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FEATURE ARTICLE

The 2nd AASSA-WISE International Symposium on Diversity, Equity, and Inclusion in STEM: Food Systems Transformation and the Sustainable Development Goals (SDGs)

The National Academy of Science and Technology, Philippines (NAST PHL) - Department of Science and Technology (DOST), in collaboration with the Association of Academies and Societies of Sciences in Asia - Women in Science and Engineering (AASSA-WISE) Committee, organized the 2nd AASSA-WISE International Symposium on Diversity, Equity and Inclusion in STEM, with the subtheme: Food Systems Transformation and the Sustainable Development Goals (SDGs) on 07 March 2024 in The Manila Hotel, Manila, Philippines.

The NAST Gender and Development Committee served as the organizing committee for the event. Its members are Academician (Acd.) Aura C. Matias, Acd. Agnes C. Rola, Acd. Edward HM Wang, Acd. Roel R. Suralta, Acd. Maribel G. Nonato, and Acd. Arvin C. Diesmos. For this event, NAST PHL has also partnered with the DOST International Technology Cooperation Unit (ITCU), DOST CALABARZON, DOST Science Technology Information Institute, and the Centro Escolar University Manila. The members of the AASSA-WISE committee who were physically present during the symposium were Prof. Nadira Karunaweera from the National Academy of Sciences of Sri Lanka, Prof. So Young Sohn from the Korean Academy of Science and Technology, Architect Jun Hada from the Women in Science and Engineering, Nepal, Prof. Azra Khanum from the Pakistan Academy of Science, Prof. Yukari Ito from the Science Council of Japan, Prof. Supawan Tantayanon from The Science Society of Thailand Under the Patronage of His Majesty King, and Prof. Suchana Chavanich from Chulalongkorn University and the AASSA-WISE Secretariat.

The symposium's aims included: (a) to promote women empowerment and pursuit of equal opportunities for women, men, and all genders in all activities and policy recommendations, propelled by Science, Technology, and Innovation (ST&I); (b) provide a venue for sharing of experiences of women's work towards the SDGs; and (c) showcase women scientists and engineers. Participants totaled 379, 55 on-site and 222 via Zoom, 71% female and 29% male.

DOST Secretary Renato U. Solidum Jr. and Philippine Commission on Women (PCW) Officer-in-Charge Atty. Khay Ann Magundayao-Borlado graced the event and shared their special messages, while NAST PHL President Academician Jaime C. Montoya officially welcomed the guests. Figure 1 (a, b, and c) shows the symposium's speakers, special guests, and participants.

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Figure 1a. (from the left) Atty. Khay Ann Magundayao-Borlado, Secretary Renato U. Solidum Jr., and Academician Jaime Montoya during the presentation of their Certificate of Appreciation.

Figure 1b. (first row, from left) Acd. Roel Suralta, Acd. Agnes Rola, Prof. Suchana Chavanich, Prof. Azra Khanum, Prof. Supawan Tantayanon, Prof. Nadira Karunaweera, Prof. Yukari Ito, National Scientist Lourdes Cruz, Acd. Evelyn Mae Tecson-Mendoza, Acd. Edward Wang. (second row, from left) Acd. Aura Matias, Prof. So Young Sohn, Architect Jun Hada, DOST Secretary Renato Solidum Jr., PCW OIC Atty. Khay Ann Magundayao-Borlado, Ms. Luningning Samarita-Domingo, Acd. Jaime Montoya.

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Figure 1c. The participants at the 2nd AASSA-WISE Symposium.

Sharing of experiences and insights to promote gender equality and food systems transformation

Several distinguished experts from various Asian countries (Figure 2) shared their insights and experiences in their respective countries related to the theme and subtheme of the activity.

The first speaker, **Prof. Nadira Karunaweera**, **PhD**, President of the National Academy of Sciences of Sri Lanka and Chair and Senior Professor of Parasitology, Faculty of Medicine, University of Colombo, discussed "Transformation of Food Systems in Sri Lanka: Women Participation." Prof. Karunaweera defined the food system as a complex web of activities involving the production, processing, transport, selling, and consumption of food. She shared the history of women in Sri Lanka in agriculture, which was considered service and public responsibility. Only in the modern times (beyond 1980s) has the involvement of Sri Lankan women in food systems changed drastically, with more women engaging in industry, government, or private-sector jobs and away from agricultural processes. However, with the development of culinary and hospitality merchandising, women have been engaged in various economic development and educational activities. While food trading has increased, the art of home cooking has greatly diminished, especially in urban surroundings, which has led to alterations in food patterns that impact the family's nutritional status, particularly that of children and young adults. With these new developments, women engage in activities related to food systems in different types/styles and degrees.

Prof. So Young Sohn, PhD, Professor of the Department of Industrial Engineering, Yonsei University and Fellow of the KAST (Korean Academy of Science and Technology) discussed her study on the "Characteristics of Female Invention: Case of Cosmetic Patents," which seeks to deepen the understanding about gender issues in technology development, particularly cosmetics patents. She used topic modeling, zero-inflated Poisson regression, and survival analysis for patents related to cosmetics, which were filed in the United States Patent and Trademark Office from 1970 to 2016 (under International Patent Classification). Patent applications were categorized by gender as female only, male only, and mixed; by technological characteristics: number of claims, backward citation, family size, conventionality, and novelty; by performance: forward citation and patent life. The study showed that women inventors were largely focused on life sciences. Out of 49,241 cosmetic patents, only around 3,000 were by females, 25,000 by males, and around 18,000 are mixed. In terms of approval rates, women had the lowest rate of 56%, compared to 70% for men. In terms of conventionality and novelty, mixed groups had the highest rate. Forward citation was also lower for females than for males but was dependent on the topic of the patent. She observed

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that women's participation in cosmetic inventions is increasing and has experienced many changes in technical characteristics over time, but still has slow growth performance.

Architect Jun Hada, Senior Programme Officer of the Swiss Agency for Development and Cooperation (SDC) and founder and chairperson of Women in Science and Engineering, Nepal, talked about "Internship and Coaching of Fresh Female Engineers — Promoting Gender Inclusion in the Development Programmes of Nepal." She emphasized how collaboration between and among development programmes involving industry, engineering institutes (academic), and female graduates can bridge the inclusion gaps in fulfilling the need for qualified and trained human resources in the engineering industry within the government, non-government, and private sectors. In particular, the SDC internship programme was started to train young fresh female graduates on infrastructure sector technical programmes (building rural roads, trail, and motor bridges) in 2008 with six female engineering graduates assigned to six operating districts of the programme in Nepal. With its success, the programme has been continued from 2011 to date. Since then, about 140 fresh female civil engineering graduates have undergone this training internship programme in Nepal. They are now working in different industries within Nepal and abroad, including government systems and the private sector, and have contributed their knowledge and skills in project design, implementation, management, and supervision. While the SDC promotes workforce diversity, the internship programme was undertaken to respond to the SDC's struggle to meet the number of female engineers because the profession was primarily and historically dominated by men.

The fourth speaker, **Prof. Srubabati Goswami**, **PhD**, Senior Professor and Head of the Theoretical Physics Division (Physical Research Laboratory), discussed, via Zoom, the issues related to diversity, equity, and inclusion in the profession of Physics in Asia and presented the status of women in physics in selected Asian countries and the steps taken to bridge the gender gap. She mentioned that the Philippines had a good representation of women scientists (around 50%), according to the UNESCO Statistics Report (2018). She shared the highlights of the recently concluded International Conference of Women in Physics (ICWIP 2023) and the resolutions adopted in the meeting. The challenges to attaining gender equity include gender stereotyping, balancing career and family, and biases and discrimination. Solutions to bridge the gender gap (by different countries) include round table meetings for women, summer school and physics camps for junior and high school students, daycare for children of participants during conferences, encouraging and empowering graduate students, encouraging post-doctoral training overseas, increasing awareness of gender equity, and prizes for women in physics. Indeed, many efforts are underway by the science academies, women working groups, and various government levels to achieve gender equality.

National Scientist Lourdes J. Cruz from the National Academy of Science and Technology, Philippines discussed the role of women in improving the human capital index. She defined the human capital index (HCI), an international metric developed by the World Bank, as a measure that a child born today can expect to attain by his/her 18th birthday, to help the productivity of the next generation. Five indicators of HCI are child survival, school enrollment, quality of learning, healthy survival and adult survival. The HCI index of the Philippines was noted to be only 0.52. NS Cruz emphasized the important role of mothers in improving the HCI in developing countries. She noted that under-5 mortality rate in the Philippines has decreased from 56% in 1990 to about 30% in 2017. However, undernutrition remains a problem with no improvement in the prevalence of malnutrition in the past 30 years. In terms of education, the ratios of female to male students are 0.9, 1.0, and 1.3 for primary, secondary, and tertiary education, respectively, in 2019. Mothers, therefore, have a big role in improving the HCI of developing countries, as "ilaw ng tahanan" (light of the home) with men considered as "haligi ng tahanan" (pillar of the home). In this regard, the following need to be considered: education of mothers as extremely important, family economics, instead of home economics, resilience as the basic social unit, and for women to be active in educating pre-schoolers.

Prof. Azra Khanum, PhD, a fellow of the Pakistan Academy of Sciences and former dean of the Faculty of Science Pir Mehr Ali Shah Arid Agriculture University Rawalpindi (PAMS-AAUR), discussed the role of Pakistani Women in Food System Transformation. According to her, food system transformation aims to have a future

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Figure 2. Distinguished experts and speakers at the 2nd AASSA-WISE symposium. (a) Prof. Nadira Karunaweera; (b) Prof. So Young Sohn; (c) Architect Jun Hada; (d) Prof. Srubabati Goswami; (e) National Scientist Lourdes J. Cruz; (f) Prof. Azra Khanum; (g) Prof. K. Arzum Erdem Gursan; (h) Prof. Yukari Ito; (i) Prof. Supawan Tantayanon; and (j) Prof. Suchana Apple Chavanich.

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where the whole population has access to healthy diets, produced in reasonable and robust ways that restore nature, and deliver equitable living. In this case, the food system is strongly related to agriculture, which is the backbone of the economy in Pakistan, employing 44.7% of the workforce. She added that 61.18% of the total population in Pakistan is rural. She highlighted that Pakistan derives two-thirds of its GDP from agriculture, where women contribute significantly, around 67% of the total economically active manpower. However, despite their pivotal role, female farmers face several challenges, such as limited access to resources, gender-based discrimination or gender gap, education and training, unpaid labor, and access to markets, among others. She added that if the participation of women is at par with men, Pakistan's GDP could increase up to 60% by 2025. Thus, her recommendations to empower women include providing a conducive environment in terms of access to resources, education and training, gender sensitization, financial inclusion, marketing linkage, technology adoption, and legal support, as well as international partnerships.

Prof. Arzum Erdem Gursan, PhD, Analytical Chemistry Department of the Faculty of Pharmacy, Ege University, Turkey, joined online and shared her work on eco-friendly materials used in developing biomedical sensor technologies. More recently, there has been great interest in designing biosensor technologies based on eco-friendly materials for the diagnosis of diseases, environmental monitoring, and biomedical research. Her study identified the analytes, infections, toxins, environmental contaminants, etc., in a sensitive, selective, and quick manner using eco-friendly biosensors, for example, the single-use biosensor for mercury detection.

Prof. Yukari Ito, PhD, Kavli Institute for the Physics of Mathematics of the Universe, University of Tokyo, discussed the state of women in science and mathematics in Japan, the role of professional organizations in mathematics in Japan and Asia-Oceania, and the affirmative actions to promote the discipline among female students and graduates to address gender bias towards attaining equity for entering students in the universities and in hiring faculties. Some of these actions are special events on STEM for female students, especially high school students and those entering university. It was noted that the situations of women scientists are, however, different in each country. Several continental organizations of women mathematicians have been established: the Association for Women in Mathematics (AWM), USA, 1971; European Women in Mathematics (EWM), 1986; Committee for Women in Mathematics (CWM) of the International Mathematical Union (IMU), Latin America, March 2015, and the Asian and Oceanian Women in Mathematics (AOAM), 2022. The AOWM has also encouraged its members to strengthen their organizations and address/resolve the gender bias in their home countries.

Prof. Supawan Tantayanon, PhD, Chair of the AASSA-WISE Committee and Professor at the Department of Chemistry, Faculty of Science, Chulalongkorn University, discussed the small-scale chemistry concept to address the inadequate chemistry lab facilities, particularly in developing countries. She underscored that this approach means a reduction in the scale of an experiment of lab activity. For instance, reducing the use of hazardous substances minimizes pollution and lowers the risk of chemical accidents without compromising the educational quality in secondary schools. Furthermore, she shared that the capacity-building program was implemented to train teachers in nine Asian countries to conduct hands-on small-scale chemistry experiments.

Prof. Suchana Apple Chavanich, PhD, Deputy Director of Aquatic Resources Institute Chulalongkorn University, in her presentation, showed that poorly managed marine microplastics can be taken up by humans through seafood (and now through the air), thus threatening food safety and human health. Thailand ranks 6th worst contributor of marine plastic waste in the world. Therefore, best practices in addressing the causes and solutions of marine plastics and microplastics are central to both governmental and non-governmental efforts. Some of these efforts are raising awareness on the potential effect of microplastics on marine and human health, strategic framework and management plan to change behaviors of local people to consciously reduce and recycle plastics. Dr. Chavanich emphasized that this is not only a government's concern and work but also every individual's concern and individual work.

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Challenges and Recommendations

Acd. Edward Wang, member of the NAST PHL GAD committee, shared his message of 4 Cs to the participants: (1) Remember the **Chain** - to support all points in a Chain, for girls and women. (2) **Collaboration** - within small areas but across nations and across disciplines. (3) **Capacity Building** - the need to enable and empower everyone. (4) **Continue** - the communication and the conversations.

Acd. Aura Matias, chair of the NAST PHL GAD committee and a member of the AASSA-WISE committee, provided the synthesis of the symposium and forwarded four challenges on the theme of "Women do have important role in the society". These are: (1) The need to support girls and women, their education starting from home, to supporting their entry to primary education through high school, through graduate school degrees, through employment and the whole value chain to produce women as active participants in industry, and productive members of society. (2) The need to strengthen collaborations and build partnerships. Collaboration is now the buzz word that means things cannot done on our own. More networks are needed in the respective countries, with ASEAN neighbors, and with other Academies. The building of these intersections will give productive ways moving forward. (3) The need to increase capacity building activities. Particular examples were observed in teacher-training, coaching and mentoring engineers. Supporting graduate education, as well as, parent orientation from speakers which gave positive results. (4) The need to continue conversation to monitor and evaluate women statistics must be organized and pursued. A lot has been learned from the past and from each other, and there is a need to continue to aspire for future improvements and watch out for ways to improve the plight and welfare of women and children in our families and society.

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About AASSA

The Association of Academies and Societies of Sciences in Asia (AASSA) is a non-profit international organization whose principal objective is to "achieve a society in Asia and Australasia in which science and technology play a major role in the development of the region". It was launched in 2012 through the merger of two organizations, i.e., AASA (Association of Academies of Sciences in Asia, founded in 2000) and FASAS (Federation of Asian Societies and Academies of Sciences founded in 1984). It now includes 32 national academies and societies of sciences from 30 countries and one regional academy of engineering and technology. The inaugural general assembly of AASSA took place in Sri Lanka in October 2012. A new constitution for AASSA was formally sanctioned and the election of new officers also took place. The Korean Academy of Science & Technology has hosted the Secretariat of AASSA since its establishment. http://aassa.asia/

About AASSA-WISE

The AASSA Special Committee for Women in Science and Engineering (the WISE Committee) was formed in 2012 to help find ways to empower women in science and technology in Asian countries. Among its activities and accomplishments are the conduct of symposia, conferences, and studies such as "Women in Science and Technology and Asia" in 2015, "Profiles of Women in Science in Asia" in 2018, and the STEM Women Asia database in 2021, to promote gender equity and showcase the scientific talents among women in the region. The database was very successful and led to the preparation and launching of the STEM Women GLOBAL in 2022 through the combined efforts of Australian Academy of Science, AASSA WISE, the Network of African Science Academies (NASAC) and the Inter-American Network of Academies of Sciences (IANAS), with funding from the InterAcademy Partnership (IAP). Professor Supawan Tantayanon, President of the Science Society of Thailand under the Patronage of His Majesty the King, is the present chair of the AASSA-WISE Committee (2023-). Professor Doe Sun Na of the Korean Academy of Science and Technology served as the first chair (2012-2016) (2012-2016) and she was followed by Professor Cheryl E Praeger of the University of Western Australia (2017-2022). From: Praeger CE. The AASSA Special Committee for Women in Science and Engineering: The First Decade 2012-2022. University of Western Australia, Former AASSA WISE Committee Chair (2017-2022).

About AASSA and NAST PHL

NAST PHL is one of the members of AASSA which participated in its inaugural general assembly in Sri Lanka on October 16-19, 2012. The first Executive Board Meeting of AASSA was held in Manila, Philippines on October 22-24, 2013, hosted by the National Academy of Science and Technology PHL. The AASSA-NAST PHL International Symposium on Emerging Technologies for a Greener Earth was also held during this time. This collaboration was followed by the AASSA-NAST PHL International Symposium: Realizing the Full Cycle of Research and Development: From Bench to Community on September 21-22, 2017, Tagaytay City, the 2nd AASSA-WISE International Symposium on Diversity, Equity, and Inclusion in STEM: Food Systems Transformation and the Sustainable Development Goals (SDGs) on March 7, 2024, Manila, and the International Symposium on Digital Transformation in Healthcare on 29-30 October 2024 at the Acacia Hotel, Alabang, Muntinlupa City, Philippines. (http://aassa.asia/achievements/history.php); https://nast.dost.gov.ph/ (Annual Reports NAST PHL 2013, 2017)