

Report

Gender Equality in STEM and Other Male-Dominated Fields in Belgium and Japan -Insights from a Panel Discussion at Expo 2025 Osaka, Kansai, Japan-

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Abstract: This article presents the outcomes of a panel discussion held at the Belgium Pavilion during “Peace and Human Rights Week” at EXPO 2025 Osaka, Kansai, Japan (Expo 2025). Experts from Belgium and Japan shared perspectives on persistent gender gap in Science, Technology, Engineering, and Mathematics (STEM) and other male-dominated fields, examining both systemic barriers and emerging solutions. Yaël Nazé presented Belgium’s case, highlighting both the statistical underrepresentation of women in science and the institutional efforts—such as advisory boards, gender quotas, and awareness campaigns—to address it. Shinae Kizaka-Kondoh analyzed Japan’s historical and cultural stereotypes that hinder women’s advancement, highlighting the slow progress despite policy reforms and affirmative action initiatives. Miho Konishi emphasized the media’s role in shaping public perceptions, showing how underrepresentation and stereotypical portrayals of women researchers affect young girls’ academic confidence and career aspirations. She advocated for visibility and role models to inspire future generations. Tomoko Minagawa introduced a business perspective, arguing that the gender gap in STEM is not only a social issue but a missed economic opportunity. She stressed the importance of investing in femtech and women’s health as key strategies for inclusive economic growth. Together, the panelists underscored that gender equality in STEM requires more than policy intervention—it demands cultural transformation, cross-sector collaboration, and international dialogue to sustain systemic change.

KEYWORDS: Gender equality, STEM, EXPO 2025 Osaka, Kansai, Japan, Belgium, Japan, Affirmative action, Women's health, Media representation/ 男女共同参画, 2025年大阪・関西万博, ベルギー, 日本, 積極的差別是正措置, 女性の健康, メディア表現

1. Introduction

World Expos are international platforms that present visions of technology, culture, and future society, and the main theme of Expo 2025 “Designing Future Society for Our Lives” focused on discussions of people, lifestyles, and future society¹⁾. Japan has focused its discussions on “Society 5.0” and “future society,” and by incorporating the perspectives of “peace, human rights, and inclusiveness” into these discussions, the Expo conveyed a message that goes beyond mere technological innovation and economic development to reexamine the very nature of society. The framework of the World Expo provided an opportunity to consider global issues (human rights, peace, and inclusion) in the context of the local area, Japan, and Kansai.

Of the Expo's sub-themes of “Saving Lives,” “Connecting Lives,” and “Empowering Lives,” the Belgian Pavilion focused on “Saving Lives”²⁾ and planned a “Peace, Human Security and Dignity Week.” Going beyond the aspect of protecting lives, the Belgian Pavilion strongly emphasized the social, humanitarian, and ethical questions of “peace, dignity, and human security,” focusing not only on technology and industry but also on social systems, values, and

human rights. The Belgian Pavilion's “Peace and Human Rights Week” was held mainly from August 1st to 12th, 2025³⁾. The main question of the week was, “How do we realize a society free of discrimination and based on mutual respect?” Specifically, the pavilion covered a wide range of themes, including human rights, gender equality, LGBTQ+, immigration, diversity, inclusion, business and human rights, and the participation of children and young people. The panel discussion that this paper is based on was held on August 8th, with the theme “Women in STEM & male-dominated fields,” and was attended by three Japanese researchers with a variety of careers who were invited by the Belgian Pavilion, and one Belgian astronomer



Fig. 1 Panelists and moderator, J Theunissen (back row right)

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Accept : Dec. 04. 2025.

who was visiting Japan for this event. During the panel, the four panelists freely exchanged opinions based on the themes presented by the moderator, Justine Theunissen, Communication Manager, the Belgian Pavilion (Fig. 1). This article summarizes the thoughts that the four panelists shared through the discussion and future challenges in their respective fields.

2. Women in STEM: a Belgian view By Yaël Nazé

Each country, each region, has its specificities. Before discussing possible ways to increase the number of women in science and technology fields, it is useful to begin by presenting some basic statistics. As I am affiliated with Liège university, you will find numbers associated with this institution below⁴⁾, but they can be taken as typical for the situation in Belgium as there are few differences between universities.

As shown in Fig. 2, amongst university students, women clearly constitute a majority: about 59% of starting students and of graduating students (bachelor as well as master). However, this overall number hide great variations amongst domains: only about 41% of students starting in “sciences and techniques” are women (and ~45% are graduating in these fields, whatever the diploma – bachelor, master, PhD). It even drops to 24% if we restrict it to engineering and to 10% in computer science. This can be compared to values of 64% of female students in social sciences or 66% in health studies. The gender disparity can also be found at the various stages (and types) of university careers: 61% of people are women within the technical and administrative staff (mostly secretaries and heads of administrations), but the values drop to 51% for the scientific staff and 32% for the academic staff. In my own field, astronomy, the situation appears to show similar variations: while around half of master and PhD students are female, the fraction of

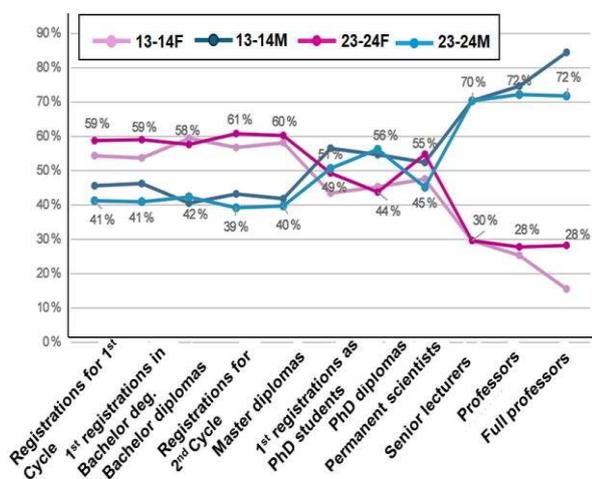


Fig. 2 Fraction of men (M) and women (F) at various stages of their academic life at the university of Liège, for academic years 2013-2014 (13-14) and 2023-2024 (23-24). Cited from the figure of page 10 of ref. 4 and modified.

professional female astronomers (affiliated to the International Astronomical Union) only amounts to 22% for Belgium⁵⁾. It might be noted that all those values change very little with time: over a decade, only a few percent change was observed in university numbers. Decades would thus be necessary to fill the gap in science and technology fields or at the academic career level.

2.1 Recent changes

While numbers have not much changed in the last decades, there have been important changes in regulations and “overall atmosphere” in universities. This is due to a mixture of governmental requirements and voluntary good practices. For example, it is now mandatory to calculate and publish gender-related statistics. The university rector has a “gender counselor” specifically in charge of this theme. This person is supported by a “gender and equality advisory board” which regularly meets to analyze the current situation and propose new ideas to improve it. It might be important to note that this board emanated from a volunteer group, i.e. it was a bottom-up approach.

Also, it is now common practice for various advisory committees (research, teaching, students) to make sure that their composition does not go below a fraction of one third for the minority gender (which can be male in some fields!). This is not yet a requirement, as in a quota, but it could become in the near future. One caveat is that it may cause (transient) overloading on female researchers since, as they are currently less numerous than their male colleagues, they are more solicited. Similarly, gender balance is considered when choosing people to be honored as “doctor honoris causa”. Another new feature (under discussion in Liège, already adopted at Brussels university) is the “waterfall” idea (“mesure cascade” in French) for promotion from one academic grade to another: the gender fraction amongst the selected persons must reflect the gender fraction at the lower grade, with the hope to finally increase the desperately constant and low fraction of women at the highest grades.

In addition, the procedures were clarified in case of harassment and other unacceptable conducts (improving the visibility of people or services in charge, creation of a violence measuring tool – “violentometer” – to be able to evaluate/identify problematic situations, institutional campaigns to raise awareness on these issues and to show the university won’t accept such things, etc.). Regular courses or staff formations specifically dedicated to gender and diversity issues were imagined and are now available to everybody.

In a similar way, everyone participating to research evaluation at the national research Fund (FNRS) must follow a short introduction to gender bias. The university also regularly participates to specific events dealing with gender and equality (women’s day on 8 March, day for scientific women on 11 Feb, international day against homo/transphobia on 17 May, international day against sexist/sexual violence on 25 November, etc.) and implement its own (e.g. workshop to edit Wikipedia by adding more information on female scientists). Positive

initiatives are also taken at the individual level, e.g. having a diverse mixture of experts in outreach activities or when organizing conferences (for gender balance amongst committees/chairs/reviewers).

Classroom naming is also currently being closely examined: in some faculties, classrooms were named from “famous figures”, who turned out to be men for a vast majority of the cases. An alternative naming scheme aiming at more diversity is being implemented. Such an endeavor might be easier to implement when there is a renovation or the addition of new buildings. In the Science faculty, where classrooms are designed by numbers, the current proposal is to highlight pairs of pictures of local scientists (a man and a woman) close to the entrances of these rooms. Choosing pairs may help facilitate acceptance amongst faculty members, as it avoids having to choose one gender for one classroom (with possible discussions about which gender gets the largest room, for example).

All this seems to be slowly working. For example, more women now ask for promotions and the first female university rector was elected in Liège in 2022. However, all these “rules” and measures are quite new, and one may have to wait for a few years more to be able to better evaluate their impact. Having such a perspective is important because hasty conclusions are sometimes drawn.

For example, in astronomy, there is a push towards implementing double-anonymous refereeing process for telescope attribution. This idea was originally based on the negative bias observed for women in research (e.g. more publications needed to get a position) and it was pushed by the first year of application of the Hubble Space Telescope panels, which seemed to show a clear improvement in gender fraction after the anonymous refereeing implementation. However, people soon forgot to continue monitoring: the “good news” of the first year was never confirmed afterwards – it was probably just

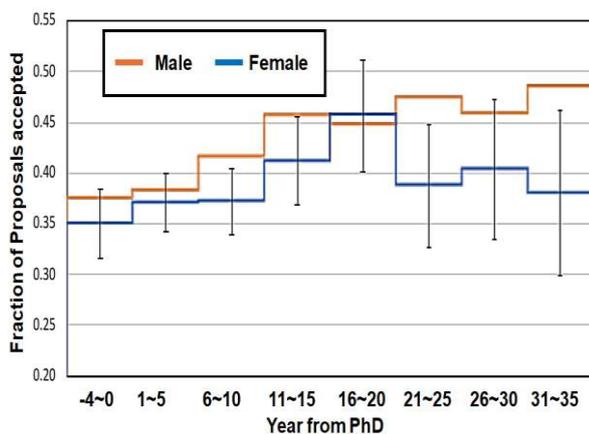


Fig. 3 Success rate of XMM-Newton proposals for male and female proposers, as a function of their academic age (0 corresponding to PhD graduation). 1-sigma error bars assume that the number of proposers follow a Poisson distribution (they are shown only for female proposers as their lower number implies larger errors). Cited from Fig. 12 of ref. 6 and modified.

statistical noise! On the contrary, space missions such as X-ray Multi-Mirror Mission (XMM-Newton), which have not implemented such a measure, do not show any gender bias⁶⁾ (Fig. 3), showing that biases are not always present!

2.2 Problems and solutions

When it comes to women in science and technology, there are two problems: one is the (still) low number of women in science and technology fields, and another one is to keep them in these careers, in particular in research. While some actions can be taken within universities (see previous subsection) to solve these problems, it may be worth noting that most of the work needs to be done outside. For example, the fraction of professional female astronomers is 26% in France but 22% in neighboring Germany.

One important difference between the two countries is the limited access to childcare in Germany (due to traditional roles, in particular mothers staying at home with children until they go to kindergarten, inducing a work pause of several years). Society choices and gender stereotypes such as this directly impact the access to women to high-level career, be them in academia or elsewhere.

Another important point is the direct support of kids: in Europe, parents and teachers (even if teachers are mostly women) are known to be less supportive of girls in fields perceived as less “feminine” such as math or engineering (and vice-versa for boys interested in “feminine” fields). Moreover, they are not aware that they make a difference – helping them realize their behavior should be the first thing to do, notably through statistics or games (e.g. counting who gets to speak in classes).

In this context, one often overlooked aspect concerns the media. Commonly seeing women in science and technology fields would make such a choice of career more acceptable. Over decades, the situation has improved in some cases and degraded in others. For example, TV series “CSI” features laboratory technicians using science to solve crimes. Whatever the city considered (Las Vegas, Miami, New York, and even in the “cyber” variation), these technicians are a mixture of men and women. They are just working together, without making the fact of having women in labs special (no specific “feminist” claim is ever made): having both genders is just shown to be normal.

A similar reasoning can apply to museums: some French science museums have thought about their exhibition content and decided to show (in pictures or videos) both male and female experts, in equal numbers if possible. Seeing such diverse teams in science and technology fields can change people’s view about what is the “norm” in a society. To help in this direction, it can be useful to build directories of female experts. In Belgium, the “Expertalia” database⁷⁾ was born with such a goal: providing names of female experts in various fields to journalists – so nobody can say “I would have liked to, but I didn’t know any name”.

However, the evolution is not always positive. For example, one may take a look at toys in Belgian shops. In

the 1970s, the colors were diverse, with (pastel) red, orange, yellow, green, and blue – a type of color was not specific to a type of toys. In the 2010s, the situation had completely reversed: all the “care” toys (baby dolls, kitchen, washing, etc.) were made in an aggressive pink, while all the “technical” toys (workshops, building, etc.) displayed an electric blue. The choice was made very clear for little boys and girls: this is for you, while this isn't. It is thus no surprise to find that current teenagers are, on average, more conservative than their slightly older counterparts.

In parallel, the European societies have also become more conservative, with far-right/religious parties gathering more and more votes and even governing in some countries. This influence appears to be particularly pervasive in young men, who are also exposed to a lot of anti-women disinformation on social networks (masculism, incel groups, etc.).

2.3 Educational experiment at EXPO 2025

Before the talk and the roundtable on scientific women, a small experiment was done on the terrace of the Belgian pavilion. Visitors were shown a small card with a short gender-neutral text about someone. They were then asked to draw that person. If puzzled, we asked them questions like: does that person wear glasses or not? does that person come from Asia, Europe, or Africa? (again, only gender-neutral questions). The chosen cases were: Hisako Koyama (observer of the Sun for decades, hence one of the 20th century anchor for solar studies), Yoko Tsuno (hero of a Belgian comics, specialist of electronics but also pilot and astronaut), Stephanie Kowlek (inventor of Kevlar), Henrietta Leavitt (one of the women in the “Harvard’s harem”, discoverer of the period-luminosity law of Cepheids which revolutionized astronomy), and Grace Hopper (soldier but also inventor of computer languages fortran and cobol). Usually, we played the game using the first two cases, and then (in the debriefing phase) showed the other examples.

Whatever their age and gender, visitors nearly unanimously draw middle-aged or old men, often westerners, with glasses and a lab coat (even if the domain didn't include laboratory work, like in astronomy). Clearly, visitors simply represented the usual stereotypes attached to scientists. At the end, they were of course shown a picture of the “real” person – the surprise made the point clear: science can be done by women too! The surprise was very often coupled to thanks, as visitors felt they had learned something important, which they will remember and share. Such a small experiment is quick and easy to do, and it can easily serve as a starting point for talking about women in science.

One additional note: comics are a specialty of Belgium (they are similar to Japanese “manga”). They are popular but, at first, most of them had either male figures as heroes or groups of persons (most often dominated by male figures). One of the first Belgian comics with a female hero was the Yoko Tsuno series. Starting in the 1970s, it was widely distributed, and it now counts more than 30 volumes. Not only was a woman the hero, but it was a

STEM figure since she was a specialist in electronics! For decades, Belgian girls thus had a *Japanese* figure as role model for STEM fields!

3. Stereotypes that hinder the promotion of gender equality in Japan

By Shinae Kizaka-Kondoh

3.1 Historical roots of stereotypes in Japan

Japan's postwar labor legislation played a critical role in shaping gendered labor norms⁸). The Labor Standards Act, enacted in 1947 immediately after the end of World War II, imposed clear restrictions on women's job titles, occupations, and employment periods. These regulations reinforced institutional stereotypes that limited women's professional advancement and discouraged their pursuit of doctoral studies. While the 1985 Equal Employment Opportunity Act and the 1999 Basic Act for a Gender-Equal Society formally established the legal framework for gender equality, cultural inertia has proven harder to dismantle. Around 1990, when I completed my doctoral degree, only about 650 females were enrolled in natural science doctoral program – merely 10.9% of the total (Fig. 4). The 1990s' policy of prioritizing graduate schools led to an increase in the number of female doctoral students. However, women still account for only about 29% of all doctoral students (e.g. 2,902 women and 7,186 men in 2022). Women continue to face an acute shortage of role models, requiring exceptional determination to persist in research careers.

In the panel discussion, I encountered experiences from an earlier era when female researchers faced pervasive yet often unspoken forms of bias in both education and employment. These biases are no longer overtly visible but persist subtly in people's attitudes and institutional practices. Typical examples include “educational settings that are reluctant to train female researchers,” “job interviews where companies were hesitant to employ women in research roles,” and “workplace environments where it is difficult to even take maternity leave”. One of the factors often cited as underlying these attitudes is men's so-called “feelings of compassion and protection towards women.” In practice, however, such sentiments reinforced structural exclusion. When I hit a wall in my

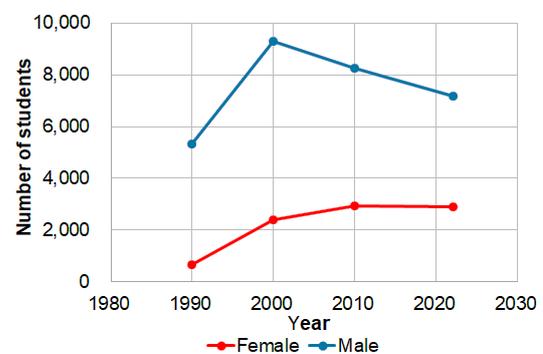


Fig. 4 Number of doctoral students in the field of natural sciences in Japan in the given year. Created using data from the table 3-3-6 of Ref. 9.

own graduate research, some professors would tell me things like, "Women are happiest when they get married and stay at home," or "Once you have children, it will be difficult for you to continue your research." Needless to say, happiness is an individual matter, and the real obstacle to balancing research and family lies not in women's ability but in the inadequacy of institutional system and workplace support.

I emphasized that many women researchers of my generation took these experiences as motivation to reform the system itself—working to improve policies and environments for future generations. As a result, the research climate for women in Japan has gradually but significantly improved over time.

3.2 The current state of gender equality in Japan

Despite these efforts, structural disparities persist. Female students who experience little gender differences in school often encounter stark inequality upon entering the workforce, facing gender gaps in pay, job content, and promotion opportunities. The proportion of female researchers has gradually risen but remains among the lowest in Organisation for Economic Co-operation and Development (OECD) countries. While a high proportion of female researchers are affiliated with universities, women are concentrated in non-permanent academic positions, with few advancing to senior or tenured roles. Although legal and institutional reforms have advanced, progress in transforming underlying attitudes has been markedly slow. In many academic institutions, informal support networks among female faculty remain limited, leaving women researchers isolated in moments of major life transition—such as marriage, childbirth, or caregiving. Without sufficient mentoring or institutional backing, many are unable to sustain their research careers and ultimately withdraw from academia. This attrition represents not only a personal loss but also a significant drain on the nation's intellectual and scientific capacity.

Between 1974 and 2015, national programs encouraging women's participation in science and engineering quadrupled their university enrollment rate—from 9% to 36%¹⁰). However, recent progress has stagnated. According to the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the proportion of female students enrolled in science and engineering faculties in 2024 will be 28.3% in science and 16.7% in engineering. This represents an increase of mere 2.8 and 6.2 percentage points compared to 2008, respectively. One contributing factor is Japan's early academic tracking system, which requires high school students to choose between humanities and sciences. Insufficient career education, lack of exposure to scientific role models, and concerns over limited job prospects for women in technical fields further discourage girls from entering STEM. Moreover, the shortage of female science teachers and male-centered design of textbooks and experiments exacerbate disinterest among female students.

Stereotypes concerning girls' aptitude for STEM fields are not unique to Japan but represent a global phenomenon.

How about Belgium? Dr. Nazé recounts her own experience of her daughter declaring, "Girls don't play this game" just two weeks after starting kindergarten. This is a prime example vividly illustrates how gender bias can shape children's perceptions and preferences long before formal education begins. In recent years, even in Japan, the stereotype that "girls are bad at science and physics" has come to be recognized not as a reflection of ability but as the outcome of intertwined social prejudices, cultural expectations, and academic anxiety. Nevertheless, the belief that "girls are not suited for science and engineering" entrenched in society. Even in Belgium, which consistently ranked among the higher-performing countries in the World Economic Forum's Global Gender Gap Index (WEF_GGGR), Dr. Nazé points out that women still comprise less than half of students in many STEM disciplines (see Section 2). This suggests that historical and cultural factors have shaped gender representation in science on both sides, and further comparative investigation into these influences in Belgium would provide valuable insight.

3.3 Japan's efforts toward gender equality

The situation in Japan began to improve after the implementation of the 2016 Act on Promotion of Women's Participation and Advancement in the Workplace, which initially applied to organizations with over 300 employees and was expanded in 2022 to include those with more than 100. The law mandates "general employer action plans" and public disclosure of related data. Companies demonstrating exceptional performance receive official certification, gaining reputational benefits and competitive advantages in recruitment. Consequently, many firms now actively promote women's participation. Coupled with the labor shortage, this has led to a growing trend toward hiring talented women in science and engineering fields, which is expected to lead to an increase in the rate at which female students pursue science and engineering studies.

Universities and other higher education institutions have also incorporated diversity and inclusion, articulating specific goals in their "mid-term goals and plans." Furthermore, as a measure to address the decline in enrollment due to the declining birthrate, affirmative action measures such as female-only admission quotas and open recruitment of female faculty members only, are being introduced to actively secure female students and faculty members⁸).

In a society where gender stereotypes remain deeply entrenched, implementing seemingly unequal measures to ensure substantive equality can serve as an effective catalyst for social change. Affirmative action, though sometimes controversial, provides a pragmatic means to correct long-standing structural imbalances. However, public resistance to such measures remains considerable. To foster broader acceptance, it is essential to recognize that building a society where gender equality allows everyone to realize their potential is not merely a matter of justice but a fundamental driver of national and organizational development.

Many initiatives in Japan have adopted a target of 30% female representation. The Japanese government has also set a goal of achieving 30% participation of women across all sectors, but many fields and organizations have yet to meet this benchmark. The 30% figure is based on the critical mass theory (the critical point that creates continuous change)¹¹. It states that above 30%, minorities are recognized not only as groups but also as individuals and begin to influence organizational management and decision-making. From this perspective, affirmative action is expected to transform society into one where the opinions and existence of minorities are recognized. As social structures evolve under this paradigm, stereotypes will gradually erode, paving the way toward a more genuinely gender-equal future.

3.4 Reflections from the discussion

One of the most memorable comments from the audience was from people who appeared to be over 60 years old, who all said, "we are shocked to see how little the situation surrounding women has improved in Japan since we were young." One participant recounted that more than 20 years ago, a man in the United States was dismissed for underperforming relative to a female colleague—illustrating that merit-based evaluation was already the norm there, whereas Japan still struggles to achieve such parity. It seems that Japan still has a long way to go before it achieves gender equality. The discussion also noted that diversity can regress if national leaders make insensitive remarks or fail to prioritize equality. Conversely, visible leadership could rapidly accelerate change. The question, then, is whether societal stereotypes prevent leaders from demonstrating such resolve—or whether leadership itself can help society transcend them.

4. How do the media portray women researchers? — From the academic self-efficacy gap to action— By Miho Konishi

In the panel discussion, I drew on my thirty years in television as a reporter and news presenter—and my current work as an on-air commentator—to reflect on how women researchers in STEM are portrayed in the media and what challenges persist.

4.1 Evidence and imbalance

According to the NHK Broadcasting Culture Research Institute's 2023 survey¹², women account for 35% and men for 65% of on-screen figures in Japanese news overall; in evening news specifically, the split is 30% women and 70% men. By age, men who appear tend to be in their 40s to 60s, while women are concentrated in their 20s and 30s—reinforcing the demographic stereotype of "middle-aged men and young women." Strikingly, these figures are low even relative to the actual proportion of women researchers and university faculty in society. Rather than mirroring reality, television reinforces a singular stereotype of the "female researcher," failing to convey the diversity of voices that exist.

Underrepresentation of women researchers is a global

problem. The 2020 Global Media Monitoring Project¹³ found that women made up only 25% of people seen or heard in news worldwide, with especially low shares in science and health—underscoring the persistent pattern that "the experts seen in the news are men." To address this imbalance, the BBC launched the "50:50 The Equality Project" in 2017, aiming for programs to reach 50% women among on-air contributors. Each team measures monthly gender ratios and feeds the data back into production. Within a few years, about 750 BBC teams had joined, some 60% reached the target, and the initiative spread to more than 30 countries¹⁴. Crucially, 50:50 began not as a top-down mandate but as a grassroots effort by volunteers on the front line. This bottom-up change resonates with the example at the University of Liège introduced by Dr. Nazé: sustainable progress comes not from imposing systems from above but from mechanisms that practitioners themselves embrace.

For the policy backdrop specific to Japan—including post-war legacies, recent disclosure mandates, and the critical-mass threshold—see Section 3.

4.2 From insight to action

When women researchers are seldom visible in the media, it undermines young people's academic self-efficacy—the belief that "I can succeed in this subject"—and narrows their aspirations. In the panel, I shared empirical data and voices from the field illustrating this impact. Japan's 2025 National Assessment of Academic Ability released gender-disaggregated results for the first time and showed almost no performance gap¹⁵. Sixth-grade boys and girls scored similarly in mathematics (59.0% vs. 57.3%) and science (55.8% vs. 58.8%); ninth-grade mathematics results were also nearly identical (49.1% vs. 48.6%). However, gender disparities emerged sharply in self-perception. Girls rated themselves as "good at this subject" much lower than boys—by 21.7 points in sixth-grade mathematics, by 19.8 points in ninth-grade mathematics, and by 17.8 points in ninth-grade science (Fig. 5). Even among high achievers, girls were twice as likely as boys to say they were "not good at it." The gap lies not in demonstrated ability but in self-perception.

Stereotypes entrenched in families and classrooms

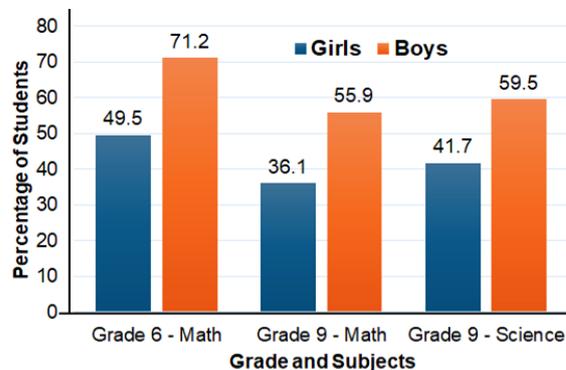


Fig. 5 Self-perceived competence ("I am good at this subject") in mathematics and science among sixth- and ninth-grade students (Japan, 2025). Cited from Ref. 15 with some modifications

contribute to this divergence. In a 2022 survey I conducted in one of my university courses, several women students reported being discouraged by relatives from pursuing STEM majors. One wrote that her grandmother told her, “Girls don’t need higher education if they’ll quit once they get pregnant.” Another recalled being removed from a leadership role because “the head should be a boy.” Independent of grades or ability, gender-based constraints on educational and career choices came into view.

Implicit bias among educators also plays a role. Experimental work has found that when children learned the board game Go, girls instructed by AI tended to achieve higher outcomes—suggesting that teachers may unconsciously limit girls’ potential¹⁶. Education therefore needs greater vigilance toward instructors’ implicit biases. Here the presence of role models is crucial. When asked during the panel about mine, I shared how journalist Atsuko Chiba’s *The Sky is the Limit* inspired me in my student days to pursue foreign correspondence. Dr. Nazé likewise spoke of discovering her future path as a girl who “loved the stars.” By actively featuring diverse women researchers, the media can offer concrete role models that help the next generation believe, “I could do that too.”

Balancing family and work remains the greatest challenge for women researchers, and how society supports that balance is decisive. Under the theme “What are the main challenges women face in career development and caregiving, and how can organizations help?”, I drew on a one-on-one interview¹⁷. I conducted with Dr. Katalin Karikó, laureate of the 2023 Nobel Prize in Physiology or Medicine. I noted that women account for only 16.9% of researchers in Japan, compared with 28.0% in Hungary, Dr. Karikó’s home country, and 33.7% in the United States¹⁸—placing Japan last among OECD nations, amid the entrenched stereotype that “science and engineering are for men.”

Asked what matters most for sustaining women’s research careers, she immediately answered: high-quality childcare and government support. After giving birth, she was able in Hungary to enroll her daughter in an affordable, well-run childcare center staffed with nurses and pediatricians. The assurance that “my daughter is in a good place during the day” allowed her to focus on research and continue her career without interruption. She also emphasized, “Women tend to strive for perfection—please stop.” Trying to be a perfect mother, spouse, and researcher compresses the time available for one’s career. Letting go of perfectionism is a critical mindset for staying in research over the long term. Another challenge she raised is internalized self-doubt—women convincing themselves, “I can’t be a professor; being an assistant is enough.” This aligns with the national assessment finding that girls, despite equal performance, are more likely to rate themselves as “not good at it.”

As a practical enabler, Belgium’s *Expertalia*⁷ shows how a curated, up-to-date database of women experts can normalize media visibility and remove the “we couldn’t find anyone” excuse. Building a comparable directory in Japan—networked with newsrooms and producers—would anchor the role-model pipeline in daily editorial

routines, not just in annual campaigns. The international setting of Expo 2025 provided a meaningful platform: experts from Japan and Belgium came together across borders to discuss shared challenges and exchange practical solutions. Such learning acquires meaning only when translated from shared ideals into concrete action within each society—that is the true value of international dialogue.

To realize a society where no one’s path is filtered by “because you are a man” or “because you are a woman,” and where everyone can choose their career free from gender constraints, the media must make role models visible and help catalyze change. My experience at the Expo 2025 reaffirmed both the weight of that responsibility and the hope that through practical efforts the future can indeed be changed.

5. Women's health and STEM: The frontier of science and innovation

By Tomoko Minagawa

This section focuses on the economic and industrial costs and missed opportunities arising from the structural lag in Japan’s STEM sector. Drawing upon the author’s primary experience in the business domain, it suggests that initiatives addressing women’s health challenges and the gender gap in STEM should not be regarded merely as ethical or social concerns, but as “managerial imperative contributing to Japan’s competitiveness.”

5.1 Re-examining the gender gap from a business perspective

Gender inequality in Japan’s STEM sector represents not only a social disparity but a structural economic loss. I will point out the following two points in particular.

Visualizing the Economic Loss: According to estimates by the Ministry of Economy, Trade and Industry, the economic loss attributable to women’s health issues amounts to approximately 22.7-billion-dollar (3.4 trillion-yen) annually¹⁹ (Fig. 6). This figure demonstrates that structural and cultural barriers—which cause women to interrupt their careers or reduce performance—are directly impacting the nation’s GDP. Diversity and Inclusion must be repositioned, not as “Corporate Social Responsibility,” but as a “preventable economic risk” and a “strategy for growth.”

The ‘Invisible Wall’ in Advanced Sectors: Even at the forefront of innovation-with venture capital (VC) and

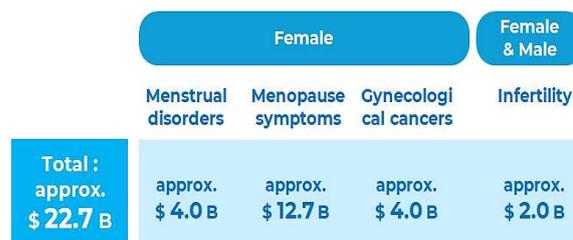


Fig. 6 Economic losses caused by women’s health issues. B stands for billion. Data taken from Ref. 19.

startup ecosystems, the gender gap remains conspicuously wide. Investment in startups led by female entrepreneurs still accounts for a disproportionately small share of total venture funding²⁰⁾ (Fig. 7). Specifically, business areas that primarily address women's needs, such as women's health, are often viewed through a biased lens, being perceived as "niche" or "difficult to understand" by predominantly male investors. This implicit bias constitutes an "invisible wall" that constrains female entrepreneurship, preventing the social implementation of innovation despite women possessing the requisite STEM and business knowledge. Overcoming this structural barrier is crucial for expanding innovation ecosystems and

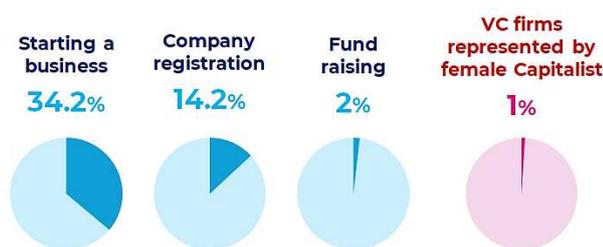


Fig. 7 Gender Gap – percentage of women at each stage of entrepreneurship and investment. Date taken from Ref. 20.

achieving inclusive economic growth.

5.2. Femtech and women's health: The intersection of STEM and business

Femtech is a portmanteau of "female" and "technology," and refers to technologies, products, and services that solve women's health issues. The concept of Gendered Innovation—scientific and technological research that explicitly incorporates sex and gender differences—remains underdeveloped in Japan. The delay in Gendered Innovation in the academic domain stems from the conventional design of science being based primarily on male-centered models²¹⁾. Femtech/Women's Health is not limited to information concerning reproduction but refers to a broad range of science, technology, and medical care addressing sex-specific medicine and needs unique to gender and life stages (e.g., menopause, osteoporosis, mental health).

A 2024 McKinsey & Company report estimates that only 1% of the total investment is allocated to research and development dedicated to various women's health issues other than cancer²²⁾. Simultaneously, investment in women's health is expected to yield \$1 trillion in economic impact²³⁾. This highlights a severe distortion in the allocation of scientific resources relative to market needs. This investment gap signals that the femtech industry represents the largest opportunity for initiating disruptive innovation and generating significant economic returns.

5.3. Roadmap for structural reform through industrial promotion

Expanding scientific investment, interest, and awareness in the femtech/women's health domain is not just a matter of market expansion; it can serve as a "roadmap for structural reform" that fundamentally improves diversity in Japan's STEM sector and society as a whole.

Investment in women's health can serve as a catalyst for systemic transformation in Japan's STEM landscape. Given the investment gap, there is an urgent need to aggressively promote investment and research in the femtech/women's health sector. This will clearly link scientific knowledge to the immediate improvement of women's lives and the mitigation of the economic loss (3.4 trillion yen)¹⁹⁾. The clear social mission of "immediately enhancing women's well-being" will dismantle the long-standing stereotype that "STEM is a male domain," serving as a powerful incentive to encourage women's entry into STEM fields.

Femtech represents the most concrete and universal starting point for realizing a truly diverse and sustainable innovation ecosystem. Addressing women's health challenges leads to solutions for issues stemming from intersecting identities such as age (e.g., menopause), race, and socioeconomic status. Increased interest in life-stage-appropriate healthcare technology for women inevitably fosters the development of inclusive products and services for diverse and previously overlooked populations, including the elderly, sexual minorities, and people with disabilities. Investment in women's health is thus the most concrete and universal starting point for scientifically realizing societal diversity.

To resolve Japan's unique challenges, such as the declining birthrate and a shrinking labor force, an environment where women are healthy and can utilize their full potential is indispensable. Mitigating women's health issues through Femtech directly contributes to increased labor force participation, prevention of career interruptions, and maintenance of productivity, making it a vital component for the sustained growth of the Japanese economy.

5.4 Conclusion

To close the gender gap in Japan's STEM sector and achieve sustainable economic growth, it is crucial to re-examine women's health, not merely as a welfare concern, but as a "frontier of science and innovation." Promoting investment, interest, and awareness in the femtech/women's health sector is the most concrete and pressing roadmap for Japan to correct investment distortions, transform the 3.4 trillion-yen economic loss into a growth opportunity, and contribute to the expansion of societal diversity across complex issues, going beyond the gender gap in STEM alone.

6. Summary of the panel discussion

The panel revealed that gender inequality in STEM is a multifaceted issue rooted in historical, cultural, institutional, and economic factors. While Belgium, which was ranked 27th out of 148 countries in WEF_GGGR 2025²⁴⁾, has advanced through transparent governance and bottom-up initiatives, while Japan, ranked 118th, continues to struggle with entrenched stereotypes and structural barriers.

The discussion emphasized that improving gender equality is not only a matter of fairness but also essential

for national competitiveness and innovation. Media representation, educational reform, and workplace policies must evolve to support women's participation and advancement. Investment in femtech and women's health offers a concrete path to address both societal and economic challenges. The panelists agreed that affirmative action, visibility of role models, and inclusive policymaking are key to driving change.

The panel underscored that international collaboration—such as this dialogue between Belgium and Japan—can accelerate mutual learning and collective progress. Ultimately, achieving gender equality in STEM requires sustained commitment across sectors and generations, transforming societal norms and unlocking the full potential of all individuals.

Acknowledgments

We would like to thank Justine Theunissen, Communication Manager, the Belgian Pavilion for Expo 2025 Osaka for organizing the panel discussion during "Peace, Human Security and Dignity Week" and giving us the opportunity to participate in it.

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ベルギーと日本における STEM 分野をはじめとする男性優位の分野における男女平等
 —2025 年大阪・関西万博におけるパネルディスカッションからの考察—

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要旨: 本稿は、2025 年大阪・関西万博の「平和と人権週間」においてベルギー館で開催されたパネルディスカッションの成果をまとめたものです。ここでは、ベルギーと日本の専門家は、STEM をはじめとする男性優位の分野における根強い男女格差について見解を共有し、制度的な障壁と新たな解決策の両面を検証しました。Yaël Nazé 氏はベルギーの事例を紹介し、科学分野における女性の統計的な過少代表と、諮問委員会、ジェンダー・クォータ、啓発キャンペーンといった制度的取り組みを強調しました。近藤氏は、女性の進出を阻む日本の歴史的・文化的固定観念を分析し、政策改革や積極的差別是正措置にもかかわらず、女性の進出が遅れていることを指摘しました。小西氏は、メディアが世論形成に果たす役割を強調し、女性研究者の過少代表や固定観念的な描写が、若い女性の学問への自信やキャリア志向にどのような影響を与えているかを示し、次世代を鼓舞するために、女性研究者の認知度向上とロールモデルの育成を提唱しました。皆川氏は、STEM 分野におけるジェンダーギャップは社会問題であるだけでなく、経済機会の損失でもあると指摘し、ビジネスの視点を紹介し、包摂的な経済成長の鍵となる戦略として、フェムテックと女性の健康への投資の重要性を強調しました。パネルディスカッションを介して、STEM 分野における男女平等には政策介入以上のものが必要であり、文化の変革、部門間の連携、そして体系的な変化を維持するための国際的な対話が必要であることが強調されました。

キーワード: 男女共同参画、STEM (科学・技術・工学・数学)、2025 年大阪・関西万博、ベルギー、日本、積極的差別是正措置、女性の健康、メディア表現