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Defence Innovation and Women's Participation in the Armed Forces: An Analysis of PISFLEMB

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Abstract: Throughout history, on several occasions, technological advances have driven fundamental changes in the defence sector. The increasing availability and technological dependence led to the redefinition of pre-established functions, the modification of the main missions, and even the rearticulation of traditional values of the military institution. From this perspective, the article aims to answer the following question: in what way did the Project for the Integration of Female Personnel in the Line of Military Warfare Education (PISFLEMB) promote innovation in the Brazilian Armed Forces? It is argued that the participation of women in a traditionally male institution is responsible for generating organizational innovation, both in values and conduct. Data will be collected through official documents and primary sources as modelled for analysis of military innovations. The study is distinguished by the understanding that innovations in the defence sector are an opportunity for transformation and a stimulus for changing patterns of conduct.

Keywords: innovation; women; Armed Forces; technology; Brazil.

Introduction

Since the end of the Cold War, defence innovations – technological and doctrinal – have led the transformation of the Armed Forces. Two trends stand out: doctrinal demands for specialized knowledge and training, and demands for new equipment and systems to respond to changing threats and technologies. Most published studies on defence innovation address situations in which the military needs to change its doctrine to adapt to already developed technologies. In general lines, this article intends to demonstrate the importance of both technological and non-technological innovations.

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The proposal starts from the sense that technological changes do not revolutionize warfare by themselves; this happens, according to Adamsky (2010), only after the military creates new organizational structures to integrate technology into doctrine. The core of innovation is not the development of new weapons, nor their adoption, but the intellectual mastery of them; that is, the knowledge of how to fight. To this end, the development of effective doctrine in the employment of technology is critical.

The argument is also in line with how Sloan (2008) defines military transformations. For the author, a Revolution in Military Affairs (RMA) occurs when there is a major change in the nature of war brought about by the innovative application of technologies that, combined with drastic changes in military doctrine and operational and organizational concepts, fundamentally alter the character and conduct of military operations.

Women have been in the military institution throughout history, in most cases playing a supportive role (Caire 2002). The incorporation process, which started mainly with the advent of the World Wars, was not without interest on the part of the Armed Forces. The lack of manpower, the end of compulsory conscription, and the disinterest of the young made the Forces pay attention to a large part of the population, which, until then, had been kept away from the ranks (Segal 1999; Carreiras 2004).

The world political changes, the democratization process of societies, and the expansion of equality rights between genders, resulting from economic and social transformations, as well as from feminist movements, also acted in favour of the incorporation of the female contingent (Mathias 2005).

Thus, the article aims to answer the following question: in what way did the Project for the Integration of Female Personnel in the Line of Military Warfare Education (*Projeto de Integração de Pessoal do Sexo Feminino na Linha de Ensino Militar Bélico* – PISFLEMB) promote innovation in the Brazilian Armed Forces? It is proposed that the participation of women in a traditionally male institution with a hierarchical structure (Janowitz 1967) is responsible for generating an organizational innovation, both in values and conduct; in other words, more specifically, in the Brazilian case, the implementation of the Project transformed training, teaching and doctrine.

The research strategy chosen for this article is qualitative. Although the intention of generalizing the findings to other cases or situations is present, the first step is to present a deeper understanding of the reality (Mahoney 2010; Rezende 2011; Cano 2012). In this sense, the study focuses on Brazil, more specifically, on the PISFLEMB, a project of the Brazilian Army (*Exército Brasileiro* – EB) responsible for implementing, among others, important adaptations in Educational Establishments in order to prepare them to receive and train the first female career military officers, in conditions comparable to those already granted to males.

In the theoretical field, the option is to approach the problem from the expanded concept of innovation (non-deterministic and socially constructed), because it is understood that in recent decades there has been a growing and notable attention to discussions focusing on the formal, technological and economic aspects of innovation, without, however, taking into account the great importance of the non-technological dimension to the analysis (Pereira and Romero, 2013). With this in mind, the study now

proposed presents the main ideas of this approach and illustrates it with the help of a case study. It is emphasized that the model used for the analysis is applicable to different innovations in the area.

Thus, the article is organized in four sections. After this introduction, the theory that underlies the study is presented, followed by a historical contextualization of the research problem, then the empirical strategy employed is presented, and, finally, the findings are discussed.

Theoretical framework

Throughout the 1990s, various military doctrines were developed motivated by changes in the international environment. The end of the Cold War reinforced the need for Armies to adapt from being mass forces to being lighter and more adaptable; the requirement was to go to the threat and for that threat to be as far away from the homeland as possible (Sloan 2008).

The set of changes and technological advances in the military was initially treated as the Revolution in Military Affairs[1], reflecting on the one hand the great increase in computer power, improvement of physical components, and the decrease in costs; and on the other hand, an effort to develop an alternative to war, less and less tied to the amount of material available (Davis 1996). Dominance on the battlefield would go beyond physical supremacy to reach informational superiority (Chapman 2003).

However, there are alternative positions, such as that of Stephen Biddle (1998), who understands that military innovations and their transformations belong to a continuum, that is, they are an evolution in search of better alternatives to deal with the complexities of war, but are inserted in a larger set of strategies, among which the human and organizational factors have great relevance. Boot (2006) also adds that it is not about the production of a particular weaponry, but rather how the new technology is employed and incorporated into the process that will ensure military advantages.

There are authors who problematize the very concept of Revolution as they believe it is too limited in claiming to describe unpredictable changes, believing, instead, in the greater appropriateness of the notion of Military Transformation that would be associated with a deep, but ongoing and not necessarily rapid change (Sloan 2008; Davis 2010). Institutions that were not attentive to daily changes would become ineffective (Murray and O'Leary 2002).

In this sense, Covarrubias (2005) places a high value on technology, when states that the evolution of the Armed Forces is basically tied to it, which, in turn, generates effects on military tactics and strategy, feeding a process of change, without which it would not be possible to innovate; that is, the capacity for innovation would also be associated with the forms of organization, preparation, and employment of power (Gusmán, Neto and Schmitt 2014; Azevedo 2018).

While the technological component is often an important initial condition for a succession of events, for Adamsky (2010) a true revolution depends on the confluence of weapons, operations, organization, and vision of future warfare. By studying three cases

– the Soviet Union, the United States, and Israel –, the author realized that the variation in the military innovation process of these countries was tied to the strategic culture[2] of each. Therefore, the structural factor and the technologies represent the starting point of the military transformation, while the cultural factor alone is not enough, but constitutes an essential intermediate variable[3] that conditions the path of innovation.

Innovation in the defence sector has as some of its objectives the search for greater efficiency, the creation of specific competencies, and the achievement of advantages over adversaries; in general, it occurs in two main ways: technological innovations and non-technological innovations. Technological innovations are responsible for creating or improving products, services, and the defence production process, and these are material or tangible, whereas non-technological innovations are related to the art of war – that is, they enable procedural, doctrinal, organizational, strategic improvements and/or create competencies for the employment of technological innovations (Azevedo 2018).

Non-technological innovations play a crucial role and significantly influence the Forces' performance. This is the case, for example, with the attention required by physical training, responsible for empowering and developing individual skills and competencies, combined with continued education throughout the entire career. Likewise, the ability to deploy new ideas as scenarios evolve and to propose doctrinal innovations that are easily understood are fundamental to interaction, coordination, and unity of command. Chart 1 presents and classifies innovations in the defence sector.

Chart 1. Classification of Defence Innovations

Technological Innovation		Material or tangible innovations; introduce or significantly improve some Military Employment Material (MEM), Defence Product (PRODE) or production process.
Non-Technological Innovation		Intangible; related to the Art of War: doctrinal, organizational, and tactical principles with direct impact on the application of Military Power.
Purpose	Product Innovation	Introduction of a new or significantly improved product or service.
	Process Innovation	Implementation of a new or significantly improved production/ distribution method.
	Marketing Innovation	Implementation of a new method or significant changes in design, positioning, and pricing.
	Organizational Innovation	Implementation of new practices or significant improvements in organization and work relations.
	Doctrinal innovation	Implementation of new forms or significant changes in the organization, preparation, and employment of Military Power in war and non-war operations.
Impact	Radical Innovation/Rupture	Introduction of something new, that breaks patterns.
	Incremental Innovation	Introduction of a significant improvement gradually, by adding or replacing features of the object/process.

Source: Adapted from Azevedo (2013).

Innovation is therefore the driver of military transformation, whether it is a change in combatant weapons, the mode of combat, or a change in operational concepts (Rosen, 1991), and 'it is worth noting that non-technological innovations can influence, by driving or demanding, technological innovations and vice versa' (Azevedo 2018:149).

Furthermore, several factors, internal and external, stimulate innovation, such as perceived threat[4], reform goals, budget constraints, social cohesion, failures, and product advocacy[5]. It is historically found, however, that institutional aspects internal to the organization have a greater influence on military innovation than external factors (Correia 2008).

In this sense, an organizational culture permeable to innovation, with values that encourage learning, experimentation, and an entrepreneurial spirit is of fundamental importance to motivate new products and processes. In other words, innovation depends both on creativity and on agents capable and interested in change, which requires teaching, training, and observation of good practices (Correia 2008).

Given this, it is important to recognize the fact that military innovation is not synonymous with technological innovation; that is, military innovation may use advanced technology, but it does not necessarily require it. States that are unable to invest in acquiring and mastering cutting-edge technologies can be efficient and prevail against their opponents by devising creative tactical or operational concepts (Isaacson, Layne and Arquilla 1999).

Contextualization

The specific literature on gender and the Armed Forces presents several motivations for the insertion of women into the military. Caire (2002) identifies, for example, the phenomenon of disaffection, which refers to the crisis of legitimacy and prestige suffered by the military profession after World War II, responsible for emptying the military ranks, and consequently generating the need to resort to the female portion of society.

There is a view that relates female incorporation and the international context of promoting women's rights. In this perspective, the debate of gender equity coming from the public sector as a result of women entering the labour market would have produced a rupture in the spheres imposed until then, which enabled them to reach power spaces and professional areas historically dominated by men, such as the police and the Armed Forces (Lucero 2009).

For Lombardi, Bruschini and Mercado (2009) it was the new roles assigned to the Armed Forces that were responsible for the increase of women in their contingent. The internal missions, surveillance, and national protection were central to the opening of space for women. The argument presents close parallels with that presented by Moskos (2000) when dealing with military post-modernity.

The Armed Forces originally linked to the nation-state, with geopolitical interests and a mandatory conscription system, experienced a transformation after the Cold War characterized by more flexible Armed Forces, with varied objectives, voluntary conscription, and greater social inclusion. That is, modern states have evolved from a stage of war

readiness to a stage of deterrence. With this, the objectives of the military organization were modified while new ones were developed (Moskos 1992).

Therefore, over the decades, there has been a greater acceptance and integration of minority groups, such as women and homosexuals. While in the pre-modern era women were excluded from military service, in the modern period a partial integration took place, with restrictions of functions and hierarchies, reaching, in post-modernity an opening of more specialties and units. Women became a viable alternative to military service (Carreiras 2004).

Mathias (2005), when looking at the process of women's entry into the Armed Forces in South American countries, highlights three factors as the main drivers: democracy; the change in the conduct of war, both in terms of the technologies employed and the management of war; and the low attraction of the profession for men and a social mistrust.

Segal (1999) also lists three main causes: the military, the social structure, and the culture. The military dimension refers to the national security situation, technology, force structure, and admissions policies. The social structure is linked to economic and demographic factors that act on women's social roles. The cultural dimension is linked to the social constructions that shape the conceptions of gender and family, social values, and discourses in favour of equal opportunities.

The first record of a Brazilian woman's participation in a conflict dates back to 1823. Known as Maria Quitéria de Jesus Medeiros, she fought for the country's independence, enlisted under the nickname Medeiros and disguised as a man. In 1996, she received from the Brazilian Army the title of Patron of the Complementary Officers Board. The actions of Ana Maria de Jesus Ribeiro, or Anita Garibaldi, from 1840 onward, were also of great importance to the contentions in the south of the country, unfolding its actions to Italy and Uruguay (Chambouleyron and Resende 2006).

In the Paraguayan War, women's participation was voluntary; the government did not call them into battle. The big name was that of Ana Néri, a nurse from Bahia who joined her sons and brothers. Also, countless other women accompanied the Brazilian Army, including mothers, wives, and wanderers. They followed the troops collaborating in all the activities they needed: cooking, washing, caring for the wounded, making bullets, and participating in the conflicts (Lannes 2008; Pascal 2006).

Women resurface on the war scene in 1942, when Brazil declares war on the Axis powers and sends the Brazilian Expeditionary Force (FEB) to the Italian front. During the war, there was a pressing need for nurses to join the troops. In view of this, the Brazilian government urgently implemented the search for volunteers. In 1943, a call was published in a nationally circulated newspaper soliciting women between 18 and 36 years old with a degree in nursing. Those selected made up the Army Reserve Nurses Emergency Board (QEERE) (Lannes 2008; Bernardes, Lopes and Santos 2005).

Thereat, 73 nurses, six of whom were air transport specialists, voluntarily served the mission and became the first women to join the active service of the Brazilian Armed Forces. With the end of the war, some of these women remained as nurses in the Army Hospital and were later re-enlisted as Second Lieutenants. Years later, they were reformed as Majors and Captains (Lannes 2008; Bernardes, Lopes and Santos 2005).

The formal admission of women into the Brazilian Army occurred with the creation of the Officers Complementary Chart (Law No. 7831), which allowed women to enter the newly created Army School of Administration, by public tender (Lannes 2008).

In 1996, the Female Voluntary Military Service was instituted for health careers, and, in 1997, the Military Institute of Engineering (IME) accepted the first 10 female students for the Military Engineers Board, in the same year, the first women joined the Army Health School (EsSEX) on the Health Bord. In 1998, the Army instituted the Technical Service Internship for areas such as law, accounting, systems analysis, architecture, and journalism. In the same year, Voluntary Military Service was implemented for nursing assistants and technicians (Lannes 2008).

More recently, the Black Needles Military Academy (AMAN – *Academia Militar das Agulhas Negras*), by force of Art. 7 of Law n. 12.705, of 2012, started to include women, also, in the line of military war education, limited, however, to the courses of War Material and Intendency. Therewith, women are able to reach the highest rank of the career: Army General.

Currently, women account for 30 334 servicewomen in the Brazilian Armed Forces (Ministério da Defesa 2019). It is important to note that in 2016, military women corresponded to 25 507; that is, there was a quantitative growth in the female contingent[6]. The descriptive analysis of the data reveals that the Air Force is among the Forces with the highest number of women, both in relation to its own personnel and in comparison with the other branches. However, when comparing the total number of women in each of the Forces, the Brazilian Army has had the largest increase in recent years.

A caveat should be made, however, because this participation is more expressive in temporary positions and not in career positions. By occupying temporary positions, career advancement and performance in the final activities are limited. Currently, the main gateway for women is still the Supplementary Board (Giannini, Folly and Lima 2017)[7]. It reflects a conservative cultural construct, rooted in norms and values, which conceives military service, especially combat, as an inherently male activity (Dunivin 1997).

In view of the above, it is clear that there are still many spaces to be conquered by women in Brazilian defence, and that some of them remain restricted by objective barriers. Women also face greater challenges when it comes to participating in the Forces' core activities; in general, they are represented in larger numbers in the administrative, support, and health sectors (Takahashi 2002).

Nevertheless, the presence of more than thirty thousand women working in the Brazilian military, their proven interest in the area, and the various positions they have held over the years, demand that the Forces pay effective attention to this segment, reviewing conduct and doctrines. Meanwhile, regardless of the numerical increase and the greater assignment of functions, there is still great resistance as to the effective integration of the female segment, especially in terms of the implementation of specific policies and daily practices (Segal 2006).

Empirical Strategy

As stated in the introduction of this article, the question that guides the study is: in what way did the Project for the Integration of Female Personnel in the Line of Military Warfare Education (PISFLEMB) promote innovation in the Brazilian Armed Forces? Military innovation is, for this article, understood as an action that a given Armed Force takes when developing new concepts and/or new means for war that integrate technology. Among them are doctrinal revision, changes in training, adoption of new tactics, equipment production, among others.

The PISFLEMB corresponds, in Brazil, to the possibility of women's participation in the military line of war. Therefore, this Project will be understood here as a non-technological innovation, with doctrinal purpose and incremental impact on the military institution. In other words, the Project was responsible for implementing significant changes in the organization and preparation of the Force, gradually adding features to the process. Figure 1 illustrates the main argument.

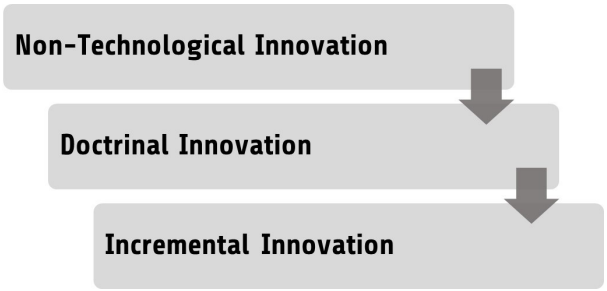

Figure 1. Innovation in the PISFLEMB
Source: Authors

In view of this, and intending to answer the question posed, the Project will be analysed from the model developed by Azevedo (2013), which considers four elements underlying the innovation process in the Defence sector, that are: Interests, Valuative Factors, Support Factors and Benefits, according to Chart 2.

In more detail, the agents (individuals, groups or organizations) have diverse interests, which are responsible for driving the action. Thus, *Interests* are all the motivations that are mobilized when the agent intends to innovate. Some examples of *Interests* found by Azevedo (2013) to innovate in the Defence sector (more specifically in the non-warfare segment) were: better working conditions, professional recognition, satisfaction in contributing, developing competitive advantage, offering better products and services, modernization and strengthening of military power, contributing to the development of the country, expansion of research related to Defence, development in the Educational, Military, and Industrial sector, expansion of social welfare, security and integrity of the national heritage, among others.

Chart 2. Data Exploration

INTERESTS	Harmonics (similar interests)
	Dissonant (diverging interests)
VALUATIVE FACTORS	Inducers (pro-change attitude)
	Inhibitors (conservative attitude)
SUPPORTIVE FACTORS	Stimulants
	Discouraging
BENEFITS	Clearly visualized; Visualized; Weakly visualized; Hardly visualized.

Source: Adapted from Azevedo (2018).

As for the *Values*, they are understood as principles or beliefs that guide the life of an organization. Azevedo (2013) presents fifteen of them that are related to innovation in the Defence sector: Spirit of the Body, Proactivity, Resilience, Autonomy, Achievement, Harmony, Equalitarianism, Reliability, Stimulation, Security, Conservatism, Standardization, Dominance, Hierarchy, and Vanity.

The *Innovation Support Factors* concern the components of an organization that allow innovation to thrive. They are, therefore, physical, human, and organizational aspects that contribute to creativity, learning, and teamwork; when evaluated it is possible to verify the proactivity of the institution to achieve its goals (Azevedo 2013).

Finally, the *Benefits* deal with the possibilities of gains, improvements, and benefits of innovation. That is, they are the concrete results visualized by the agents involved in the process, and sometimes they may coincide with their own interests when they materialize. Some of these *Benefits* are: mutual learning, personal satisfaction, potentialization of resources, appropriation of external technologies, strengthening of the industry, competitiveness of the Defence sector in the global market, development of the strategic sector in Science Technology and Innovation (S,T&I), increase in the trade balance surplus, among others (Azevedo 2013).

According to the proposed analysis model, the four elements and the relationships underlying them configure a structure responsible for stimulating the agents' actions and generating reflexes (positive and negative) for innovations. Therefore, for this article, what interests us, in the end, is to evaluate, based on data available in official documents of the Brazilian Army, the process of innovation raised by the project of insertion of women into the military war line.

Discussion

On 8 August 2012, Federal Law No. 12705, resulting from a Supreme Court decision, carried out a major reform in the Brazilian Armed Forces (Mathias and Adão 2013) by

providing for the requirements for entry into the Army's career military training courses, among them age limits, moral fitness, good record, and, fundamentally, the permission for women to enter the Line of Military Warfare Education, married and family breadwinners.

Article 7 of this law established a period of up to five years from the date of its publication for women's entry. In order to comply with the legal dictates, the Brazilian Army established Ordinance No. 11-EME, of 1 February 2013, which approved the guideline for implementing the requirements for entry into the training courses for career military personnel and guided the preparation of the Project for implementing administrative and educational measures for the entry of the female segment.

In this context, the Army General Staff (EME) was responsible for guiding, monitoring, and supervising the actions, while the Army Department of Education and Culture (DECEx) was in charge of identifying and proposing the new job structure in the Educational Establishments (Ed. Est.); elaborate, approve, and publish the announcements of the competitions; prepare the teaching staff of the schools; and, maintain the minimum standards of performance. In parallel, the Sectoral Direction Organs (ODS) were in charge of estimating the costs and resources necessary for the execution of the Project, and the Ed. Est. to perform all necessary actions (Brazilian Army 2013)[8].

Thus, the central purpose of the Project was to implement the necessary measures to adapt the Ed. Est. to receive and train women. In addition, it aimed to establish administrative and educational measures, as well as to implement actions in the areas of Education and Culture, Human Resources, Defence Materials, Economy and Finance, Engineering and Construction, Science and Technology, and of a general, logistical and administrative nature (Brazilian Army 2013).

To this end, nine main tasks were defined: planning, documentation, infrastructure, health, human resources, uniforms/weapons/equipment, extraordinary situations, physical training, and closure. They were then subdivided into specific activities that allow a better follow-up of the Project's progress, as presented in Figure 2.

The multiplicity of activities and the complexity of the project, involving different sectors of the EB, can be observed. In a document released by the institution in 2020, some of the actions already taken were announced, like:

Review and updating of all AMAN documentation (Internal Regulations, By-Laws, Scheduled Positions, Statutes, etc.), in order to adapt the Academy's internal rules so that all cadets would have equal treatment;

Changes in the Positions' Boards of Instructors of the Basic Courses of Intendency and War Material and alteration of the headcount and reference of positions of the Health Section and the current Military Hospital of Resende to meet the insertion of the female gender;

Conducting group dynamics, lectures, Pedagogical Update Internship, qualifying the internal public for the new procedures. Creation of specific training for Basic Course instructors and Levelling Cadets;

Adaptation projects (mainly concerning the bathrooms) and furniture acquisition. Construction and adaptation of female accommodation pavilions and facilities at the

Figure 2. Tasks/Activities of the PISFLEMB
Source: Brazil (2013).

AMAN, Army Cadets Preparatory School (EsPCEx) and Logistics Sergeants School (EsSLog);

Under the coordination of the Army's Research Institute of Physical Training (IPCFEx), a table was made considering the proportional values of women's physical skills in relation to men's. Adjustment of the Military Physical Training (TFM) grade tables applying the principle of proportionality between men and women; that is, same tests with differentiated indexes;

Design of guidelines, by the Physical Education Section (SEF/AMAN), for specific training for each of the TFM tests. Establishment of training methods for upper limb strength development in women and officials for individual performance monitoring;

Setting up a committee to study and create special uniforms for women. Signing of a Term of Contract with the National Service of Industrial Learning (SENAI/CETIQT) for testing, modelling, prototyping, and making Technical Standards for women's uniforms;

Conducting research with the faculty and students and exchange visits to other institutions to address issues considered critical (Coexistence, Affective Relationship, Pregnancy/Lactation, Menstruation, Dependents).

Given the importance of the aforementioned actions, the PISFLEMB was considered by many to be the impulse that was missing for the mobilization of the female entry

process, especially regarding the improvement and expansion works of the facilities. Such structural adaptations are crucial so that by the end of 2021 the first female officer aspirants will graduate on an equal footing with the male officers, even though some restrictions will still be in place regarding the percentage of vacancies[9].

Furthermore, the preparation and training of the members of the Ed. Est. and the revision of legislation are two other highlights of this Project, since isonomy and equal treatment underpin the initiatives. To this end, the students receive the same instructions and classes, and must perform all the activities foreseen in the curriculum. The physical exercises are carried out in a systematized way aiming at preparing the students for the peculiarities of military life (Brazil 2020).

The performance of common activities is considered important, as it provides for the building of corps spirit and cohesion among the class during military training (Passos 2013), improves women's physical preparation, helping to demystify arguments that postulate that women would be incapable of performing combat functions due to the physical requirements necessary for the task (Schaefer et al. 2015) and, more than that, neutralizes the historical disadvantages and obstacles to women's recruitment (Rocha 2017).

In consultation with the EsPCEx Grade System, in the years 2017 and 2018, female entrants outperformed male entrants in all academic subjects (with the exception of the cybernetics subject). In professional education, which is eminently practical and focused on the military combatant's final activity, women again presented better results. Regarding the physical tests, the results of the evaluations (50-meter swim; 3000-meter run; flexion of arms/flexion on the fixed bar and abdominal), respecting the isonomy of effort, showed parity between the genders, with the exception of the run, in which women showed a lower performance (Brito 2019).

Therefore, in order to put an end to questions about the possibility of an effective participation of women in combat positions, due to their lower fitness than men (Cohn 2000), it is suggested that, with regard to physical standards, there is a frequent monitoring and review of assessments and indexes according to the needs of the post in question, as well as additional training to be offered to female recruits as a way to increase their capacity (Schaefer et al. 2015)—both actions implemented by the PISFLEMB.

It is understood, by this logic, that female participation is useful to the Forces as it allows for greater extension of their workforce and prioritization of professional competence (King 2013)[10]. Professional soldiers are associated with an optimal performance of their functions, in such a way that for a successful military performance the notion of functional cohesion, based on the commitment and effort of the members to achieve the objectives, replaces that of social cohesion (emotional ties, friendship and affection), which, at high levels, can be deleterious to the organization and generate insubordination (Maccoun, Kier and Belkin 2006).

Therefore, contrary to what is argued, the female presence in the Forces is not only a contribution to coexistence but is also capable of reducing stereotypes[11], especially when there is leadership committed to progressing integration and implementing legal and policy changes (Schaefer et al. 2015).

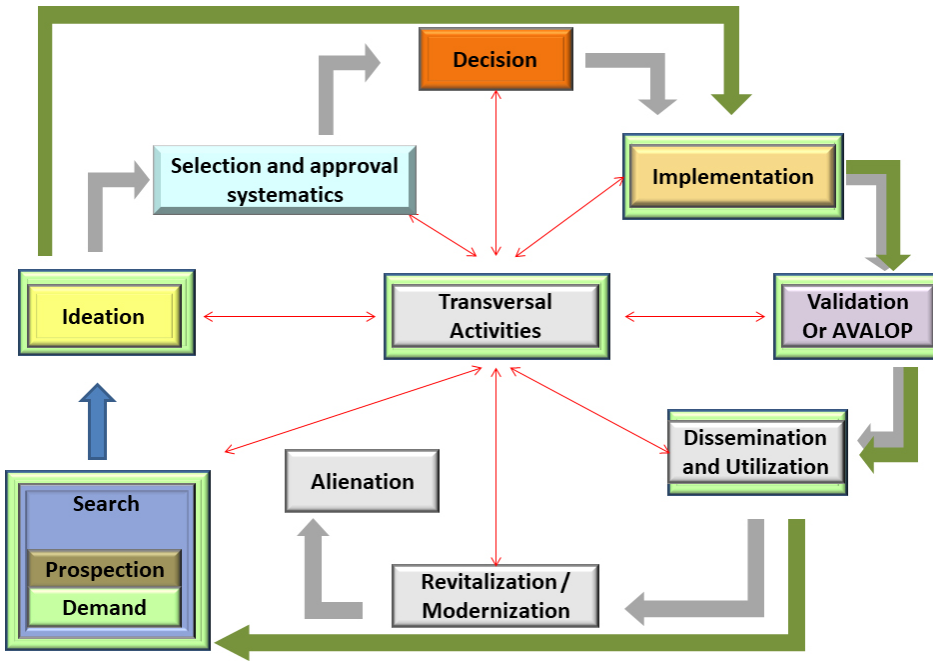

Figure 3. Defence Innovations management model
Source: Adapted from Azevedo (2013).

In this sense, a careful management of human resources and attention to recruitment and retention policies, such as flexible workplaces and working hours, availability of day-care facilities, provision of training, and equal opportunities for promotion, becomes crucial so that matters considered critical can be handled in a professional manner and that organizational demands do not disregard the requests of family life (Rocha 2017)[12].

Added to this are changes in the warfare mode and, just as important, in the roles assigned to the military. Technological innovations, professionalization, and changing power relationships at the international level demand specific interpersonal skills and aptitudes from modern soldiers (Chapman 2003). Therefore, female participation contributes to operational effectiveness in better information capture, greater credibility, and better protection of the Force (Dharmapuri 2011)[13]. Including women in conflict settings allows for new voices to be heard and for negotiation to prevail over violence.

In this way, female participation in the most diverse segments of the Forces establishes close parallels with the notion of innovation, insofar as the latter affirms the importance of interaction between different actors in order to contribute their different knowledge, capacities, and competencies (Azevedo 2018).

Therefore, the PISFLEMB, as a Project that made it possible for women to enter the Brazilian military, went through all the stages of the innovation process –search, ideation, approval, decision, implementation, validation, diffusion, modernization – and

offered the Brazilian Army a non-technological/doctrinal innovation in the way of organizing and preparing the Forces (Figure 3).

In other words, based on a state demand, the agents responsible for the execution of the Project started to explore opportunities to innovate, which included visits to Navy and Air Force officer training schools and North American Military Academies. Given the opportunities mapped out, those that would be priority efforts were selected. Emphasis was then placed on structural reforms and legal adjustments.

To accomplish some of the tasks, the option adopted was the formalization of alliances, such as the one established with SENAI/CETIQT for the prospecting and production of uniforms for the female segment. In others, however, the use of own resources was preferred, such as IPCFEx, which led the studies on physical capacity and adjustments in training.

The implementation of the actions led to several improvements in the Ed. Est. In 2016, the first adaptation works of the restrooms of the Women's Wing of the EsPCEx were completed; in 2018, the expansion and adaptation work of the aquatic park locker room and the new Health Section were delivered; and in 2019, the Army inaugurated the new quarters for EsSLog students, for up to 152 military personnel (EsPCEx 2018; Army 2019).

In parallel, the theoretical studies were taken to the practical validation of their feasibility and effectiveness. This was the case of the table of physical skills developed by the IPCFEx, which has been constantly monitored. Over the past few years, control physical evaluations have been carried out with students of both sexes, in order to map the evolution of physical performance, and periodic meetings were held to present the results, discuss difficulties, and propose changes in the criteria (IPCFEx 2020).

The set of these actions allowed it to start a process of dissemination of new learnings and concepts in order to prepare the personnel, for which several forms of knowledge transmission were used, such as banners, folders, videos, and murals in the cadets' wings, exploration of themes in graduations, primers on specific subjects, institutional narrative, social media, etc. (Brazil 2020).

Completing seven years of the first arrangements for the development of the Project, currently, there are already initiatives for revitalization and modernization in areas considered outdated or obsolete, as was the case of women's uniforms, which since the last regulation, published in 2016, has already experienced updates.

With this, many of the activities listed (Figure 2) were initially considered completed. Others, however, remain pending – in processing phase – but an overall assessment indicates a near end to the Project, not without first accomplishing the important task of closure, in which the results and lessons learned will be presented.

At this point, doctrinal innovations can drive or demand technological innovations, or even give rise to new doctrinal demands that give rise to new projects, starting another cycle of innovation within the Force.

In conclusion, in order to synthesize the information described throughout this section we present Chart 3.

Chart 3. PISFLEMB Analysis

INTERESTS	a. Materialize the entry of the female gender into the Military Warfare Education Line; b. Adopt new regulations, bylaws, and standards; c. Improve the physical structure of the schools; d. Adapt the uniforms; f. Reassess physical activity for women.
VALUATIVE FACTORS	a. Seek maximum equality between men and women; b. Muster a predisposition for acceptance of the female gender in combatant status; c. Commitment of those involved in the project.
SUPPORTIVE FACTORS	a. Planned budget resources; b. Female entry deadline; c. Competition to the other Earth force projects.
BENEFITS	a. Review and update of all AMAN documentation; b. Training of the internal public; c. Adaptation works and furniture acquisition; d. Adjustment of the TFM degree tables; e. Specific training methods; f. Study and creation of special uniforms.

Source: Authors.

In this summary chart, we observe that the PISFLEMB was constituted from interests that, although varied, are harmonious as to the purpose of implementing the necessary measures to receive and train women, in such a way that they drive the actions to achieve the goal.

As far as value factors are concerned, most of them were identified as innovation-inducing values, that is, values that positively influence change. One can cite, for example, the *Team Spirit* in the commitment to the Project; that is, a feeling of solidarity and mutual support for the success of the actions. *Resilience* can also be observed in the predisposition to accept change and to adapt to different demands, as well as a *Proactivity* in the search for equality, not being limited by situational forces and aiming for improvement.

However, it is important to emphasize that *Conservatism* as a group's resistance to change and desire to maintain the *status quo*, together with the *Hierarchy*, responsible for distributing resources and social roles in the military organization, are values that, although not present in the writing of the documents, are present in the military institution and, in general, act in a way that inhibits actions and policies in this area (Schwether and Steiner 2021).

Likewise, regarding the support factors, those that stimulate innovation are in greater number, especially the definition of a transparent schedule of tasks and activities, with a maximum execution period, responsible bodies, and budget resources. On the other hand, however, one cannot fail to mention the fact that the Brazilian Army has a large portfolio of projects and programs, which generates competition for resources and, many times, the need for prioritization among them.

Finally, in the benefits category, some of them are clearly visualized and derive specifically from PISFLEMB, such as the revision and updating of all AMAN documentation, the infrastructure adaptation works, as well as the studies and research that allowed the development of specific training methods and special uniforms.

Furthermore, there are other benefits that, if perhaps not so clearly visualized by the decision makers and those responsible for the execution of this Project (since they are not listed in the documents), are responsible for substantial gains to the Forces. After all, the presence of women in the line of war of the Brazilian Army contributes to minimize stereotypes, contributes to a better operational effectiveness, and stimulates the professional competence of the soldiers.

Concluding Remarks

This article, in dealing with two thematic areas of military science studies – on the one hand, defence management, more specifically military innovations, and, on the other hand, gender issues from the point of view of the incorporation of women in the Armed Forces –, established bridges and interconnected hitherto little explored knowledge, with the main purpose of contributing to the advancement of the theoretical and applied debate in both areas.

In the end, we conclude that the act of innovating in search of better alternatives to deal with the complexities of war must also take into consideration the organizational, force preparation and employment aspects. These innovations were treated here as non-technological or doctrinal innovations.

Furthermore, innovations require defence industry players to pay constant attention to social changes and to be creative in devising new concepts. It is in this sense that the process of female incorporation in the Armed Forces becomes an important object of observation, since the evolution of actions has accompanied, as described, external variations, such as the promotion of women's rights internationally, the democratization of the Brazilian state, and technological advances.

That said, the last important act in the succession of events for the insertion of women in the Brazilian Army was the approval of Law 12705, which made it possible for this segment to enter the military line. Accordingly, this measure has driven the EB to think strategies, define tasks, and execute activities in order to adapt its physical structures and, more than that, its legal framework, internal regulations, and human resources to materialize integration.

Thus, if, on the one hand, it is evident that the Brazilian process of female incorporation into the Armed Forces was marked by the maintenance of stereotypes – women remained, for example, excluded from combatant positions and, consequently, from the higher ranks of the military hierarchy –, on the other hand, the PISFLEMB was the first initiative that sought to make this ticket friendlier and more respectful of women's needs.

However, core issues have not yet been addressed, such as motherhood, and women still suffer from soft forms of discrimination, especially when it comes to promotions.

The PISFLEMB sought to find initial solutions to old issues, such as bathroom access, housing, uniforms, physical testing, and legal aspects.

Therefore, the achievement of all these activities brought tangible and intangible benefits to the institution, which took a step towards greater equality between the genders, demanding from future leadership the consolidation of learning, attention to future demands, and the creative spirit to break with patterns and propose new actions.

Notes

1 A term coined by Andrew W. Marshall, director of the Aviation Office of the United States Department of Defense, derived from the Soviet Techno-Military Revolution concept, by which he described the transformations occasioned by new technologies in the military environment (Saint-Pierre and Gonçalves 2018).

2 The main parameters adopted to assess strategic culture were: social structure (collective vs. individualistic); cognitive style (holistic/dialectical vs. logical/analytical); time orientation (polychronic vs. monochronic); and communication styles (Adamsky 2010).

3 Organizational culture seen as a variable is common for management professionals and consultants as something that an organization possesses. For organizational theorists, on the other hand, there is a more anthropological view: organizational culture is something an organization is, it arises from social interaction. It can also be understood as a cognitive or symbolic system that influences how members perceive their world (Kier 2009).

4 An example of innovation stimulated by an external threat is the creation of aircraft carriers in the interwar period by the Americans (Isaacson, Laynee and Arquilla 1999).

5 According to Isaacson, Layne and Arquilla (1999) the indicators that predict military innovation can be applied in sequence: the first is the realistic ones (threat and resources) then the social indicator appears (cohesion), and finally the organizational indicators (past failures, career). The indicators are more probabilistic than deterministic. For example, a cohesive State that has produced victories and faces serious external threats is more likely to succeed in military innovation, than a divided State that faces no threats.

6 This same numerical increase had already been noticed in the previous period, between 2012 and 2016, driven mainly by the Air Force (Giannini, Folly and Lima 2017).

7 There are also restrictions when it comes to access to certain careers and training. At the *Escola de Sargentos das Armas*, the Base Weapons (Infantry and Cavalry) and the Support Weapons (Artillery, Engineering, and Communications) are limited to the male public. In the AMAN, women are limited to taking two courses among the seven specialties offered.

8 The Project received input from the Secretariat of Economy and Finance (SEF), the Land Operations Command (COTER), the Department of Science and Technology (DCT), the General Department of Personnel (DGP), the Department of Engineering and Construction (DEC), the Logistics Command (COLOG), and the Area Military Commands (C Mil A).

9 Women will be allowed to occupy up to 10% of the total vacancies in the EsPCEx and ESA edicts, and 30% will be the limit of female students per Board and Service. For planning purposes, the following numbers were considered: EsPCEx/AMAN: up to 40 per year; EsSLOg: up to 130 per year; and CIAvEx: up to 15 per year.

10 England repealed barriers to women serving in combat roles in 2016. The decision to do so was based on equal opportunity and maximizing talent.

11 Analyses show that heterogeneous groups are more efficient than homogeneous groups.

12 Parsimonious solutions can be implemented following the example of the Israeli Army, which has adopted customized schedules for married women. Regarding female participation in manoeuvres, in the United

States categories have been established that take into account the age, strength, weight, and purpose of the female presence to enhance integration (Rocha 2017).

13 Women are better articulators in conservative societies, specifically in Muslim society, where surveys reveal that leaders prefer to interact with female representatives (Dharmapuri 2011).

References

Adamsky, D. 2010. *The Culture of Military Innovation*: *The impact of cultural factors on the revolution in military affairs in Russia, the US, and Israel*. California: Stanford University Press.

Azevedo, C. 2018. 'Os Elementos de Análise da Cultura de Inovação no Setor de Defesa e seu Modelo Tridimensional'. *Coleção Meira Mattos* 12 (45): 145-167.

Azevedo, C. 2013. *Gestão de Defesa*: o Sistema de Inovação no Segmento de não-guerra. PhD Thesis, Fundação Getúlio Vargas, BR.

Bernardes, M, G Lopes and T Santos. 2005. 'O Cotidiano das Enfermeiras do Exército na Força Expedicionária Brasileira (FEB) no Teatro de Operações da 2ª Guerra Mundial, na Itália (1942-1945)' *Rev. Latino-Americana de Enfermagem*, 13 (3): 314-321.

Biddle, S. 1998. 'The past as prologue: assessing theories of future warfare'. *Security Studies* 8 (1): 1-74.

Boot, M. 2006. *War made new*: *Technology, Warfare, and the course of History, 1500 to today*. London: Gotham Books.

Brazil. 2012. *Lei no 12.705, de 8 de agosto de 2012*. Brazil.

Brazil. 2020. *Projeto de Inserção do Sexo Feminino na Linha de Ensino Militar Bélica do Exército Brasileiro*. Extrato de Informações. PISFLEMB-AMAN. Brazil.

Brazilian Army [BR]. 2013. *Portaria Nº 11, do EME de 1º de fevereiro de 2013*. Brazil

Brito, R A. 2019. *O Processo de Implantação da Mulher na Linha de Ensino Militar Bélico na Escola Preparatória de Cadetes do Exército*. Final Paper, (Escola de Comando e Estado-Maior do Exército, BR.

Caire, R. 2002. *A Mulher Militar*: *das origens aos nossos dias*. Rio de Janeiro: Biblioteca do Exército.

Cano, I. 2012. 'Nas trincheiras do método: o ensino da metodologia das ciências sociais no Brasil' *Sociologias* 14 (31): 94-119.

Carreiras, H. 2004. 'Diversidade Social nas Forças Armadas: Género e Orientação Sexual em Perspectiva Comparada' *Nação e Defesa* 107: 61-88.

Chambouleyron, I and E Resende. 2006. 'Duque de Caxias e Maria Quitéria na mesma trincheira: o questionamento das representações do masculino e feminino pela mulher combatente' Paper delivered at XXX Encontro Anual da ANPOCS, Caxambú, BR.

Chapman, G. 2003. 'An introduction to the Revolution in Military Affairs' Paper delivered at XV Amaldi Conference on Problems in Global Security, Helsinki, Finland.

Cohn, C. 2000. 'How Can She Claim Equal Rights When She Doesn't Have to Do as Many Push-Ups as I Do?: The Framing of Men's Opposition to Women's Equality in the Military' *Men and Masculinities* 3 (2): 131-151.

Correia, A. 2008. 'Inovar para transformar a defesa' *Revista Militar* [online]. Available at https://www.revistamilitar.pt/artigo/269 [Accessed on 12 November 2023].

Covarrubias, J. 2005. 'A transformação da defesa nos EUA e sua aplicação na América Latina.' *Military Review* 85 (4): 80-86.

Davis, N. 1996. 'An Information-Based Revolution in Military Affairs.' *Strategic Review* 24 (1): 43-53.

Davis, P. 2010. 'Military Transformation? Which Transformation, and What Lies Ahead?' In: S Cimbala (ed), *The George W. Bush Defense Program: Policy, Strategy & War*. Washington: Potomac Books, pp. 11-41.

Dharmapuri, S. 2011. 'Just Add Women and Stir?.' *Parameters* 41 (1): 56-70.

Dunivin, K O. 1997. 'Military Culture: a paradigm shift?' *Maxwell Paper* 10.

Giannini, R, M Folly and M F Lima. 2017. 'Situações extraordinárias: a entrada de mulheres na linha de frente das Forças Armadas brasileiras.' Artigo Estratégico 27 [online]. Available at https://igarape.org.br/wp-content/uploads/2017/08/AE-27_Mulheres-linha-de-fente-07-08_2.pdf [Accessed on 12 November 2023].

Gusmán, J, L M Neto and V Schmitt. 2014. 'Una discusión de tranformación: perspectivas para la transformación militar desde la cultura organizacional.' *Coleção Meira Mattos* 8 (32): 105-115.

IPCFEx, Instituto de Pesquisa e Capacitação Física do Exército [BR]. 2020. *Projeto Monitoramento da Capacidade Física dos Militares, de ambos os sexos, da Linha de Ensino Militar Bélica*. Brazil.

Isaacson, J, C Layne and J Arquilla. 1999. 'Predicting Military Innovation.' *RAND* [online]. Available at https://www.rand.org/pubs/documented_briefings/DB242.html [Accessed on 12 November 2023].

Janowitz, M. 1967. *O Soldado Profissional: um estudo social e político*. Rio de Janeiro: GRD.

Kier, E. 2009. 'Organizational Culture and Change: The Revolution in military affairs, Counterinsurgency, and the US Army.' In B Loo (ed), *Military Transformation and Strategy: revolutions in military affairs and small states*. London: Routledge, pp. 145-167.

King, A. 2013. 'Women in Combat.' *The RUSI Journal* 158 (1): 4-11.

Lannes, S B. 2008. 'A Inserção da Mulher no Moderno Exército Brasileiro.' Paper delivered at Encontro da Associação Brasileira de Estudos de Defesa. Niterói, BR.

Lombardi, M R, C Bruschini and C Mercado. 2009. *As Mulheres nas Forças Armadas brasileiras: a Marinha do Brasil 1980-2008*. São Paulo: Fundação Carlos Chagas.

Lucero, M. 2009. 'Las Mujeres en las Fuerzas Armadas Argentinas. Breve análisis sobre su participación y estado actual de la situación.' *UNISCI Discussion Papers* [online]. Available at https://www.redalyc.org/pdf/767/76711408004.pdf [Accessed on 12 November 2023].

Maccoun, R, E Kier and A Belkin. 2006. 'Does Social Cohesion Determine Motivation in Combat? An old question with an old answer.' *Armed Forces & Society* 32 (4): 646-654.

Mahoney, J. 2010. 'Review Articles AFTER KKV The New Methodology of Qualitative Research.' *World Politics* 62 (1): 120-147.

Mathias, S. 2005. 'As Mulheres Chegam aos Quartéis'. *Resdal Eletrônica* [online] Available at www.resdal.org/producciones-miembros/art-kalil.html [Accessed on 12 November 2023].

Mathias, S and M C Adão. 2013. 'Mulheres e vida militar.' *Cadernos ADENAUER* 14 (3): 145-165.

Moskos, C. 1992. 'Armed Forces in a Warless Society.' In J Kuhlmann and C Dandeker (eds), *Armed Forces after the Cold War*. Munich: Sozial Wissenschaftliches Institut Der Bundeswehr, pp. 1-10.

Moskos, C. 2000. *The Postmodern Military: Armed Forces After the Cold War*. Nova York: Oxford University Press.

Murray, W and T O'Leary. 2002. 'Military Transformation and Legacy Forces.' *Institute for Defense Analysis* [online]. Available at https://apps.dtic.mil/sti/pdfs/ADA411749.pdf [Accessed on 12 November 2023].

Pascal, M A. 2006. *As Mulheres e a Guerra do Paraguai*. Mackenzie: São Paulo.

Passos, C. 2013. *Relações de Gênero na Caserna: significados dos sujeitos militares no Exército Brasileiro*. PhD Thesis. Universidade Federal da Bahia, BR.

Pereira, C and F Romero. 'Non-technological innovation: current issues and perspectives.' *Independent Journal of Management & Production* 4 (1): 360-376.

Rezende, F. 2011. 'A nova metodologia qualitativa e as condições essenciais de demarcação entre desenhos de pesquisa na Ciência Política Comparada.' *Revista Política Hoje* 20 (1): 218-252.

Rocha, M. 2017. 'A Mulher Militar e sua Integração nas Forças Armadas.' R*evista Jurídica Luso-Brasileira* 3 (3): 775-804.

Rosen, S P. 1991. *Winning the Next War*. Ithaca: Cornell University Press.

Saint-Pierre, H and L Gonçalves. 2018. 'Nem Revolução Militar (RM) nem Revolução em Assuntos Militares (RAM), apenas mudanças de longa duração condensadas na guerra pelo gênio militar.' *Revista Brasileira de Estudos de Defesa* 5 (2): 13-36.

Schaefer, A G, J Wenger, J Kavanagh, J Wong, G Oak, T Trail and T Nichols. 2015. *Implications of Integrating Women into Marine Corps Infantry*. Santa Monica: RAND.

Schwether, N. 2020. *A Política de Defesa Brasileira e a Questão de Gênero: entre presenças e ausências*. PhD Thesis, Universidade Federal de Pernambuco, BR.

Segal, M. 1999. 'Funções Militares das Mulheres numa perspectiva comparada. Passado, Presente e Futuro.' *Nação e Defesa* 88: 15-43.

Segal, M. 2006. 'Gender and the Military.' In J Chafetz (ed), *Handbook of the Sociology of Gender*. Boston: Springer, pp. 563-581.

Sloan, E. 2008. *Military transformation and modern warfare: a reference handbook*. Westport: Praeger Security International.

Takahashi, E. 2002. *Homens e mulheres em campo: um estudo sobre a formação da identidade militar*. PhD Thesis, Universidade de Campinas, BR.

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Inovação em Defesa e Participação Feminina nas Forças Armadas: Uma Análise do PISFLEMB

Resumo: Ao longo da história o avanço tecnológico impulsionou, por diversas vezes, mudanças fundamentais no setor de defesa. A crescente disponibilização e dependência tecnológica provocou a redefinição de funções pré-estabelecidas, a modificação das principais missões e, até mesmo, a rearticulação de valores tradicionais da instituição militar. A partir dessa perspectiva, o artigo visa responder à pergunta: de que forma o Projeto de Inserção do Sexo Feminino na Linha Ensino Militar Bélico (PISFLEMB) promoveu inovação nas Forças Armadas brasileiras? Argumenta-se que a participação de mulheres em uma instituição tradicionalmente masculina é responsável por gerar uma inovação organizacional, tanto em valores quanto na conduta. Serão coletados dados por meio de documentos oficiais e fontes primárias conforme modelo para análise das inovações militares. O estudo distingue-se em virtude da compreensão de que inovações no setor de defesa são uma oportunidade para a transformação e um estímulo para a alteração de padrões de conduta.

Palavras-chave: inovação; mulheres; Forças Armadas; tecnologia; Brasil.

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