene, R. D. (2013). Explaining Entrepreneurial Intention of University Students: The Role of Entrepreneurial Education. To Know Press, 299-307.
18. Rusu, V. D. (2022). Determinants of entrepreneurial Intentions of Youth: the Role of Access to Finance. 86-102.
19. Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. Academy of management review, 217-226.
20. Svotwa, T. D., Jaiyeoba, O., Roberts-Lombard, M., & Makanyeza, C. (2022). Perceived Access to Finance, Entrepreneurial Self-Efficacy, Attitude Toward Entrepreneurship, Entrepreneurial Ability, and Entrepreneurial Intentions: A Botswana Youth Perspective. Sage Open Journals,, 2-18.
21. Tarapuez-Chamorro, E., Parra-Hernandez, R., & Gil-Giraldo, A. (2020). Social Norms and Entrepreneurial Intention in University Researches in Columbia. Journal of Management, University Del Velle, Vol. 36, 119-131.
22. Teixeira, S. J., Casteleiro, C. M., Rodrigues, R. G., & Guerra, M. D. (2018). Entrepreneurial Intentions and Entrepreneurship in the Europe Countries. International Journal of Innovation Science, 1-21.
23. Tur, A. M., & Soriano, D. R. (2018). Inside the Mind of the Entrepreneur: Cognition, Personality Traits, intention, and Gender Behavior. Springer Nature.
24. Umihanic, B., Donlagic, S., & Piplica, D. (2016). Enhancing Entrepreneurship Development in Bosnia and Herzegovina Through Adequate Government Financial Support. Management, Vol 21., 129-144.
25. Urban, B., & Ratsimanetrimanana, F. (2019). Access to Finance and Entreprenurial Intention. University of the Witwatersrand, Johannesburg, South Africa, 455-471.
26. Wong, P. K., Lee, L., & Leung, A. (2006). Entrepreneurship by circumstances and abilities: the mediating role of the job satisfaction and moderating role of self-eficiancy. Frontiers of Entrepreneurship research, Vol. 26. No. 6, pp,, 14-23.