Women in Surveying - Today and Tomorrow

Monika PRZYBILLA, Germany

Key words: women in surveying, female network, gender gap, discrimination, lack of professionals

SUMMARY

Digital transformation and rapid technological advances are leading to large changes in the surveying profession. Smart environments with new working methods offer the best opportunities for women in surveying in the future. In 2018, the annual OECD (Organisation for Economic Co-operation and Development) education report was focused on equity in education ("Education at a Glance", BMBF 2018). The report showed, that there is an increase of women studying in STEM degree courses (science, technology, engineering, mathematics) in the evaluated countries. In line with that, the number of women in the engineering profession and practical surveying is growing, especially in Germany.
For more than 20 years, the International Federation of Surveyors FIG has been inspecting and presenting the topic of "women in surveying" from different national perspectives. Since 2015, the FIG working group 1.2, "Women in Surveying" has been an important part of their activities. Interestingly, Australia is well represented by SSSI Women in Spatial (WIS) group due to their statistical investigation in 2017.
In Germany, the group "Women in Surveying/DVW" exists since 1989 as a network of women, who are working as professionals in surveying. The network is characterized by regular meetings twice a year and offers year-round exchanges of information via social media. Adding up to that, subjects of the German Women's Network are represented in an international context. However, future attention should be focused on the potential of women in surveying, not only in times of lack of young engineers, in order to further increase the number of female surveyors.

ZUSAMMENFASSUNG

Digitalisierung und rasante, technologische Fortschritte führen im Vermessungsberuf zu umfassenden Veränderungen. Die Zukunft in einem intelligenten Umfeld mit neuen Arbeitsmethoden bietet in der Vermessung auch für Frauen beste Chancen. Der jährlich erstellte Bildungsbericht der OECD enthält 2018 als Schwerpunkt die Chancengerechtigkeit im Bildungswesen („Bildung auf einen Blick“, BMBF 2018). In den MINT-Fächern (STEM) ist ein Zuwachs von Frauen im Studium in den untersuchten Ländern zu verzeichnen. Die Zahl von Frauen im Ingenieurberuf und dem Vermessungsalltag wird insbesondere in Deutschland größer. Seit mehr als 20 Jahren hat FIG das Thema „Frauen in der Vermessung“ aus verschiedenen nationalen Perspektiven betrachtet und präsentiert. Im Arbeitsprogramm der FIG- Working Group 1.2 ist „Women in surveying“ seit 2015 fest eingeplant. Australien ist

durch SSSI (Surveying and Spatial Sciences Institute) Women in Spatial (WIS) group und deren statistische Erhebung gut vertreten.
In Deutschland gibt es die Gruppe „Frauen im Vermessungswesen bzw. im DVW“ seit 1989 als Netzwerk von Frauen, die im Vermessungsberuf tätig oder ausgebildet sind. Das Netzwerk zeichnet sich durch regelmäßige Treffen 2mal im Jahr aus und bietet ganzjährigen Austausch über soziale Medien. Die Themen des deutschen Frauennetzwerkes werden im internationalen Kontext vorgestellt. Das Potenzial von Frauen in der Vermessung ist nicht nur in Zeiten von Nachwuchsmangel in den Fokus zu nehmen, um die Zahl der Geodätinnen weiter zu erhöhen.

Women in Surveying - Today and Tomorrow

Monika PRZYBILLA, Germany

1. INTRODUCTION

The current situation of women in the surveying profession is characterized by a shortage of young surveyors, affecting the profession in general. In times of digital transformation, smart data and new work, there are many new opportunities for female surveyors. The positive aspects of "diversity" are far-reaching, but there are still hurdles for female surveyors, which is why a female quota of 50% is still a long way off. As the FIG stated many years ago, women in surveying belong to under-represented groups, not only in Germany, but around the world. Compared to other countries, there is an increasing number of women, while no equality with regard to the number of men and their income (women in European Union EU: minus 16%, Eurostat 2018) is accomplished. Since many years, the DVW – Society for Geodesy, Geoinformation and Land Management – has highly supported the network of "Women in the DVW", which is presented in the following. In the context of the different international framework conditions, further examples for the conditions of multiple other countries are also described. Finally, an outlook is given on future possibilities based on the current situation.

2. HISTORY / DEVELOPMENT OF THE GROUP “WOMEN IN DVW” IN GERMANY

Regarding the situation of women in surveying, the beginnings of the women's network in Germany have to be considered. In 1989, the group "Women in Surveying" was founded upon a suggestion by a professor of geodesy at the Technical University of Munich during the so called “Geodetic Day” in Stuttgart, today's INTERGEO. Subsequently, Jutta Reinhardt from North Rhine-Westphalia was elected as the first leader of the nationwide female group. At that time, very few women learned the profession of a surveyor, both in vocational education and in study. Back then, it was an important concern to evaluate the number of female surveyors and their situation in career terms nationwide. To do so, a group of active women in North Rhine-Westphalia prepared a four-page survey with questions on education, employment and further training. Due to the lack of technical possibilities, the questionnaire had to be distributed nationwide by letter post via the known offices. However, it was difficult to achieve a nationwide survey since there was a lack of willingness within the authorities to pass these letters on. Nevertheless, 800 questionnaires were completed and evaluated by the North Rhine-Westphalia regional group. In 1993, Jutta Reinhardt was able to present the first results from this study under the title "Surveying – a (fe)male profession" at the FIG Congress in Melbourne. As an independent group of women in the surveying profession, characterized by vocational education or diploma from a university of applied sciences or a university, until 1995 the nationwide arrangement of the group was quite difficult, especially without having the global possibilities of using the internet as given today. The meeting once a year during the “geodetic day” was supplemented by an annual working weekend in spring at a central location in Germany, either at the city of Fulda or Kassel, with additional regional meetings 3 - 4 times a

year. During these meetings, documents on topics such as the establishment of a surveying office, application for employment as well as time- and self-management were worked out and distributed within the women's group.
In 1995, the DVW declared to support the group from then on, building an additional junction to the DVW working group. The exchange of information among specialist colleagues and the network idea hence was strengthened under the leadership of Gabriele Dasse. Consequently, the proportion of female members in the DVW increased to 6.9 % in 1998. Nevertheless, there was not a single woman on the executive board. Additionally, only 4.3 % of the members of the DVW working groups were women (ZfV 1999).
Nowadays, the development of the German surveying system offers various possibilities for working in public authorities, industry or as a freelancer. Traditionally, there are only a few women who go into self-employment as chartered surveyor. In 1990, there were no female Publicly Appointed Surveyors (so called ÖbVI) in West Germany and only a few in the former German Democratic Republic (GDR). In contrast, there are already 6 % female ÖbVI in North Rhine-Westphalia (NRW), in Berlin-Brandenburg even 13%, but in other federal states of Germany considerably less (Forum 2018).
Part-time employment models and mobile work (home office), are increasingly offered by administration and industry thus opening up good prospects for women who wish to combine family and career.

3. ACTIVITIES OF THE WOMEN'S NETWORK "WOMAN IN DVW (FiDVW)"

Since the foundation of the women's network, a DVW exhibition booth at INTERGEO has been run by women every year (Figure 1). In addition to the topic of recruiting junior staff, the focus is on personal career planning as well as training and further education. Furthermore, there is a separately organized, but annually meeting of the woman's group on one of the fair days. In general, 20 - 30% of more than 100 members take part in those appointments.
In 2000, the women's group organized a panel discussion at INTERGEO entitled "Career profiles in transition", which dealt with the developments in the new federal states after German reunification. In fact, women in the GDR were less under-represented in technical professions than in Western Germany. For this reason, there were voices which did not consider a special women's group to be necessary. However, enough female participants wanted an exchange in the women's group.
From 2004 on, new possibilities for digital exchange were exploited by forming a Yahoo group with a correspondingly simple e-mail distribution list. The minutes of the meetings as well as corresponding documents can still be filed and viewed in this storage location, which is only accessible to members.

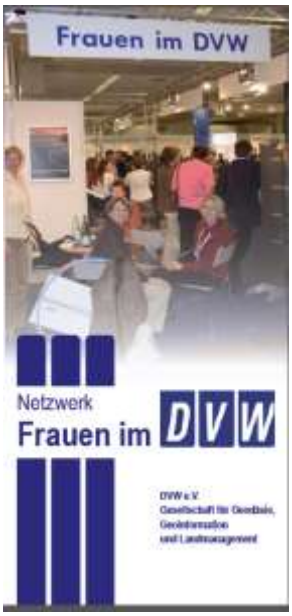

Fig. 1:
Women's exhibition booth at INTERGEO

Fig. 2: The 25th anniversary of the Women's Network in the DVW celebrated at INTERGEO in Berlin in 2014.

"Career planning for women in surveying", in the Surveying Department of Essen University, and "Coaching for Professional Life" were presented by external experts and supplemented internal further female training.

Back in 2010, the women's network prepared a panel discussion on the topic of "Reconciling Family and Career" at the INTERGEO, resulting in intensive discussions within numerous male and female visitors. The title "Family and Career - Presumptuous?" examined the topic not only from the point of view of childcare, which is increasingly being provided by male colleagues, but also with regard to the care of senior people.

Recently, the 25th anniversary of the Women's Network in the DVW, so called FiDVW was celebrated in 2014 at INTERGEO in Berlin with the DVW Presidium and many friends and supporters (Figure 2).

At the same time, a new medium for recruiting young talents was presented in Berlin. Our colleague Gabriele Dasse, who was also active in the FIG for many years, produced a PIXI book with the help of the women's network, aiming at getting children aged 4 - 7 years into contact with the topic of surveying and geodesy (Figure 3). In general, the PIXI booklet is available for kids in many professional fields such as doctors, lawyers, civil engineers, and many more. Hence, this special edition was only created on the initiative of Gabriele Dasse and turned out to be a successful model with a circulation of more than 200,000 copies in Germany. In addition, the booklet is already available in Estonian and French.

Meanwhile, the proportion of women studying surveying and professional education has risen sharply. After graduation, the proportion of women organized in the DVW is currently around 14%. This displays a 100% increase in contrast to only 7% of women present in the DVW 15 years ago (ZfV 1999). Additionally, a member survey in DVW 2014 revealed a strong increase

in the number of younger women under 40 years (Kutterer & Ziem 2015). These are positive signs, but the total number of women in jobs and executing positions still needs to be improved.

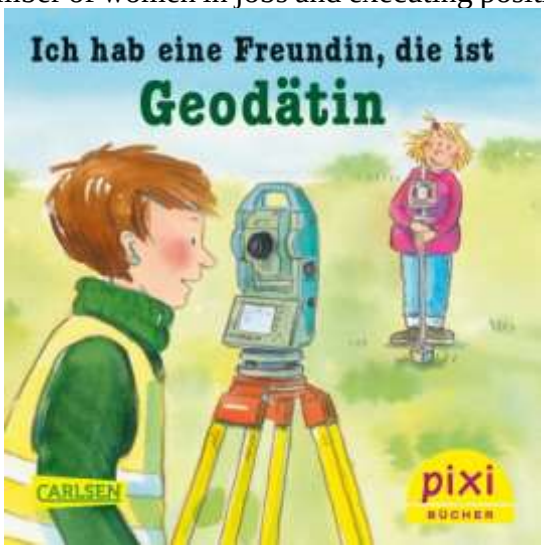

Fig. 3: PIXI book "I have a friend who is a geodesist" (Gabriele Dasse)

4. FIG-ACTIVITIES OF WOMEN ORGANIZED IN THE DVW

Since the FIG Congress in Sofia in 1983, the topic "Women in the surveying profession" has been discussed internationally. In 1993, the chair of the women's group in Germany, Jutta Reinhardt, gave the lecture "Surveying - a (fe)male profession" at the FIG Congress in Melbourne.

Moreover, a FIG Task Force on "Under-represented Groups in Surveying" was established in 1996 and chaired by Gabriele Dasse from Germany from 1998 to 2002. She had been a member of the German Women in Surveying Group since 1990 and leading it as a chair since 1995. At the FIG Congress in Brighton, Dasse presented the topic "Women in Surveying – the long way to acceptance".

The activities of the FIG Task Force on key topics such as gender policy, the status of young professionals and other under-represented groups led to the FIG publication in Vol. No. 35 in August 2006 (Dasse 2006). As a result, the Young Surveyors Group had been founded as working group 1.2 in Commission 1 of the FIG. This group was then further transferred into the Young Surveyors Network (YSN) in 2009, offering young people a permanent institution for exchange and further training.

Thanks to DVW support, both the women's group and YSN are well positioned in Germany as a whole.

5. WOMAN IN STEM (SCIENCE, TECHNOLOY, ENGINEERING; MATHEMATICS)

All across Europe, there are significant differences in the proportions of women in STEM subjects. In general, the gender ratio is much better for women in the former socialist countries of Eastern Europe. Furthermore, the proportion of women in employment in these countries is generally higher.

The OECD average proportion of women studying a science subject is 31%. In countries such as Japan, only 16% of student in science subjects are women, while it is 23% and 24 % in the Netherlands and Switzerland respectively. In contrast, in countries like Denmark, Iceland, Italy and New Zealand, more than 35% of first-year female students already choose a science subject. This provides a good basis for the further career path of women.
Still, recent studies show that only a few women arrive at executive level, both in administration and industry. However, according to the GWK Report (GWK 2017) and the German Education Index 2015, the proportion of German female scientists at universities and research institutions has risen from 8.5% to 22.7% in the last 10 years.
Currently, there are 13% female professors at geodetic universities and colleges. Back in the 1990s, not one single woman worked as a professor and only a few completed a PhD. This extremely positive development should be continued in the future.
To do so, there are many different initiatives in STEM subjects in Germany, especially for women engineers. These are organized and offered by women groups within professional associations (VDI Association of Engineers and DAB German Academic Society). As a consequence of the active promotion of women for the engineering profession, positive effects, at least among first-year students, can be observed.

6. WOMEN IN INTERNATIONAL SURVEYING

The public image of the surveying profession is characterized by strenuous field work on building sites which women do not seem to be able to cope with. In some countries, only a few women face these challenges. Surveying, however, has many more facets and professional activities in which women can perform good work and enjoy doing it.

6.1 Situation in Great Britain

A survey conducted in 2016 by the Royal Institute of Chartered Surveyors (RICS) showed that 42% of women and young girls feel that their careers are disadvantaged because of their femininity. Education at RICS is very demanding and predominantly male-dominated. Although the proportion of women has risen in recent years, it currently remains a modest 14%. RICS targets a figure of 25% for 2020 in order to achieve the recognized benefits of gender diversity. To do so, barriers identified were the conflicting demands of family and career, as well as the male occupation in construction, real estate and surveying.
To overcome this, RICS (2018) advertises with successful RICS women who describe their careers and the current positive professional situation on a specially created website (https://www.rics.org/uk/news-insight/latest-news/news-opinion/female-property-role-models-must-become-more-visible/). For additional support there is a LinkedIn group "Women in Surveying UK" and furthermore the website www.womeninsurveying.com.
A current number of female surveyors in Great Britain from 2017 – with a total of 75,000 geodesists – was given as 15% (Tasso 2017). In order to increase this number, the profession needs actions such as Elaine Ball's "Get kids into Survey, with Geo Ginger & Prof. Topo". These events are attracting young talents through vividly designed advertising as early as in childhood (Forum 2018).

6.2 Situation in Turkey

In their contribution to FIG 2014, Colak and Memisoglu (2014) mentioned a figure of 12-14% for the proportion of women in the surveying profession in Turkey. Now that socio-economic, cultural and technological conditions have improved the overall professional activity of women, the proportion of female employees in surveying is growing along with this development. Importantly, the public perception as a profession for men is changing and convince more women to choose surveying.

6.3 Situation in Australia/New Zealand

The SSSI survey on women in the spatial industry 2017/18 in Australia and New Zealand showed that there has been a small increase of the number of women in the spatial industry in the last 10 years (2017 and 2018 McCutcheon). However, women often take a career break because they bear children, which consequently may lead to fewer career opportunities. The survey revealed that not much of this has changed; there is still a lack of diversity in the surveying profession and thus further efforts for diversity and more women in surveying are urgently needed.

6.4 Situation in USA

The Society of Women Engineer´s (SWE) has published statistics showing that the number of female engineers in the surveying profession accounts for 13%. Nevertheless, an important point is identified in the different and more importantly, lower payment of women for equivalent work. Additional considered barriers are the lack of acceptance in the sales force and the lack of female role models.

6.5 Situation in Africa

Sylla (2018) described the particular challenges facing women in Muslim countries in the FIG congress proceedings. Furthermore, Khouri (2018) reported on the growing number of women with higher education levels in the FIG. Access to land rights and violence against women are the biggest problems to be solved. In fact, Iraq and Congo are cited as examples for discrimination and disadvantage against women. Examples like in these African countries have to be removed through regulations. Therefore, the demand for equal rights for access to land is the basis for female employment. The gender gap is particularly large in the Middle East and North Africa MENA. In an OECD comparison, women in these countries have the lowest general employment rate of 24%, with the global average being 60%.

7. CONCLUSION & OUTLOOK

Surveying in the field is often not the preferred job for women, although the proportion of publicly appointed female surveyors (in Germany) has increased significantly over the last 20 years. New technologies which enabled the transition to mainly work in an office are more suited to the needs of working women and facilitate the balance between family and career. Mobile work (home office) opens up additional opportunities in the surveying profession that have to be further exploited. Still, digital transformation offers good opportunities to reduce the gender gap. Most importantly, the gender bias is a hurdle that can be overcome. However, it remains questionable whether a 50% share of women can be achieved. As long as the OECD's

average value of female first-year students in engineering remains 25% or less, there cannot be equal proportions of women and men in the profession.
This is especially unfavourable, since a lack of women in the surveying profession represents untapped potential in working life. Internationally, there has been an increase in the number of women working as surveyors, which still remains by no means enough. Role models serve as best practice and can arouse the interest of young women. Therefore, the Women in Surveying group in the FIG is a meaningful and important institution, which, together with national groups such as the FiDVW, can make a difference - towards more women in the surveying profession.

REFERENCES

BMBF (2018): OECD "Education at a glance 2018" https://www.bmbf.de/de/bildung-auf-einen-blick-2014-1231.html. Last access: 30.01.2019

Colak, E. & Memisoglu, T. (2014): The Changing Woman Role of Surveyors in Turkey (6934). Proceedings FIG Congress 2014, Kuala Lumpur, Malaysia, 16-21 June 2014

Dasse, G. (2006): Guidelines to Enhance the Representation of Under-Represented Groups in FIG. TS 87 – Under-represented Groups and Ethics. Proceedings FIG Congress Munich, Germany, October 8-13, 2006

DVW (2017): PIXI book "I have a friend who is a geodesist" sold out! https://www.dvw.de/dvw-taxonomie/dvw/pixi-buch. Last access: 30.01.2019

Eurostat (2018): The unadjusted gender pay gap, 2016, https://ec.europa.eu/eurostat/statistics-explained/index.php/Gender_pay_gap_statistics. Last access: 30.01.2019

Forum (2018): Forum – Zeitschrift des Bundes der Öffentlich bestellten Vermessungs-ingenieure e.V., Vol. 1/2018, page 32. http://www.elaineball.co.uk. Last access: 30.01.2019

GWK (2017): Chancengleichheit in Wissenschaft und Forschung. Gemeinsame Wissenschaftskonferenz (GWK), Heft 55 ISBN 978-3-942342-45-2. https://www.gwk-bonn.de/fileadmin/Redaktion/Dokumente/Papers/GWK-Heft-55-Chancengleichheit.pdf. Last access: 30.01.2019

Khouri, R. (2018): Women and Land in the Muslim World. Proceedings FIG Congress Istanbul, Turkey, May 6–11, 2018

Kutterer, H. & Ziem, E. (2015): Mitgliederbefragung des DVW 2014. zfv – Zeitschrift für Geodäsie, Geoinformation und Landmanagement. Vol. 5/2015, DOI 10.12902/zfv-0085-2015

McCutcheon, R. (2018) Status of women in the spatial industry (9472). Proceedings FIG Congress Istanbul, Turkey, May 6–11, 2018

Quaiser-Pohl, C. (2012). Mädchen und Frauen in MINT – ein Überblick. In Stöger, H. & Ziegler, A. (Hrsg.), Mädchen und Frauen in MINT – Bedingungen von Geschlechtsunterschieden und Interventionsmöglichkeiten (S. 13-39). Münster: LIT Verlag.

RICS (2018): Female surveyors: giving something back. https://www.rics.org/mena/news-insight/latest-news/news-opinion/female-surveyors-giving-something-back/. Last access: 30.01.2019

Sylla, O. (2018): Women land rights in postconflict: building evidences. Proceedings FIG Congress Istanbul, Turkey, May 6–11, 2018

Tasso, K. (2017): How do we get more women into surveying? http://www.kimtasso.com/get-women-surveying. Last access: 30.01.2019
Zeit Online (2017): Deutschland führend in technischer Ausbildung. https://www.zeit.de/gesellschaft/zeitgeschehen/2017-09/oecd-bildungsbericht-ausbildung-mint-faecher-frauen. Last access: 30.01.2019
ZfV (1999): DVW-Nachrichten 2/99. Zeitschrift für Vermessungswesen, Vol. 2/99, page V

BIOGRAPHICAL NOTES

- University Degree in Geodesy, studies at RWTH Aachen and Bonn University
- Long term activities in DVW working group “Profession/Education”. Chair since 2015
- Project manager “Geoinformation Systems” at the Regional Association Ruhr (RVR)

CONTACTS

Dipl.-Ing. Monika Przybilla
Regionalverband Ruhr
Kronprinzenstrasse 35
45128Essen
GERMANY
Tel. +49 234 3210517
Email: monika.przybilla@dvw.de
Web site: https://www.dvw.de