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(Article begins on next page)

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HerTechVenture, empowering women in tech innovation and entrepreneurship in Higher Education institutions

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Abstract. The rapid advancement of technology has highlighted persistent gender disparities in the tech sector, limiting the industry's potential due to the underrepresentation of women. Despite efforts to promote gender equality, deep-rooted biases and stereotypes continue to restrict women's participation and advancement, especially in entrepreneurial and leadership roles. The HerTechVenture project aims to address these disparities by fostering inclusive environments in Higher Education Institutions (HEIs), equipping female students with the confidence and skills needed for tech-driven entrepreneurship, and ultimately creating a new generation of female tech innovators and entrepreneurs. This work introduces the HerTechVenture project's strategies and anticipated outcomes in promoting gender inclusivity in STEM education and entrepreneurship. The project employs a multifaceted approach, including needs assessments, targeted training programs, mentorship opportunities, and awareness campaigns. These activities aim to boost the confidence and competence of female students, enhance their entrepreneurial skills through practical training, and establish supportive networks. Furthermore, the project equips educators with tools to foster inclusive learning environments. While the HerTechVenture project marks a substantial step towards closing the gender gap in the tech entrepreneurial sector, future efforts should focus on assessing the long-term impact of these interventions and continuously developing innovative strategies to promote gender equality in STEM.

Keywords: Enterpreneurship · Gender gap · Tech sector · self-employment · women in STEM.

1 Introduction

In recent decades, the rapid advancement of technology has revolutionized industries, economies, and societies worldwide, positioning innovation as a cornerstone of progress in the 21st century. However, amidst this era of unprecedented technological transformation, persistent disparities in gender representation within the tech sector have emerged as a pressing challenge, reflecting broader societal inequities and hindering the realization of the full potential of technological innovation.

The underrepresentation of women in technology-related fields not only deprives the industry of diverse perspectives and talent but also perpetuates systemic biases and reinforces gender stereotypes. Despite significant strides in promoting gender equality and empowering women in various domains, the tech sector continues to grapple with deep-rooted barriers that limit the participation and advancement of women, particularly in entrepreneurial roles and leadership positions.

Recognizing the imperative to address these disparities, the HerTechVenture project emerges as a pioneering initiative aimed at reshaping the landscape of Higher Education Institutions (HEIs) and fostering inclusive ecosystems that empower and encourage female students to pursue careers in tech-driven entrepreneurship. The novelty of the project is the holistic approach to creating an ecosystem that connects higher education institutions to business tech sector establishing a bridge for fostering more women in tech entrepreneurship. Rooted in the conviction that HEIs can serve as catalysts for societal change, the project endeavours to challenge existing stereotypes, boost confidence, develop entrepreneurial skills, and, ultimately, cultivate a new generation of female tech innovators and entrepreneurs across Europe.

This paper aims to provide a comprehensive overview of the HerTechVenture project, elucidating its objectives, implementation strategies, anticipated outcomes, and potential implications for advancing gender diversity and inclusivity in the tech entrepreneurship ecosystem. By examining the theoretical underpinnings of the project, analyzing its key components and activities, and evaluating its expected impact, this paper seeks to contribute valuable insights to the discourse on gender equality in technology and inform future initiatives aimed at fostering an environment where all individuals, regardless of gender, can thrive and contribute to technological innovation and societal progress.

Through a combination of rigorous research, innovative training programs, targeted interventions, and collaborative partnerships, the HerTechVenture project endeavours to pave the way for a more equitable and inclusive tech industry where diversity is celebrated, barriers are dismantled, and opportunities for all are realized.

2 Background

2.1 Needs Analysis

The entrepreneurial potential of women remains significantly underutilized across Europe, as highlighted by statistics from SheFigures 2018 [1], indicating that although women constitute 52% of the European population, they represent only 34.4% of EU self-employed individuals and 30% of start-up entrepreneurs. According to SheFigures 2021 [2], the proportion of self-employed women in Science and Engineering and Information and Communication Technologies (ICT) in Europe (EU-27) was 24.87% in 2018. Moreover, within the technology sector, women's representation stands at a mere 19% among IT professionals [3].

Companies (co-)founded solely by women garnered just 1.6% of the total capital invested in venture-backed startups in Europe in 2024 [4]. Empirical evidence shows that female entrepreneurs have significantly lower access to financing for their companies. They often face biased questions from investors and have fewer networking opportunities, and the structural differences and stereotypes about industry sectors also contribute to the venture capital (VC) gender gap [5]. Women in deep tech often face the additional hurdle of gender bias and stereotypes, particularly prevalent in sectors like technology [6].

This persistent gender gap in tech entrepreneurship is compounded by a declining trend in the relative participation of women as technologists over the past two decades despite the sector's exponential growth outpacing the broader EU job marketplace. Encouraging female participation in traditionally male-dominated sectors and improving networking opportunities can help mitigate the gaps [5].

The HerTechVenture project seeks to address this gender disparity by targeting the factors that hinder women from pursuing careers in tech entrepreneurship. Central to its objectives is the need to create gender-inclusive environments within HEIs and equip female students with the confidence and entrepreneurial skills necessary for success in the tech industry.

2.2 HEIs Needs

HEIs face a critical need to enhance their educators' capacity to foster gender inclusivity in STEM fields and establish supportive environments conducive to female students' success. Research underscores the role of implicit biases in teaching practices and curricula as contributing factors to the underrepresentation of women in STEM professions [7]. Professional development opportunities focused on recognizing and addressing these biases are essential for dismantling gender disparities in STEM education [8].

Moreover, creating gender-inclusive classrooms and curricula involves more than just addressing implicit biases. It requires the implementation of teaching strategies that actively engage female students and provide them with role models and mentors who can offer guidance and inspiration. Studies have shown that the presence of female faculty members and mentors in STEM significantly

enhances the retention and success rates of female students in these fields [9]. Therefore, HEIs must prioritize hiring and supporting female faculty in STEM disciplines and create mentorship programs that connect female students with successful women in tech.

Additionally, gender mainstreaming in STEM education has been proven to improve learning outcomes for all students, not just women [10–12]. These pedagogies include collaborative learning, active learning, and problem-based learning, which have been shown to reduce the achievement gap between male and female students in STEM [13]. By fostering an inclusive and supportive educational environment, HEIs can help to break down the barriers that have traditionally excluded women from STEM and empower them to pursue and excel in tech-driven careers.

2.3 Women's Needs

Female students in STEM encounter various challenges stemming from gender stereotypes, lower self-perception of competence, and insufficient exposure to entrepreneurial skills within IT education. Research indicates that these factors contribute to women's attrition from STEM fields and their reluctance to pursue tech entrepreneurship careers (European Parliament FEMM Committee, 2018) [14]. Addressing these barriers requires interventions that empower women to confront self-limiting beliefs, develop entrepreneurial competencies, and navigate the tech business landscape with confidence.

Furthermore, women often face a lack of visible role models in STEM [15] and tech entrepreneurship, which can impact their career aspirations. Studies have shown that role models play a critical role in overcoming challenges, normalize feelings of not belonging in male-dominated domains and increase career motivation [16, 17]. By increasing the visibility of successful female tech entrepreneurs and providing mentorship opportunities, HEIs can help female students visualize and pursue similar career paths.

3 The project

The HerTechVenture project ("Empowering Women in Tech Innovation and Entrepreneurship by developing a Supportive Ecosystem in Higher Education Institutions") was funded in 2023 through the Erasmus+ call: KA220-HED - Cooperation partnerships in higher education. This call aims to foster collaboration and innovation among European higher education institutions, enhancing the quality and inclusivity of educational practices across the continent. Following the call requirements, HerTechVenture is designed to bridge the gender gap in STEM fields by empowering women and girls to pursue education and careers in technology and entrepreneurship.

3.1 The consortium

The consortium for HerTechVenture brings together eight diverse organizations from five EU countries (Fig. 1), each with extensive experience and expertise in various aspects of education, research, innovation, and entrepreneurship. The coordinator of the project is Fundacja Edukacyjna Perspektywy from Poland, a non-governmental organization dedicated to inspiring, connecting, and supporting women in tech. On the non-academic side, the consortium includes Stimmuli for Social Change from Greece, a non-profit organization focused on future education and societal change, and INOVA+ - Innovation Services from Portugal, which specializes in project management, capacity building, and innovation across sectors.

The higher education institutions involved are Uniwersytet Gdański in Poland, offering education in fields such as Applied Informatics and Mathematical Modelling; the University of Macedonia in Greece, which integrates theoretical and practical academia with market needs; Instituto Politécnico da Guarda in Portugal, promoting entrepreneurship and skills development; Universidad de Salamanca in Spain, focusing on STEM education and gender equality through the Research Group on Interaction and eLearning (GRIAL); and Politecnico di Torino in Italy, emphasizing international collaboration and research to address the gender gap in STEM careers and promote gender-responsive innovation.

Together, the consortium partners bring a wealth of experience, knowledge, and resources to the HerTechVenture project, aiming to create inclusive spaces in education, reduce the gender gap in STEM, and empower women in technology and entrepreneurship. They seek to drive positive change and foster a more diverse and equitable STEM ecosystem through collaborative efforts.

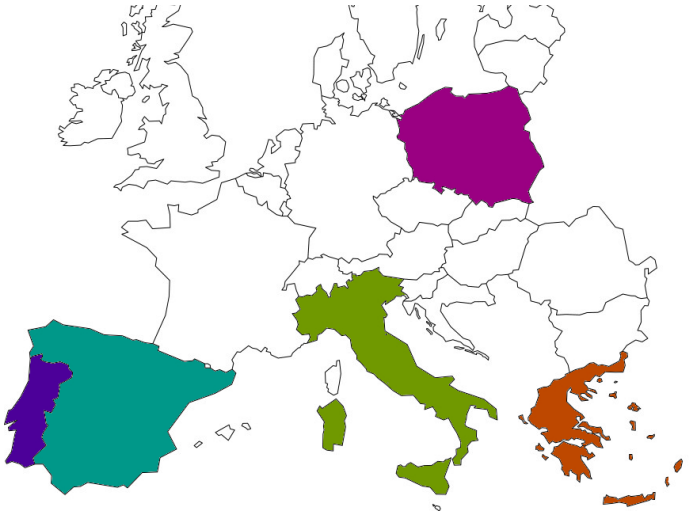


Fig. 1. Countries involved in HerTechVenture project

3.2 Objectives

The objectives of the HerTechVenture project are multifaceted. It seeks to promote inclusivity by developing strategies that create equitable STEM education and entrepreneurship opportunities, ensuring that women and girls have access to the same resources and support as their male counterparts. The project also focuses on skills development, providing tailored training and capacity-building activities to enhance participants' technological, innovative, and entrepreneurial competencies. Additionally, it aims to raise awareness and advocate for gender diversity in STEM through targeted campaigns and initiatives that highlight the critical importance of female participation and leadership. Another core objective is to establish robust mentorship and networking programs, connecting women and girls with industry professionals and role models who can offer guidance and support. Furthermore, the project prioritizes research to identify the barriers and challenges women face in STEM and to develop best practices for promoting gender equality and diversity within these fields.

3.3 Target Groups

The HerTechVenture project targets two primary groups:

1. *Female Undergraduate Students in STEM*: Particularly those in male-dominated departments such as ICT, who will benefit from tailored training, mentorship, and networking opportunities to bolster their confidence and enthusiasm for tech entrepreneurship.
2. *University Professors, Lecturers, and Directors of Studies*: With a focus on STEM faculties, to equip them with the knowledge and resources necessary to create inclusive learning environments and support female students' professional development.

3.4 Workplan

The workplan for HerTechVenture is systematically organized to address its objectives through a series of strategic activities (Fig. 2). Initially, a comprehensive needs assessment will be conducted to pinpoint the challenges and barriers women and girls encounter in STEM education and entrepreneurship. This needs analysis includes a comprehensive analysis of gender, STEM, and tech entrepreneurship literature, including reports from EIGE, SheFigures, and national studies. Additionally, partners' experiences and activities provided empirical insights into the needs of educators and female students in STEM fields. By addressing the needs of educators and female students through targeted interventions, the HerTechVenture project aims to dismantle barriers, challenge stereotypes, and cultivate an inclusive environment where women can thrive in tech entrepreneurship. The results of the needs assessment will be available under the "HerTechVenture Theory of Change: Empowering Women in Tech Innovation and Entrepreneurship" report.

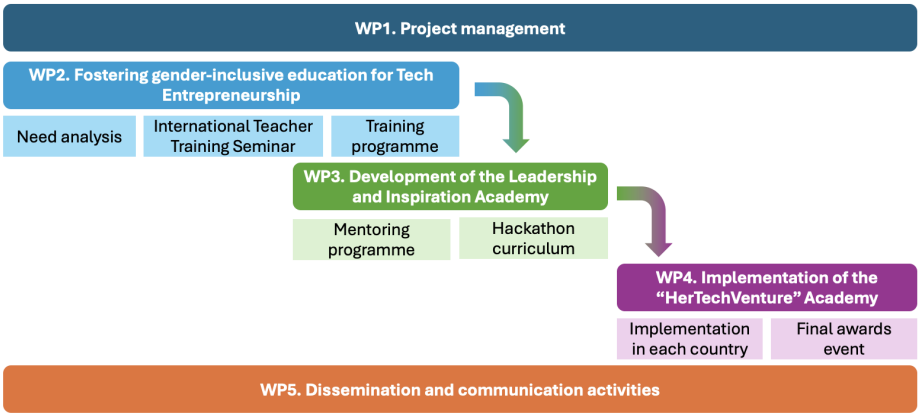


Fig. 2. Work packages with main tasks

Following this, the project will focus on capacity building by developing and delivering training programs, workshops, and educational resources designed to enhance technological, innovative, and entrepreneurial skills among participants. To further the goal of raising awareness, the project will organize campaigns, seminars, and events aimed at highlighting the importance of gender diversity in STEM and showcasing positive female role models. Mentorship programs will be established to provide ongoing guidance, support, and networking opportunities, fostering a community of practice and encouragement for women and girls interested in technology and entrepreneurship.

The mentorship programs will include a training phase. A training program for HEI educators will be organized to work on unconscious gender bias, gender-inclusive classroom environments, gender mainstreaming in teaching, and strategies for supporting female students in entrepreneurship and innovation beyond the classroom. This training will provide resources for implementing the mentorship programs, and also resources for the preparation of the mentors. In particular, mentors will be women from the tech sector who will serve as a connection between HEI and tech entrepreneurship. These women will guide women mentees from STEM courses during the hackathon implemented as part of the mentorship programs.

The project also includes a strong research and evaluation component, wherein the effectiveness of project activities will be assessed, and best practices for promoting gender equality and diversity in STEM will be identified. This evidence-based approach will inform policy advocacy efforts, supporting initiatives that promote women's participation and leadership in STEM at various levels. Finally, dissemination and knowledge sharing are integral to the workplan. Project results, findings, and best practices will be widely disseminated through publications, conferences, and online platforms, facilitating broader knowledge sharing and enabling the replication of successful strategies and interventions.

4 The Project's Expected Results

The HerTechVenture project anticipates several significant outcomes aligned with its overarching goal of empowering women and girls in STEM fields, particularly in technology and entrepreneurship. These expected results span across various work packages, each contributing to the project's mission in distinct ways.

4.1 Empowering Educators and Students

One of the primary objectives of the project is to empower educators with strategies to create inclusive environments in STEM education and entrepreneurship. By integrating gender perspectives into course content and teaching methodologies, educators will foster equal opportunities for all students, thereby addressing unconscious gender bias and enhancing inclusivity.

For female students, the project aims to provide comprehensive support structures through mentorship programs, role model initiatives, and networking opportunities. These initiatives will not only enhance their skills and competencies but also increase their confidence and motivation to pursue careers in technology and entrepreneurship.

4.2 Capacity Building and Skills Development

The project's training programs and workshops are designed to build the skills and competencies of women and girls in technology, innovation, and entrepreneurship. By offering practical training modules covering essential topics such as business planning, innovation, and entrepreneurial mindset, participants will be equipped with the tools and knowledge necessary to navigate the tech business landscape effectively.

Furthermore, hackathon-style innovation processes will provide hands-on experience, enabling participants to develop real-world solutions to tech challenges while fostering creativity and collaboration.

4.3 Awareness and Advocacy

Through awareness campaigns, seminars, and events, the project seeks to raise awareness about the importance of gender diversity in STEM fields and promote positive role models. By showcasing inspirational stories of women role models and tech projects, the project aims to inspire and motivate participants, highlighting the diverse opportunities available in the tech sector.

4.4 Research and Best Practices

The project will conduct comprehensive research to identify barriers and challenges faced by women in STEM and develop best practices for promoting gender

equality and diversity. By analyzing data obtained from surveys, mapping activities, and stakeholder interviews, the project will gain insights crucial for shaping its theory of change and designing effective interventions.

Overall, by implementing these initiatives and activities, the HerTechVenture project aims to make significant strides towards closing the gender gap in STEM and empowering women and girls to succeed in technology and entrepreneurship.

5 Conclusions

This work has provided a thorough analysis of the HerTechVenture project, which aims to empower women in technology innovation and entrepreneurship within Higher Education Institutions (HEIs). By exploring the project's goals, strategies, and expected outcomes, we have shown the importance of creating inclusive environments that support female participation in the tech industry. The project addresses the ongoing gender gaps in STEM fields by giving female students the skills, confidence, and opportunities they need to succeed in tech-related entrepreneurial roles.

The HerTechVenture project effectively identifies and addresses the main barriers that prevent women from pursuing careers in technology and entrepreneurship through the "HerTechVenture Theory of Change" report. Through focused training programs, mentorship opportunities, and awareness campaigns, the project aims to break down stereotypes and biases that have traditionally limited female participation in STEM. One of the key conclusions is that creating supportive educational environments and providing practical entrepreneurial experiences are essential for increasing women's confidence and competence in these fields. The project's focus on training educators ensures that gender inclusivity becomes a core part of the teaching and learning process in HEIs.

Another contribution that the HerTechVenture project is seeking to achieve is the value of mentorship and networking in creating a supportive community for female tech entrepreneurs. By connecting female students with industry professionals and role models, the HerTechVenture project not only will enhance their skills and knowledge but also will provide them with the social connections needed to navigate the tech industry successfully. This approach is crucial in addressing the gender gap in entrepreneurial finance [4, 5], as it equips women with the tools and networks needed to secure funding and grow their ventures.

Moreover, the project's research component provides important insights into the challenges and barriers faced by women in STEM. By conducting thorough needs assessments and evaluations, HerTechVenture contributes to the broader discussion on gender equality in technology, offering evidence-based recommendations for policy and practice. The HerTechVenture Theory of Change report highlights the need for continued efforts to promote gender diversity in STEM, showing that inclusive practices benefit not only women but also the tech industry and society as a whole by fostering innovation and diverse perspectives.

In conclusion, the HerTechVenture project represents a significant step towards closing the gender gap in technology and entrepreneurship within HEIs.

By fostering inclusive environments, providing targeted support, and conducting thorough research, the project empowers women to pursue and succeed in tech-related entrepreneurial careers. However, achieving true gender equality in STEM requires ongoing commitment and collaboration among educators, policymakers, industry leaders, and the broader community.

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