

WHAT DO WE KNOW ABOUT...?

Artificial intelligence and gender equality

A review of Norwegian research

English summary



PUBLISHED BY: Kilden genderresearch.no

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ISBN: 978-82-12-03878-3

PUBLISHED: DECEMBER 2020

LAYOUT: KILDEN GENDERRESEARCH.NO

PHOTO: ISTOCKPHOTO

TITLE:

English summary: What do we know about artificial intelligence and gender equality? A review of Norwegian research

Kilden genderresearch.no is a national knowledge centre for gender perspectives and gender balance in research.

English summary:

What do we know about artificial intelligence and gender equality?

A review of Norwegian research

About the project

In October 2020, Kilden genderresearch.no published a report (in Norwegian) reviewing the state of the art of Norwegian research that sheds light on what artificial intelligence (AI) means for gender equality. This scoping review – entitled “What do we know about artificial intelligence and gender equality? A review of Norwegian research” – is a collaboration between the Equality and Anti-Discrimination Ombud and Kilden genderresearch.no. This translated summary presents the scoping review’s most important findings. The full version of the report in Norwegian is available on [Kilden’s website](#).

Artificial intelligence is expected to open up great opportunities for society. The technology is also seen as a key to achieving the UN Sustainable Development Goals and delivering services that are more cost-effective, precisely targeted and user friendly. One of Norway’s stated political objectives is to increase the use of AI systems to maintain and develop competitiveness as well as welfare standards.

Nevertheless, there are multiple examples of AI technology having unintended –but still directly discriminatory – consequences. International studies have documented how facial recognition systems from some of the largest technology companies were less able to correctly identify women than men, and were least accurate in the case of black women (Buolamwini and Gebru 2018). Another study has shown that Google’s algorithms targeted advertisements for high-paying, prestigious jobs to men, but not to women (Datta, Tschantz and Datta 2015). Researchers have also argued that AI technology helps to perpetuate traditional gender stereotypes in a way that contravenes the UN Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) (Adams and Loideain 2019).

Consequently, Kilden genderresearch.no and the Equality and Anti-Discrimination Ombud saw a need to collect and systematize research about artificial intelligence and gender equality in Norway. This scoping review examines Norwegian research findings about the expanding role of AI technology in everyday life. We have chosen to focus on AI’s significance in three key areas of society: 1) public and private services, 2) working life and 3) digital social platforms and entertainment.

Methodology

The report is designed as a systematic scoping review mapping Norwegian research on artificial intelligence that integrates a gender and equality dimension.

In this context “Norwegian research” is defined as scientific publications with at least one co-author affiliated with a Norwegian institution. The literature search was conducted in collaboration with the University of Oslo Library. Searches were conducted using relevant keywords in the following central databases: Norart (the National Library of Norway’s index to Norwegian and Nordic periodical articles); Idunn (Scandinavian University Press’s digital platform for academic and scientific journals); Web of Science; Scopus; and Sociological Abstracts.

We supplemented the results with manual searches for relevant articles and reports published by research institutions. The total number of Norwegian studies presented as cases in this report is 24 (21 scientific articles and 3 research reports). The main findings within the three key areas examined in this knowledge overview are presented below.

Artificial intelligence in public and private services

The scoping review shows that relatively few empirical studies have been conducted in Norway on the social impacts of AI-based automated systems used to operate public and private services. Even fewer empirical studies have included the gender and equality dimension.

AI and health services

Norwegian research on AI-based health technology generally lacks the gender dimension. Health researchers assert that AI can help to overcome challenges in medical trials associated with biased selection of gender, age, class and ethnicity. However, when decision-making is left to systems that rely only on mathematics and statistics, there is a risk that existing conscious and unconscious biases will be reinforced. The gender dimension is important when considering the effects of personalized e-health services that transfer more follow-up and treatment responsibility to individual patients (Andreassen et al. 2018) and when analysing health data based on the entire patient population.

Feminist research within social science emphasizes how robot technology in the health care system may be at risk of excluding groups that fall outside the norm of the “standard human”, such as with the use of robotic exoskeletons that assist people suffering paralysis to get up and walk (Søraa, Fosch-Villaronga 2020).

Robotics researchers employing a feminist theoretical tradition also discuss how robots can influence our view of gender, and how our view of gender affects robot design. Culture “genders” robots, in the sense that the more human-like a robot is, the more it is ascribed “masculine” or “feminine” qualities. In this way robots can perpetuate or reinforce gender stereotypes (Søraa 2017; Poulsen, Fosch-Villaronga and Søraa 2020; Søraa and Fosch-Villaronga 2020).

Welfare services and automated case processing

Studies that examine the social effects of automated case processing are also relevant in the context of gender equality and discrimination. According to the research we have identified, Norwegian municipal authorities have little awareness that algorithms can perpetuate biases contained in the data on which the algorithms are based, thus reinforcing existing differential treatment – including gender discrimination (Andreasson and Stende 2019). With regard to automated systems already in use by public welfare services, the research reveals an emerging digital divide between those who master such systems and those who do not. This means certain users risk not receiving benefits to which they are entitled (Hansen, Lundberg and Syltevik 2018; Kane 2020).

Predictive analytics as a tool to prevent crime and settle refugees

Internationally, efforts are under way to develop machine learning-based algorithmic tools for identifying ideal settlement locations for refugees. Machine learning is also used to develop methods for anticipating the times and locations of undesirable or criminal acts – a method known as *predictive policing*. Some researchers in *critical algorithm studies* have expressed vigorous scepticism to such use of AI in public services.

The research we have identified warns against using algorithm-based predictive analytics to prevent crime, as it can threaten individuals' due process safeguards. Researchers point out that presumably objective data have a tendency to reproduce socioeconomic inequalities, prejudices and stereotypes. As a result, algorithm-based predictive systems can lead not only to mistaken conclusions and unfair treatment but also to self-fulfilling prophecies and, at worst, a more authoritarian society (Kuldova 2020).

AI in working life

International research has demonstrated that AI-based recruitment algorithms can have discriminatory effects in working life (see Dastin 2018; Howcroft and Rubery 2019; West, Whittaker and Crawford 2019). Norwegian working life is already undergoing a digital transformation in which AI-based systems and automation are reshaping ever more employees' jobs. The scoping review reveals that the social implications of AI in working life, including gender and equality dimensions, are still relatively unexplored in Norway.

However, there are relevant findings pertaining to workplace restructuring prompted by automation, specifically related to which occupational groups are most and least vulnerable, as well as about employee participation in decision-making. Although this research did not focus specifically on gender or equality, it is relevant to an analysis of how AI and automation affect occupations typically dominated by women or by men.

Employment polarization

Research demonstrates that increased automation can lead to employment polarization by heightening economic inequalities between employees. The "platform economy" (or "gig economy"), with private individuals offering services on digital platforms, has led to the emergence of new service professions. On the other hand, the platform economy leads to a reduction in permanent employees, an increase in freelancers, self-employed persons and casual workers (collectively known as the precariat) and a consequent weakening of trade unionization. Insecure employment conditions and the exclusion from the labour market of people with low levels of education and poor health may exacerbate social inequality, which in turn could undermine public health (Hessel, Christiansen and Skirbekk 2018) and perhaps gender equality as well.

Occupational groups vulnerable to automation

Typically, female-dominated occupations in the health, care services and education sector are among those that are least subject to disappear due to automation. There, robotics and AI can serve as useful on-the-job aids. By contrast, many of the tasks of office clerks, another typically female-dominated occupation, have already disappeared due to automation (Øye 2019).

Higher education, where women are in the majority, is often put forward as a shield against job loss caused by automation (Pajarinen et al. 2015). But research suggests that for the time being, AI and robotics will be unable to replace occupations requiring complex problem-solving and social interaction, regardless of workers' gender (Pettersen 2019).

In Norwegian agriculture, the introduction of AI technology has given farmers greater flexibility in their workday. But robotic milking machines, which are increasingly common on dairy farms, have not led to more gender equality among farmers so far. Research indicates that female farmers still do more housework than male farmers, whether or not milking robots are in use (Hårstad 2019).

Does automation give more power to the bosses?

AI also affects the working environment and employee participation in decision-making. Internationally, the term *algorithmic governance* has been adopted to characterize a management model based on automation, digitalization and quantification (Katzenbach and Ulbricht 2019). Norwegian employment researchers studying the expanding role of algorithms in workplace decision-making also argue that standardized and automated management strategies diminish participation by workers and middle managers, thereby limiting opportunities to exercise professional judgment. There is concern that these management models, in combination with New Public Management principles, pose a threat to democracy in the workplace (Kuldova et al. 2020).

The impacts of AI-based automation on the working environment remain relatively unexplored. The research we have reviewed indicates that automation benefits management more than employees (Dahlstrøm and Hognestad 2016; Røhnebak 2016; Thun et al. 2019).

Gender inequality in the ICT sector

As algorithms and AI systems gain importance, the need increases for ICT professionals – among whom women are a minority. To boost Norwegian ICT expertise, including ICT security, researchers say it is necessary to strengthen ICT education and recruit more women to the field (Mark et al. 2019). The research we have identified shows that specific gender equality measures have not yet received priority in the ICT sector (Corneliussen and Seddighi 2019).

AI in digital social platforms and entertainment

Though AI is a crucial part of the technology we use every day, few studies have examined its significance from the perspective of gender equality.

Little awareness of what algorithms are

Research shows that broad swaths of the Norwegian population know very little about algorithms, a knowledge gap that correlates with gender, age, educational level and place of residence (Gran et al. 2020). The gender difference is large, with far more men than women reporting that they have knowledge and viewpoints about algorithms. A large proportion of women, especially the elderly and less educated, report having no understanding of algorithms at all. Highly educated men living in urban areas most often report that they have a solid understanding of algorithms. According to the researchers, a lack of knowledge about algorithms may represent a problem for democracy as the role of algorithms in internet search, information access and digital platform participation steadily expands (Gran et al. 2020).

Algorithm-driven recommendation systems

Of particular note in the gender equality context is the discussion of how algorithmic recommendation systems in streaming services may be at risk of standardizing and reproducing conventional gender role patterns. When a streaming service's recommender system lacks information about a user, it bases its recommendations on such information as age, gender and place of residence provided in the user's subscription form. Because such systems try to predict what male and female listeners will like and dislike, providing one's gender when opening a subscription can "push" the listener into "gender bubbles" that separate boy music from girl music (Kiberg 2019).

Sexuality, harassment and artificial intelligence

The research literature also discusses ethical and psychological issues related to commercial robots that are being designed to satisfy people sexually and emotionally. Researchers find clear gender differences, with women being more sceptical of robots in general, and of sex robots in particular (Nordmo et al. 2020).

Another approach to sexuality and technology is to look at how people express their sexuality and gender or respond to unwanted sexual attention on digital social platforms, such as computer games. Research indicates that being a “girl gamer” is viewed negatively, and that gender clearly affects a player’s hierarchical standing in computer gaming. According to researchers, the gender dynamics that play out in the gaming world are likely to affect players in real life as well (Arneberg and Hegna 2018). We have also identified research showing that gender-based sexual harassment occurs in digital games and is something women actively address. Women take a variety of precautions to avoid unwanted sexual attention in games, including disguising their gender (Ask et al. 2016).

Discussion and ways forward

Kilden’s report maps Norwegian research about the impact of AI technology on gender equality issues as the technology expands its influence across the population in everyday interactions with public and private services, in the workplace and during leisure time. As the review shows, it is difficult to conclude definitively whether intelligent systems are at risk of reproducing, or even amplifying, the gender differences that already exist in society. Or instead, whether advances in AI technology could help us to achieve a greater degree of gender equality and hinder discrimination.

One consistent criticism is that machine learning algorithms can pass along biases – gender bias, for example – from the data they are fed, and that this may reinforce differential treatment. Experimentation is under way to develop AI-based tools to combat discrimination, but no Norwegian research to date has lent credence to the hope that AI will develop into a gender equality tool.

The scoping review suggests that for AI-based technology to have the positive social effect many observers anticipate, more research is needed about how the technology affects social and gender inequality. Since Norway’s ambition is to pioneer the development and use of artificial intelligence while respecting individual rights and freedoms, research should be conducted on ways to ensure the technology is beneficial to all.

Generally speaking, the findings in this scoping review indicate that in the three thematic areas we have dealt with – services, working life and digital social platforms – there is a need for additional interdisciplinary research and methodological development to strengthen the knowledge base on the gender equality effects of artificial intelligence. It is our sincere hope that this review will inspire such additional efforts.

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