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## Patent filings: where are the women?

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“Shameful” is the word WIPO director general Francis Gurry used last month to describe the lack of women participating in the innovation ecosystem. And the statistics back him up—less than one-fifth (18.7%) of inventors named in international patent applications in 2019 were women. Sarah Morgan reports.

It's taken 25 years for the share of women inventors named in international patent applications to almost double and, at its current pace, gender parity among Patent Cooperation Treaty (PCT) listed inventors will only be reached in 2044. Look deeper, and the numbers are even more startling.



The World Intellectual Property Organization (WIPO) has kindly provided *WIPR* with more in-depth statistics, which show that only 9.4% of PCT patents filed name a majority of women inventors. It's an increase from 8.6% in 2018, but it's still not good enough.

This percentage drops even further when you look at the share of patents with only female inventors named (5.9%). Clearly, progress remains sluggish, with shares increasing by 5.5% and 3.3% over 20 years, respectively.

While the numbers are slowly increasing, there's a lot left to be desired, says Tulika Rastogi, senior IP consultant at IP research and analytics firm Intricate Research in New Delhi.

"Innovation is being compromised in all sectors of the economy and we can't even begin to quantify it." Mary Juhas, Ohio State University

That's not to say there aren't brilliant women inventors out there. Take CRISPR pioneer Jennifer Doudna and computer scientist Barbara Liskov as prime examples of "leading inventors of some potent technologies which hold the power to revolutionise modern society completely", adds Rastogi.

But, as [WIPO director general Francis Gurry told \*WIPR\* last year](#), in the inaugural *Influential Women in IP* publication, if we don't have gender equality, humanity cannot realise its full innovative and creative potential.

The low representation of women is of particular concern, says WIPO, because it indicates that a huge range of talents are not being "put at the disposal of humanity to help solve pressing social problems—such as climate change, sustainable energy production and consumption or food security—and to increase competitiveness".


For Mary Juhas, associate vice president, office of research at the Ohio State University in the US, the lost societal benefit is "incalculable and surely significant".

"Economic projections of the potential increase in gross domestic product if women could fully realise their innovations are staggering. Innovation is being compromised in all sectors of the economy and we can't even begin to quantify it," she adds.

## The broader picture

First we need to look at history, explains Mercedes Meyer, partner at Faegre Drinker Biddle & Reath in the US.

"In the US, before the mid-1980s, women had to have a man cosign a bank loan. You could say we have come a long way—women have been filing patents for over 100 years. The first patent to a colonial woman was granted by King George III but had to be given to her husband, not her," she says.

This unequal past pervades the present. It's unlikely that any of us will see gender parity in lifetime—the World Economic Forum's index reveals that gender parity will not be attained  1 5 years.

Although the amount of women being recruited science, technology, engineering, and mathematics (STEM) fields is increasing, retention is still a major problem.

Rastogi adds: “Women in science still face obstacles to advancement, despite an improved professional climate in recent years. Many surveys reveal that though a large number of women are being recruited in STEM fields, there are still so few in higher academic ranks or management positions.

“The pay gap, authorship, recognition, work-life balance, and gender discrimination between men and women is still troubling.”

This all amounts to a dearth of women in research—according to statistics from the United Nations Educational, Scientific and Cultural Organization, women account for only 28.8% of the world’s researchers.

While women scientists have been Nobel Prize winners (beginning with Marie Curie [1903] for physics to Donna Strickland [2018] in optical physics), that’s not the whole story. Between 1901 and 2018, Nobel Prizes and the Prize in Economic Sciences were awarded 590 times—but only 52 of these laureates were women.

“Women enter the world of patenting with a built-in time deficit and an unfamiliarity of the process,” warns Juhas.

“Innovators have precious little discretionary time to make new connections and find trustworthy contacts who can help them move their idea forward. Busy women don’t have time to repeat steps in the commercialisation process, particularly when the outcome isn’t guaranteed.”

Traditionally, women take on the majority of the domestic work, leaving less time to network and advance in their careers. Couple this with the idea that research-active women are routinely burdened with the “service tax” of extra committee work, and their time is further eaten into. Unfortunately, these commitments invariably go “unnoticed and unrewarded”, especially for women, says Juhas.

### **A specific concentration**

Women inventors tend to be concentrated in specific disciplines, with approximately 60% filing applications in the fields of biotechnology, pharmaceuticals and organic fine chemistry. Engines, pumps and turbines, and mechanical elements were the least popular fields for women.

“I would say we need to demand—and hold accountable—diversity in certain areas.” Mercedes Meyer, Faegre Drinker Biddle & Reath

Rastogi believes that societal beliefs, learning environments, and negative stereotypes (such as that “computing is too hard for girls”) play a huge role in women’s interest in choosing chemistry-related fields over other science careers.



Many areas of research happen to be of particular interest to women in which men traditionally don’t have any interest, says Rastogi, citing novel materials for menstrual hygiene products, creating safe

seatbelts for pregnant women, and assistive technology to free people from domestic work as examples.

She adds: “I think it goes back to our childhood, with a lot of non-conscious emphasis on implicit gender-bias toys and through the media. Even today, engineering and coding toys are considered to be for boys,” she adds.

Meyer herself has experienced negative stereotyping first-hand—she was told she couldn’t code or be a good chemist as a girl. Her daughter, who is now 17, was bullied out of coding in her school.

A [2018 report from the US Patent and Trademark Office](#) suggested that women inventors remain confined to areas in which women “have traditionally patented”, rather than breaking into male-dominated sectors. One year later, the [UK Intellectual Property Office came to the same conclusion](#).

For Juhas, this concentration maps directly onto the percentage of bachelor’s, master’s and doctoral degrees held by women.

“In parallel but related disciplines, the ones where salaries are highest and the financial gain the greatest have the lowest percentage of women. It’s the classic scissor plot of inverse relation: low economic gain translates to more women; as economic gain increases, the percentage of women decreases,” she adds.

Consistent with trends in the past decade, women inventors are more prevalent within academia (27.1% in 2019) as opposed to the private sector (17.8%).

Juhas reasons that this is because of the potential for lucrative financial gain combined with a “persistent and wide power differential” between men and women.

That’s not to say academia is perfect. Meyer adds that a pipeline problem remains, in part due to the silos in academia.

“Women drop out of academia when they have children, or they face having no children at all because there is no backup system. Areas that promote being in silos (law, academia, medicine) have a bigger problem with retaining women,” warns Meyer.

### **No simple solution**

Things would be easier if there were one simple solution to the dearth of women inventors, but it’s not an easy problem to solve.

However, although there’s a long way to go, says Rastogi, to say that nothing is being done would be an overstatement.

Breaking stereotypes is very important, particularly at the beginning of the pipeline. In a [LinkedIn post](#), Meyer compares the covers of two popular magazines targeted at boys or girls of ten years of age and older.

“Compare the covers of *Boys’ Life*, the monthly magazine of the Boy Scouts of America, versus American teen magazine *Girls’ Life*.



“What’s wrong? The former appears to promote invention, investigation, careers and exploration. Well, that’s cool. The other focuses on hair, beauty, how pretty you are, and fashion,” she says.

Support is also essential. The need for local female-centric innovation networks is the most successful solution to correct the imbalance in academia and the private sector, says Juhas. She thinks that the key barrier to women patenting is a lack of easily accessible established networks.

“Fewer networks means fewer resources, resulting in isolation. On the flip side, we’ve observed that when we provide a network of resources and peers—other women innovators—there is a pronounced positive effect in filing invention disclosures, the precursor to patent filings,” she adds.

Meyer’s offering of support comes from a toolkit she developed with technology transfer association the Association of University Technology Managers (AUTM) and the Intellectual Property Owners Association, helping companies educate their researchers to promote patentable discoveries.

“I would say we need to demand—and hold accountable—diversity in certain areas,” says Meyer.

“We can do incubators and brown bag lunches to educate men and women about how to invent, considerations, working on problems of the future for a company, identifying and educating talent, and helping be flexible to keep them in the pipeline to leadership.

“Diverse teams lead to increased team IQs and more diverse solutions.”

Although the WIPO’s statistics are generally “shameful” there may be one bright light in the dark. A 2016 report from the UN body stated that a gender balance may not be achieved until 2080. Now the date is 2044. That’s quite a leap, but there’s still a long way to go.

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1