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**“WOMEN IN INNOVATION AND SCIENCE”
XALQARO ILMIY-AMALIY KONFERENSIYA VA FORUMI
ILMIY ISHLARI TO‘PLAMI**

Toshkent davlat transport universitetida 2026-yil 27-mart kuni “Women in Innovation and Science” xalqaro forumi ilmiy ishlari to‘plami chop etildi.

Mazkur nufuzli tadbirlar O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi hamda Transport vazirligi hamkorligida tashkil etilib, mamlakatimizda ilm-fan, innovatsiyalar va zamonaviy texnologiyalarni rivojlantirish, shuningdek xalqaro ilmiy hamkorlikni yanada kengaytirishga qaratilgan muhim platforma hisoblanadi.

Konferensiya ochilish marosimida davlat organlari, xalqaro tashkilotlar va yetakchi oliy ta’lim muassasalari vakillari ishtirok etdi. Jumladan, Toshkent davlat transport universiteti rektori G‘ulomov Abdulaziz Abdullayevich, O‘zbekiston Respublikasi Transport vazirligi vakili Ulmasova Lobarkhon Adilovna, Osiyo taraqqiyot banki eksperti Claire Charnac, Istanbul Aydin universiteti vasiylik kengashi raisi Mustafa Aydin, Belarus davlat transport universiteti rektori Kazakov Nikolay Nikolayevich hamda Qirg‘iziston Respublikasi Transport vazirligi vakili Dinara Moldokalieva ishtirok etdilar.

Konferensiya ilmiy dasturi doirasida plenar va panel sessiyalar, shuningdek ilmiy ma’ruzalar taqdimoti o‘tkazilib, ularda sun’iy intellekt va raqamli texnologiyalarni iqtisodiyot va ta’limga joriy etish, transport va aviatsiya sohasida innovatsion yechimlar, sanoat va IT sohasida texnologiya transferi, shuningdek ta’limda raqamli platformalar va intellektual tizimlar kabi dolzarb masalalar yoritildi.

2026-yil 27-mart kuni o‘tkazilgan “Women in Innovation and Science” xalqaro forumi ayollar yetakchiligi, innovatsiyalar va STEM sohalariga bag‘ishlangan bo‘lib, mamlakatimizda ayollarning ilm-fan va texnologiya sohalaridagi ishtirokini kengaytirish, ularning yetakchilik salohiyatini rivojlantirish hamda xalqaro hamkorlikni mustahkamlashga qaratilgan strategik maydon sifatida tashkil etildi.

Forum doirasida ayollar yetakchiligini rivojlantirish va rag‘batlantirish, xalqaro tajriba almashinuvi va ilmiy tarmoqlarni kengaytirish, yosh tadqiqotchi ayollar va PhD talabalarni qo‘llab-quvvatlash hamda innovatsion ekotizimlarda gender tenglikni ta’minlash kabi ustuvor vazifalar amalga oshirildi. Shuningdek, forumda ayollar yetakchiligi va STEM, gender tenglik va ilm-fan institutsional rivoji, ayollar tadbirkorligi va innovatsion startaplar, innovatsiya ekotizimlari va xalqaro hamkorlik, yosh ayol tadqiqotchilarni rivojlantirish, mentorlik va akademik tarmoqlar yo‘nalishlarida tematik sessiyalar tashkil etildi.

Forumda davlat organlari, xalqaro tashkilotlar, yetakchi oliy ta’lim muassasalari va ilmiy markazlar vakillari, jumladan “OLIMA” uyushmasi raisi Murtazayeva Raxbar Hamidovna, “Sharq ayoli” xalqaro ayollar jamoat fondi raisi Tursunbayeva Saodat Gafurovna, Osiyo taraqqiyot banki eksperti Claire Charnac, O‘zbekiston Respublikasi Transport vazirligi vakili Ulmasova Lobarkhon Adilovna, Toshkent davlat transport universiteti rektori G‘ulomov Abdulaziz Abdullayevich, Qirg‘iziston Respublikasi Transport vazirligi vakili Dinara Moldokalieva hamda Indoneziyadan universitet dekani Yoga Prihatin ishtirok etdilar.



Shuningdek, forumda Yevropa va Osiyo davlatlaridan yetakchi olimlar, ekspertlar va yosh tadqiqotchilar keng qatnashdi.

Forum dasturiga ochilish marosimi, panel muhokamalar, ilmiy chiqishlar hamda professional rivojlanish bo'yicha workshoplar kiritilgan bo'lib, ular doirasida gender tenglik, ayollar karyerasini rivojlantirish, ilmiy tadqiqotlar va innovatsion boshqaruv bo'yicha amaliy seminarlar tashkil etildi.

Mazkur tadbirlar Osiyo taraqqiyot banki (ADB), "OLIMA" — O'zbekiston xotin-qizlar olimlari uyushmasi, "Sharq ayoli" xalqaro ayollar jamoat fondi, Germaniya xalqaro hamkorlik jamiyati (GIZ), shuningdek Rossiya, Turkiya, Indoneziya va Qirg'iziston oliy ta'lim muassasalari hamda Belarus Milliy fanlar akademiyasi ilmiy institutlari hamkorligida o'tkazildi.

Mazkur xalqaro ilmiy-amaliy konferensiya va forumning ahamiyati shundaki, ular xalqaro ilmiy hamkorlikni mustahkamlash, innovatsion ishlanmalarni amaliyotga joriy etish, raqamli va barqaror rivojlanishni ta'minlash, shuningdek ayollarning ilm-fan va innovatsiya sohalaridagi rolini kuchaytirishga xizmat qiladi. Shu bilan birga, mazkur tadbirlar yosh olimlar va tadqiqotchilarni qo'llab-quvvatlash, ilmiy tajriba almashish hamda global ilmiy makonga integratsiyalashuvni jadallashtirishda muhim ahamiyat kasb etadi.

Mazkur xalqaro ilmiy-amaliy konferensiya va forumning maqsadi zamonaviy ilmiy tadqiqot yo'nalishlarini muhokama qilish, innovatsion yondashuvlar va ilg'or texnologiyalar bo'yicha ilmiy natijalar almashuvini ta'minlash, shuningdek xalqaro ilmiy hamkorlikni rivojlantirishdan iboratdir.

Tadbirda O'zbekiston Respublikasi hamda xorijiy mamlakatlarning oliy ta'lim muassasalari va ilmiy-tadqiqot institutlari olimlari, shuningdek amaliyotda muhim natijalarga ega bo'lgan mutaxassislar o'z ilmiy ishlari bilan ishtirok etdilar.

Ushbu ilmiy to'plamda muhandislik, transport, raqamlashtirish, sun'iy intellekt, innovatsion boshqaruv, gender tenglik va barqaror rivojlanish sohalarida faoliyat yuritayotgan yetakchi olimlar, professor-o'qituvchilar va tadqiqotchilarning ilmiy ishlari jamlangan. To'plamda dolzarb ilmiy muammolar, zamonaviy yechimlar, nazariy va amaliy tadqiqot natijalari yoritilib, ushbu yo'nalishlarning bugungi holati va istiqboldagi rivojlanish tendensiyalari aks ettirilgan.

Mazkur nashr mamlakatimizda ilm-fan va innovatsion rivojlanishni ta'minlash, xalqaro ilmiy aloqalarni mustahkamlash hamda yosh olimlar va tadqiqotchilarni qo'llab-quvvatlash yo'lidagi muhim qadamlardan biri sifatida e'tirof etiladi.

Shuningdek, mazkur ilmiy to'plamda keltirilgan natijalar kelgusida ilmiy tadqiqotlar samaradorligini oshirish, amaliyotga yo'naltirilgan innovatsion yechimlarni keng joriy etish hamda sohalararo integratsiyani chuqurlashtirish uchun muhim ilmiy asos bo'lib xizmat qiladi. To'plam materiallari nafaqat ilmiy jamoatchilik, balki ishlab chiqarish sohasi mutaxassislari, doktorantlar va talabalar uchun ham foydali manba hisoblanadi.

Mazkur nashrda yoritilgan ilmiy g'oyalar va ilg'or yondashuvlar asosida yangi ilmiy izlanishlar olib borilishi, xalqaro ilmiy aloqalarning yanada rivojlanishi hamda innovatsion rivojlanish strategiyalarining takomillashishiga xizmat qilishi kutilmoqda.



Women's role in engineering innovation and scientific leadership in modern stem systems

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Abstract: This scientific article presents a comprehensive analysis of energy losses in photovoltaic power plants under the climatic conditions of Karshi. The study identifies and systematizes the main factors affecting the conversion of solar energy into electrical energy, including shading, soiling, temperature effects, module degradation, and electrical losses, along with their quantitative assessment. Considering the high solar radiation and sharply continental climate of the region, scientifically grounded recommendations for improving the efficiency of photovoltaic systems have been developed.

Keywords: women in STEM, engineering innovation, gender equality, scientific leadership, technology development, STEM education

1. Introduction

The twenty-first century has witnessed unprecedented technological transformation driven by rapid advancements in science, engineering, and digital innovation. Engineering disciplines play a crucial role in addressing complex global challenges such as climate change, sustainable energy systems, digital transformation, and industrial modernization. However, despite progress in educational access and workforce participation, women remain significantly underrepresented in many STEM disciplines, particularly in engineering and technology sectors [1].

This imbalance presents not only a gender equality issue but also a challenge for scientific progress itself. Diverse research teams tend to demonstrate higher levels of creativity, problem-solving capacity, and interdisciplinary collaboration. When women are underrepresented in engineering research and innovation processes, the scientific community loses valuable intellectual perspectives that could contribute to technological advancement and societal development.

In recent years, governments, universities, and international organizations have increasingly recognized the importance of promoting women's participation in STEM. Numerous initiatives—including scholarship programs, mentorship networks, and leadership development platforms—have been established to encourage women to pursue careers in engineering and scientific research [2]. These programs aim to reduce structural barriers and improve women's access to professional opportunities within academic and industrial research environments.

Historically, women have contributed significantly to scientific and engineering achievements, although their contributions have often been underrecognized. Improvements in higher education access, international collaboration, and research infrastructure have gradually increased women's representation in engineering and technology programs worldwide. According to international statistical reports, the number of women entering engineering and technological fields has steadily increased over the past two decades, reflecting the influence of inclusive educational policies and global gender equality initiatives [3].

The growing presence of women engineers and scientists contributes to strengthening research communities by introducing diverse perspectives and encouraging

interdisciplinary approaches to innovation. Research suggests that heterogeneous teams are often more capable of generating creative technological solutions that address complex societal needs. Therefore, expanding women's participation in engineering research is not only a matter of social equality but also an important factor for improving scientific productivity and innovation capacity.

Despite this progress, women continue to face multiple structural challenges within engineering and STEM careers. These barriers include limited access to leadership positions, gender stereotypes in technical professions, unequal distribution of research funding, and restricted opportunities for professional advancement [4]. In many regions, cultural expectations and traditional social norms further discourage women from pursuing careers in engineering and technology, contributing to the persistence of gender disparities in STEM disciplines.

Another significant challenge is the lack of visible female role models within engineering leadership. When young women do not observe successful women scientists and engineers occupying influential academic or industrial positions, their motivation to pursue similar career paths may be reduced. Increasing the visibility of women leaders in scientific and technological fields is therefore essential for inspiring future generations of researchers and innovators.

To address these challenges effectively, universities, research institutions, and policy-making bodies must implement institutional strategies that actively support women's participation in engineering research and technological innovation. Mentorship programs, leadership training initiatives, and specialized research grants designed for women scientists can significantly enhance professional development and research productivity [5]. Furthermore, integrating gender equality principles into national innovation policies and scientific development strategies can foster more inclusive research ecosystems.

International collaboration also plays an important role in promoting women's contributions to science and engineering. Academic conferences, research networks, and global scientific forums provide valuable platforms where women researchers can present their work, establish professional partnerships, and increase their visibility within the international scientific community. Through these collaborative efforts, the participation and influence of women in engineering innovation can be substantially strengthened.



The objective of this study is to analyze the role of women in engineering innovation and scientific leadership within modern STEM systems, with particular attention to institutional mechanisms that promote gender equality and inclusive scientific development.

2. Research methodology

This study adopts a structured qualitative-analytical approach designed to provide a coherent and evidence-based examination of women's participation in engineering innovation and scientific leadership within contemporary STEM systems. The methodological framework is built on the integration of secondary data analysis, comparative evaluation, and conceptual interpretation in order to ensure analytical consistency and academic rigor. The research relies on statistical and institutional data obtained from internationally recognized organizations, including UNESCO, OECD, World Bank, and the National Science Foundation, which provide reliable indicators on gender distribution in engineering education, research activity, and leadership representation. The use of such sources is essential for maintaining comparability across regions and avoiding subjective or unverified assumptions.

A cross-country comparative perspective is applied to identify structural differences in women's participation across various economic and institutional contexts. This comparison focuses on key measurable dimensions, including access to engineering education, representation in research institutions, participation in innovation systems, and involvement in decision-making positions. Rather than treating these indicators independently, the study interprets them within an integrated analytical framework that combines gender equality theory with innovation system theory, allowing for a systematic understanding of how institutional structures and policy environments shape participation outcomes.

To strengthen the analytical depth, the study incorporates content analysis of academic literature, policy reports, and documented international practices. This enables the identification of recurring patterns related to barriers, institutional constraints, and enabling mechanisms such as mentorship programs, funding access, and leadership development initiatives. Particular attention is given to the interaction between formal institutional policies and underlying socio-cultural factors, recognizing that disparities in STEM participation are driven by both structural and contextual influences.

Finally, the study employs a qualitative correlation approach to assess the relationship between women's participation and innovation performance. Instead of relying on formal econometric modeling, the analysis systematically synthesizes empirical evidence and theoretical insights to establish logically consistent connections between gender diversity, research productivity, and innovation outcomes. This methodological choice prioritizes clarity of interpretation and conceptual validity, ensuring that the conclusions are grounded in observable trends rather than unsupported generalizations.

3. Results and Discussion

The analysis demonstrates that increasing women's participation in engineering and STEM fields is directly associated with stronger innovation performance and more

effective research systems. While global data indicate a steady rise in female enrollment in engineering education, this progress does not extend proportionally to leadership positions or advanced research roles. This imbalance reflects a structural limitation within STEM systems, where participation at entry levels does not translate into sustained career advancement, resulting in a gradual reduction of female representation at higher levels of responsibility.

Institutional analysis shows that organizations with greater gender diversity tend to achieve higher levels of research productivity and innovation efficiency. This outcome is linked to the presence of varied perspectives within research teams, which enhances problem-solving capacity and supports the development of interdisciplinary solutions. In environments characterized by complex technological challenges, such diversity becomes a functional advantage rather than a normative objective.

The findings also indicate that targeted institutional and policy interventions contribute positively to improving women's participation. Programs focused on education access, professional development, and leadership support have demonstrated measurable impact, particularly in systems where these initiatives are implemented consistently. However, the effectiveness of such measures is constrained in contexts where socio-cultural factors continue to influence career pathways. Persistent stereotypes and traditional role expectations remain significant barriers, limiting the long-term retention and advancement of women in engineering fields.

Another important observation concerns the role of women in leadership positions. Institutions that include women in strategic decision-making processes tend to demonstrate more balanced and socially responsive approaches to innovation. This suggests that participation at the leadership level influences not only representation but also the direction and quality of technological development.

Overall, the results confirm that gender inclusion in STEM is closely linked to the functional capacity of innovation systems. Expanding women's participation contributes to more adaptive, efficient, and resilient research environments. Conversely, underutilization of this potential represents a structural inefficiency that directly limits scientific and technological progress.

4. Conclusion

The analysis presented in this study demonstrates that women's participation in engineering and technological innovation represents a critical factor for strengthening contemporary scientific ecosystems. Increased representation of women in STEM contributes to greater diversity of perspectives, which enhances creativity, interdisciplinary collaboration, and the development of socially relevant technological solutions.

Although significant progress has been achieved in expanding women's access to STEM education and research opportunities, disparities remain evident in leadership positions, research funding distribution, and representation within engineering industries. Addressing these gaps requires coordinated efforts at institutional, national, and international levels.

Policies aimed at ensuring equitable access to education, research resources, and leadership opportunities can significantly strengthen women's engagement in engineering innovation. In addition, mentorship programs, professional



networks, and international scientific collaborations play an important role in supporting the professional development and global visibility of women researchers.

Ultimately, strengthening women's participation in STEM fields is not only a matter of social justice but also a strategic necessity for building inclusive, innovative, and sustainable scientific systems capable of addressing complex global challenges.

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