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Służba wojskowa kobiet w Polsce w perspektywie rekrutacji kobiet do Wojskowej Akademii Technicznej

Women's military service in Poland in the perspective of recruiting women to the Military University of Technology

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Abstract. Since 1999, Poland has become a member of the North Atlantic Alliance. The aftermath of this event was that women were allowed to serve in all military positions. At the same time, military academies gave women the opportunity to study on terms previously available only to men. The forerunner in this area was the Military University of Technology (WAT), which not only was the first to open the Academy to female cadets, but also educated the largest number of female officers. The existing research gap regarding the process of transformation of the Armed Forces of the Republic of Poland in the context of educating a highly qualified officer corps, taking into account fundamental changes in ensuring women have access to all officer positions, required an analysis of the process of recruitment and education of women for military service by the largest military university in Poland. Now, after 20 years of training, it is possible to evaluate this process, which became the purpose of this article. The question of how the number of women at the WAT changed in the process of recruitment and enrollment was adopted as a research problem. The intention of the Authors is not only to identify existing trends, but also to highlight the distinguished role of the Military University of Technology in this area. It was assumed (research hypothesis) that not only the interest of women in military studies is increasing, but also the number of women choosing technical education is increasing, as well. The article uses research methods in relation to the cognitive and praxeological research problem: systematic literature review, quantitative methods and qualitative methods, comparative methods, concretization, and formalization methods. The research conducted clearly indicates an upward trend in women's interest not only in military studies, but also in studying at the Academy in general. Although some fluctuations over a period of more than 20 years are

noticeable, they are due to economic, demographic, or political factors. Nevertheless, the article clearly shows the significant role of the Military Academy of Technology in educating female officers and thus meeting the requirements of a modern, professional army.

Keywords: professional army, women's military service, military recruitment, Military Academy of Technology, military education

Abstrakt. Od 1999 roku Polska jest członkiem Sojuszu Północnoatlantyckiego. Pokłosiem tego wydarzenia było umożliwienie kobietom służby na wszystkich stanowiskach wojskowych. Jednocześnie akademie wojskowe dały możliwość studiowania kobietom na zasadach dostępnych dotąd jedynie mężczyznom. Prekursorem w tym obszarze była Wojskowa Akademia Techniczna (WAT), która nie tylko jako pierwsza stworzyła mury dla pań podchorąży, ale również wykształciła największą liczbę oficerów – kobiet. Istniejąca luka badawcza dotycząca procesu przemian Sił Zbrojnych Rzeczypospolitej Polskiej w kontekście kształcenia wysoko wykwalifikowanego korpusu oficerskiego z uwzględnieniem fundamentalnych zmian w zakresie zapewnienia kobietom możliwości dostępu do wszystkich stanowisk oficerskich, wymagała podjęcia analizy procesu rekrutacji i kształcenia kobiet na rzecz służby wojskowej przez największą wojskową uczelnię wyższą w Polsce. Obecnie, po 20 latach kształcenia możliwe jest dokonanie ewaluacji tego procesu, co stało się celem niniejszego artykułu. Jako problem badawczy przyjęto pytanie: jak zmieniła się liczba kobiet na WAT w procesie rekrutacji i przyjęcia na studia. Intencją Autorek jest nie tylko wskazanie istniejących trendów, ale również podkreślenie ogromnej roli Wojskowej Akademii Technicznej w tym obszarze. Założono (hipoteza badawcza), że nie tylko zainteresowanie kobiet studiami wojskowymi jest coraz większe, ale również zwiększa się liczba kobiet wybierających wykształcenie techniczne. W artykule zostały wykorzystane metody badawcze w odniesieniu do problemu badawczego poznawczego oraz prakseologicznego: systematyczny przegląd literatury, metody ilościowe oraz metody jakościowe, metody porównawcze, metody konkretyzacji i formalizacji. Przeprowadzone badania jednoznacznie wskazują na tendencję wzrostową zainteresowania kobiet nie tylko kierunkami wojskowymi, ale i studium w Akademii w ogóle. Zauważalne są wprawdzie pewne fluktuacje na przestrzeni ponad 20-letniego okresu, jednak wynikają one z czynników gospodarczych, demograficznych czy politycznych. Niemniej jednak artykuł wyraźnie pokazuje znaczącą rolę Wojskowej Akademii Technicznej w kształceniu kobiet – oficerów i tym samym spełnianiu wymagań nowoczesnej, profesjonalnej armii.

Słowa kluczowe: profesjonalna armia, służba wojskowa kobiet, rekrutacja na studia wojskowe, Wojskowa Akademia Techniczna, szkolnictwo wojskowe

Introduction

The abolition of compulsory military service and the steps taken to create a professional army involved many changes regarding the functioning of the Polish armed forces. One of them was the decision on the possibility of military qualification for women. A milestone in the area of women's military service was 1999, when Poland became a member of the North Atlantic Alliance. This was the moment when women gained access to all military positions. Of considerable importance in the process of replenishing the ranks of the military with women was played by military universities, especially the Military University of Technology. It is not only the largest military academy in Poland, but also the first to admit women as officers.

It is reasonable to evaluate the number of women in the Polish armed forces precisely on the example of the history of this university and its experience, related to the service of women, which is now more than 20 years. The key in this regard is to first learn about and analyze existing trends, which has become the purpose of this publication. The question of how the number of women at WAT changed in the

process of recruitment and admission to the university was adopted as a research problem. The intention of the Authors is not only to indicate existing trends, but also to highlight the distinguished role of the Military University of Technology in this area. It was assumed (research hypothesis) that not only the interest of women in military studies is increasing, but also the number of women choosing technical education is increasing. In the article, research methods were used in relation to the cognitive and praxeological research problem. At the stage of data collection, non-reactive methods were used, which primarily include a systematic literature review. At the stage of data analysis, selected quantitative methods and qualitative methods were applied. At the stage of data evaluation, comparative methods were used. Regarding the praxeological research problem, the methods of concretization and formalization were used to formulate final conclusions and recommendations (Skarbek, 2013). The research conducted clearly indicates an upward trend in women's interest not only in military studies, but also in studying at the Academy in general. While some fluctuations over a period of more than 20 years are noticeable, they are due to economic, demographic, or political factors. Nevertheless, the article clearly demonstrates the significant role of the Military Academy of Technology in educating women officers, highly qualified specialists and thus meeting the requirements of a modern, professional army.

The following structure of the article presents a systematic review of the literature, which clearly indicates the need to present research on women's education in military fields due to the small number of publications in this area. The next section is the authors' own research, and a discussion of the research results is presented. The entire article ends with a summary of the presented results and final conclusions.

The whole is crowned with a conclusion containing a summary of the presented results and final conclusions.

Literature review

The literature review conducted shows that most of the articles on women's military service in general are publications on the Internet, most often short, popular-scientific mentions or interviews conducted, such as an interview with the commander of the Territorial Defense Forces (Kukuła, 2020) or with the pro-rector for military affairs of the Military University of Technology (Kaliciak, 2022).

In contrast, the number of strictly scientific publications is exceedingly small, which is also emphasized by other researchers dealing with the issue of women soldiers. Most are articles presenting the face of women who played a significant role in the history of our country. For example, we can mention the study on the participation of women in the January Uprising (Baranska, 2022) or the presentation of profiles of selected women involved in the underground organization during

the struggle for the rebirth of Poland (Pawlaczyk, 2021). Few articles deal with the sociological perception of women in the army (Drapikowska, 2021; Judzińska, 2021). It is also possible to find publications in which quantitative changes in the number of women are analyzed, but these are positions that present results that are outdated now, because they are a decade old (Drapikowska, 2013; Palczewska, M., Drapikowska, B. 2014).

Research on the participation of women in military education is nonexistent, despite the fact that as early as 2011 Col. Beata Czuba emphasized in her publication (Czuba, 2011) that it is necessary to monitor the effectiveness of the education system with regard to the group of women soldiers. In 2012 Tadeusz Rotter analyzed selected psychological problems that arise in connection with the professional military service of women, but in very general terms. In 2016 Marta Tyśkiewicz published the results of a survey conducted at the Air Force Officers School in Dęblin on the process of integration of women in the candidate service (Tyśkiewicz, 2016). A more recent study, however, only narrowly focused on the physical fitness components of female candidates for the military academy was conducted in 2021. (Chodała, Stupnicki, 2021). The article, however, concerned only the assessment of strength, speed, and endurance abilities. A slightly broader view, as it considered the impact of physical fitness and level of attention on the academic achievement of military academy students in relation to the female and male sexes, was presented in 2012. (Jamro et al., 2012).

Thus, in the Polish literature, the presence of scientific research on women in military universities is negligible, and most of it is from many years ago, which means that the results presented may have become outdated. The conclusion, therefore, is the need to present current scientific considerations in this area.

The review of foreign literature in the subject area is more extensive. Many publications deal with gender inequality. Such studies on both military and civilian students were presented, for example, in Canada, which, according to the authors (Archer, 2017, Scoppio et al., 2020), is considered a forerunner in opening military positions to women. Perceptions were evaluated regarding gender equality and how women are treated at universities. Gender by leadership characteristics among West Point cadets was studied in 2004 (Morgan, 2004), and the differences found were minimal. The need for urgent action and implementation of gender equality policies in military academies was highlighted in an article by Atanasova-Krasteva (Atanasova-Krasteva, 2019). This was considered a key element in ensuring national and international security, including the preparation of motivated soldiers with diverse knowledge and competencies also in terms of gender balance. A big problem in the armies of other countries is also the topic of sexual violence, which is also often mentioned in scientific publications, not only in relation to military education (Sadler, et al. 2000; Mattocks et al., 2012).

Topics addressed in foreign articles also include elements related to women's military service in the broadest sense and concern, for example, combat stress, health, or service-related injuries.

The publications cited above, despite the different topics, unequivocally emphasize the need for the presence of women in the military and their effectiveness in many situations, including battlefield. Moreover, they indicate the paucity of articles related to the military service of Polish women, especially those served at military universities. In addition, due to the polytechnic nature of military studies at the Military University of Technology and the Academy's position as a leader among military universities, the area of scientific consideration will include the largest number of women in military studies. The key in this regard is to first learn about and analyze existing trends, which has become the purpose of this publication.

Own research

Quantitative analysis

As outlined above, women were given the opportunity to run for higher officer schools in 1999. At that time, 69 women were enrolled in military service, and in early 2003 women accounted for only 0.3% of the total number of soldiers. The legislation at the time opened up access for women to all service positions. However, this opportunity alone was no guarantee of willingness to enter demanding profession as a soldier. Currently, women chose this career path and continue to do so today. Nowadays, there are various ways to join the army, but the appointment within the military academies is the oldest of the possibilities, while at the same time supplying the largest number of female officers, which is why the largest military academy in Poland, i.e. the Military University of Technology, was taken as the subject of the study. A summary of the quotas for military academies (Military University of Technology – WAT, Polish Naval Academy – AMW, Military University of Land Forces – AWL, Polish Air Force University – LAW) in 2012-2022, shown in Figure 1, can evidence this potential.

Of course, it should be noted that many factors affect the number of people admitted. These include issues related to economic, demographic, economic, social, and political factors. They cause fluctuations in the analyzed series, but the trend is clearly upward, and the overall assessment is positive. It is also necessary before presenting the results of the study to point out that in 1996-1999 there was no enrollment of women in military studies, while in 2002-2005 enrollment in military studies was completely suspended for all candidates.

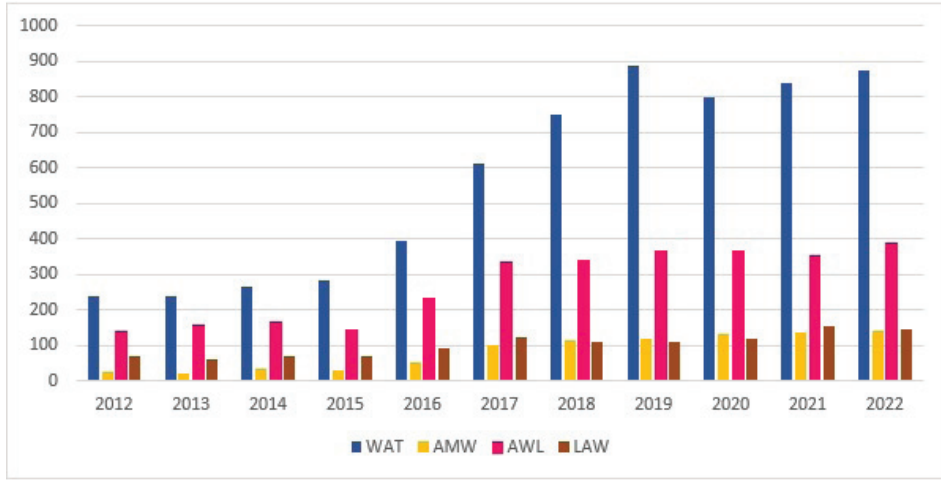


Fig. 1. Summary of limits at Polish military academies training officer cadets from 2012 to 2022
Source: <https://isap.sejm.gov.pl/> [Accessed: 26 June 2023]

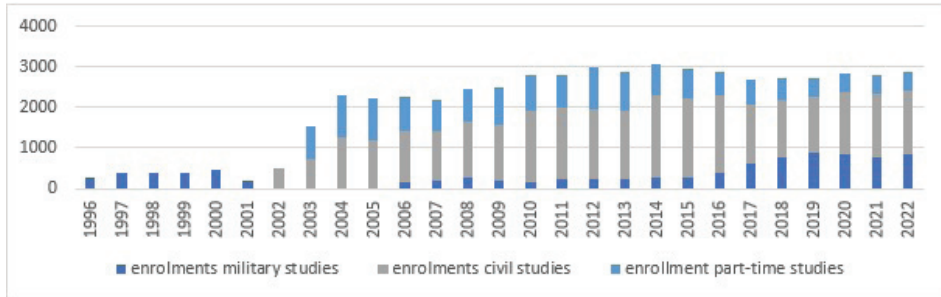


Fig. 2. Total number of students enrolled in all types of studies at the Military University of Technology
Source: Ministry of National Defense and Military University of Technology

It is worth highlighting the fact that the growing interest of women in technical colleges, also observed at other universities. These trends are shown in Figure 3.

The following section of the study presents the results for military studies only.

Enrollment limits for military studies are decided by the Minister of Defense. Each time a decree is published on the limits of places on courses of study for candidates for professional soldiers at individual military universities, while the decree specifies the conditions and procedures for enrollment in military universities for a given academic year. The allocated limits are based on needs and plans for the development of the armed forces.



Fig. 3. Total number of women admitted to all types of studies at the Military University of Technology
Source: Military University of Technology

The number of candidates for military studies changes every year. It is also accompanied by slight decreases, but the trend is upward, as confirmed by Figure 4. It juxtaposes the limit provided for a given recruitment (blue bar) with the total number of candidates without gender breakdown (orange bar) and the number of female candidates (gray bar).

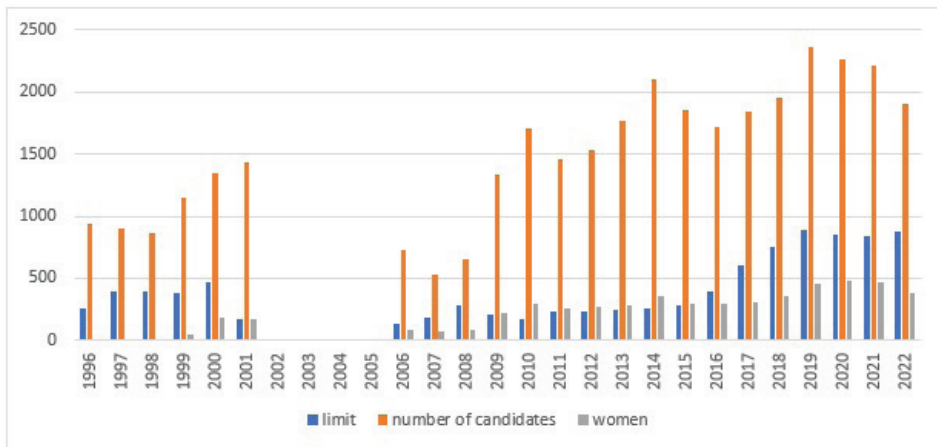


Fig. 4. The number of applicants to the Military University of Technology from 1996 to 2023
Source: Ministry of National Defense and Military University of Technology

As can be seen in the chart above, the number of women willing to join the ranks of the academy, in terms of numbers, also shows an upward trend. However, accurate information in this regard will express only the percentage of women in the total number of candidates, as presented in Figure 5.

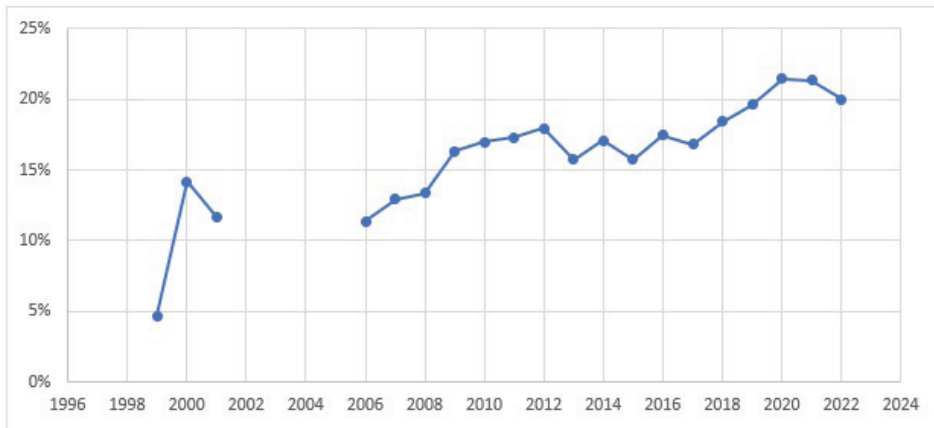


Fig. 5. Percentage share of women among all candidates to the WAT in 1999-2023

Source: Own studies

As the figure above shows, the percentage share of women among applicants to the Military University of Technology has a clear upward trend.

An identical analysis was made for those who were admitted to the university, in order to show the relationships that exist in this area. The number of military students admitted to the Military University of Technology is influenced primarily by the quotas set by the Ministry of Defense. The changes over the period under study are shown in Figure 6.

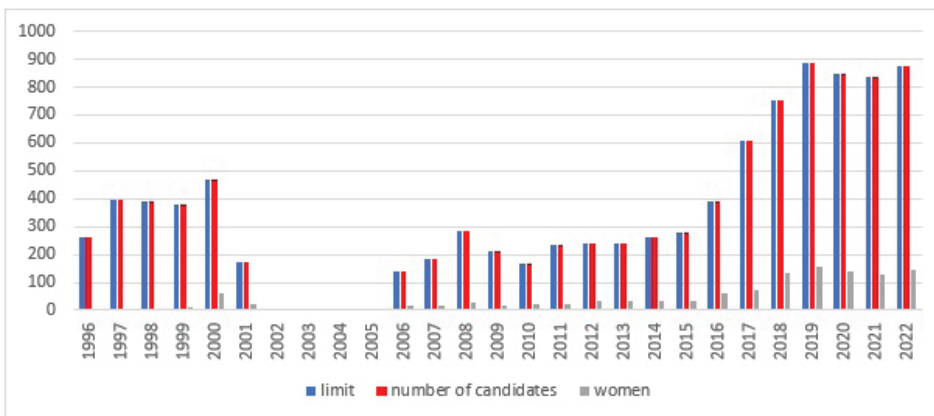


Fig. 6. Number admitted to military studies at the Military University of Technology from 1996-2022

Source: Ministry of National Defense

From the above figure, it is clear that the quotas adopted for the Academy each year are filled 100%, which indicates a very high interest among young people in military studies. Invariably, the increase in the interest of women is also evident. Similarly, this is presented in percentage terms (Figure 7).

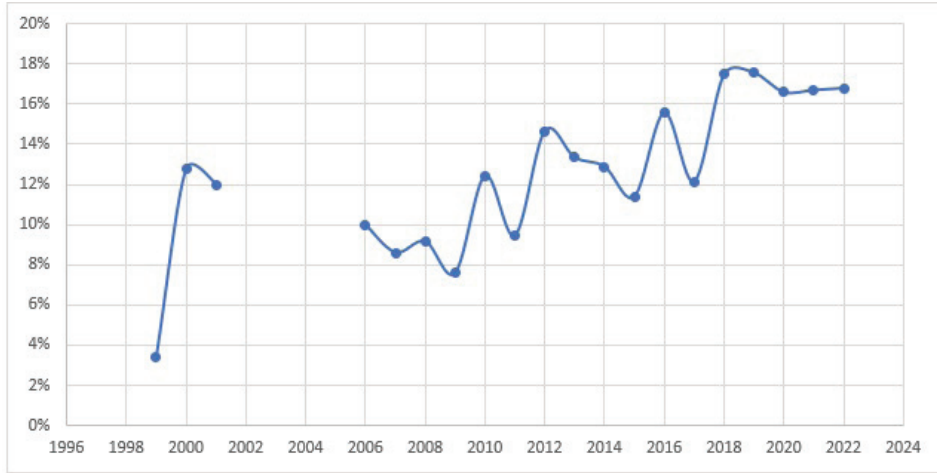


Fig. 7. Percentage of women among all WAT military students from 1999 to 2023

Source: Own studies

Trend analysis

To study the trend, we used observations from 2006-2022. We omitted data from before the suspension of military recruitment due to their distance in time. In the time series $\{x(t)\}_{1 \leq t \leq n}$ thus taken, we identify a linear trend of the form (Borucka, Kozłowski, 2023; Grzelak et al., 2021):

Where $\{\{\varepsilon_t\}_{1 \leq t \leq n}$ is a sequence of independent random variables with a normal distribution $N(0, \sigma^2)$. To identify the trend in equation (1), we create a system of

$$Y = X\beta + \varepsilon \quad (2)$$

where

$$X = \begin{bmatrix} 1 & 1 \\ 1 & 2 \\ \vdots & \vdots \\ 1 & n \end{bmatrix}, \quad Y = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}, \quad \varepsilon = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{bmatrix}, \quad \beta = \begin{bmatrix} \beta_0 \\ \beta_1 \end{bmatrix}$$

and $X \in \mathbb{R}^{n \times 2}$; $Y, \varepsilon \in \mathbb{R}^{n \times 1}$, $\beta \in \mathbb{R}^{2 \times 1}$

Using the method of least squares, we estimate the values of the model coefficients using the formula (Wooldridge, 2019; Borucka, Kozłowski, 2023)

$$\hat{\beta} = (X^T X)^{-1} X^T Y \quad (3)$$

We determine the vector of residuals as $\varepsilon = Y - X\hat{\beta}$. The coefficient of determination (Borucka, Kozłowski, 2023)

$$R^2 = 1 - \frac{\sum_{t=1}^n \varepsilon_t^2}{\sum_{t=1}^n (x_t - \bar{x})^2}, \quad (4)$$

Where $\bar{x} = \frac{1}{n} \sum_{j=1}^n x_t$ as an estimator of the variance of the residuals

Variance values of structural parameters (Wooldridge, 2019).

Thus, each of the structural parameters has a normal distribution, $N(\hat{\beta}_i, S_i^2)$ for (Borucka, Kozłowski, 2023). At a significance level we form a working hypothesis: $H_0: \beta_j = 0$ and the alternative hypothesis $H_0: \beta_j \neq 0$.

for $j \in \{0, 1\}$ test statistic $T_j = \frac{\hat{\beta}_j}{\sqrt{S_j^2}} \quad (5)$

has a student's t distribution with degrees of freedom (Woodward, 2017). The test probability is (Grzelak et al. 2019):

$$p. val_j = 2 \left(1 - \Psi(|T_j|) \right)$$

Where $\Psi(\cdot)$ is the distribution of the Student's t-distribution with degrees of freedom. If $p. val_j < \alpha$ then for the parameter we reject the working hypothesis in favor of the alternative hypothesis, so the time factor significantly affects the realization of series (1).

A linear trend was determined for two variables. For the number of female candidates for military studies at the Military University of Technology and the number of women who passed the recruitment stage successfully. For each of the series examined, the number of observations $n = 17$. The estimated parameters of both models are presented in Table 1 and Table 2.

Table 1. Estimated parameters of the linear trend model for the number of female military candidates

	Estimate	Std. Error	t value	p-value
	86.36	28.067	3.077	0.00767
	22.855	2.739	8.344	5.11

Source: Own study

Table 2. Estimated parameters of the linear trend model for the number of women enrolled in college

	Estimate	Std. Error	t value	p-value
	-21.676	12.342	-1.756	0.009
	9.500	1.204	7.887	1.02

Source: Own study

For both models all estimated coefficient parameters are statistically significant. Moreover, the calculated coefficient of determination is also satisfactory, taking a high value of 82% for the first model and 80% for the second.

Discussion of results

Both the quantitative analysis and the trend study show that women's interest in military service, as expressed by their desire to study at the Military University of Technology, is steadily increasing. This is illustrated in the figures below, which present the determined trend line for the number of women recruited to study (Figure 8) and those accepted (Figure 9).

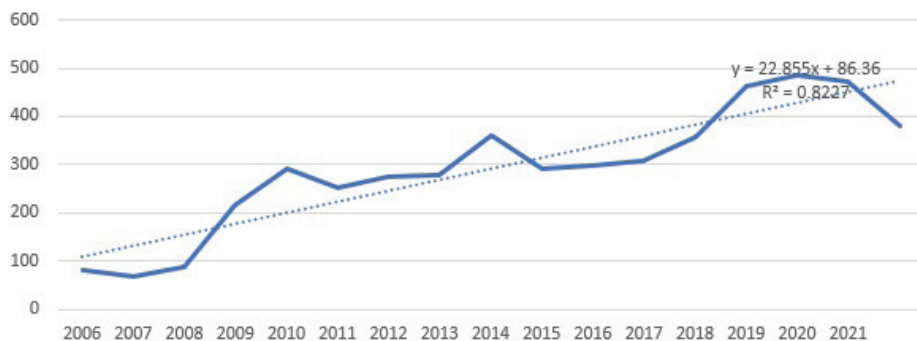


Fig. 8. The fitted trend line for the number of female WAT candidates

Source: Own study

The developed models are statistically significant and have high coefficients of determination, which allows us to conclude that the authors' predictions were correct and succeeded in demonstrating the additive direction of the trend, which means a systematic increase in women's interest in studying at WAT.

The trend of growing popularity of military studies at the Military University of Technology among women indicates the prospect of an increasing number of women in the officer corps - primarily in key areas of the army's functioning in

highly qualified positions requiring competences in the field of new and breakthrough technologies in all operational domains of the Armed Forces.

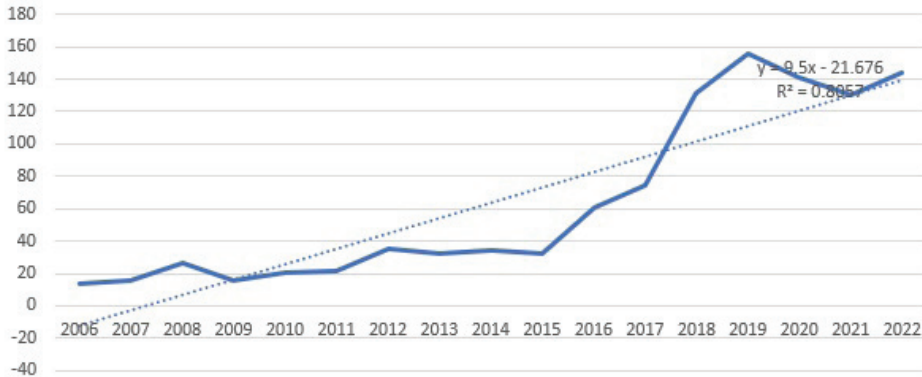


Fig. 9. Fitted trend line for the number of female military students at WAT

Source: Own study

The Military University of Technology meets the goals of increasing the percentage of women in the armed forces also presented by the North Atlantic Alliance. The highest percentage of women performing military service in Poland, presented by the WAT, is consistent with the international policy of increasing the role of women in security area.

The number of women studying military studies at the Academy exceeds the general average percentage of women in the Polish Armed Forces and constitutes on average more than half of the number of women studying in all officer military academies. However, detailed data on the participation of women at other military universities are not known. The ongoing trend in this respect at the WAT also confirms its leading position in military education.

This situation also indicates the growing popularity of military polytechnic studies and STEM fields of studies at the Military University of Technology among women, as well as career planning for highly qualified positions in the Polish Army. This trend was not stopped by the closure of recruitment for military studies for several years.

The increased interest in women's military studies at the Military University of Technology may also indicate the importance of double education - polytechnic and military, which allows after the end of military service to pursue a professional career in professions requiring exact sciences qualifications and ensuring professional stability.

Educating women in military studies at the Military University of Technology is an important link in strengthening the image of women in the army and their service.

Taking into account the active policy of the Military University of Technology in the promotion of military studies, the opportunities and scientific achievements of female students presented during promotional campaigns, it can be assumed that the example of the wide presence of women in military studies has a significant impact on strengthening the trend of increasing interest in polytechnic military studies.

Also noteworthy is the growing share of women among the WAT cadets - this proves the opposite situation to the trend at civilian universities, where the percentage of women studying polytechnic fields is significantly lower than in humanities studies. Women choosing military studies more often decide to study at the Military University of Technology - the most demanding military and polytechnic studies in Poland in terms of curriculum. This tendency may translate into the perception of military polytechnic studies as the most attractive form of military service.

The increasing participation of women in military polytechnic studies ensuring hard skills of the future may constitute a determinant for the development of programs motivating young women to choose military service in the officer corps, taking into account the predispositions and skills of secondary school students in the field of exact sciences.

Conclusions

The experience of more than 20 years shows that women in the Polish army have found their place and are fulfilling themselves in many, hugely different service positions. A huge role in attracting women officers has been played for many years by the Military University of Technology, which has been a forerunner in admitting women to military studies. The analysis conducted in this publication is unique in the country because of the range of information. It allowed the authors to analyze existing trends regarding interest in studying at Poland's largest military academy, with a special focus on women. It also made it possible to answer the research question posed in the introduction and show how the number of women at the WAT in the recruitment and admission process changed over the period studied. The adopted research hypothesis was confirmed: women's interest in military studies is increasing, and the number of women choosing technical education is also increasing. It is worth mentioning that such a decision may be influenced by the fact that the military is an example of an employer that provides equality in terms of wages and promotions. In addition, access to opportunities for advancement, additional education and upgrading of skills does not depend on gender in the Polish army. Moreover, military universities are an excellent tool for combating stereotypes about women, they influence the formation of the service culture due to the fact that the presence of female cadets is a natural issue in them, and graduates of military studies are familiar with the service environment, in which women

are present from the beginning. This is especially important in the context of the fight against stereotypes and concern for women's equality. Since the opening of military universities to female candidates and providing them with access to officer positions after completing their military studies, Poland has been a leader in Europe and among the member states of the North Atlantic Alliance in terms of women's military service. A social feature of military service in Poland is the guarantee of gender equality, which is one of the factors contributing to increased interest in military service among women. Similarly, elements related to the attractiveness of the military STEM (science, technology, engineering, and mathematics) majors offered by the Military University of Technology and the prospect of employment in areas applying the latest military technologies contribute to the growing popularity of military studies among young people. The presented studies will be continued. They are only an introduction to the detailed analysis and evaluation of the recruitment process that is planned as part of further research. The authors intend to make an in-depth study of the factors that influence the decision to study military studies and shape the recruitment process. The results of this research will be published soon.

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