

Knowledge creation in the Armed Forces: an analysis of the lessons learned systems in the light of the SECI model


La creación del conocimiento en las Fuerzas Armadas: un análisis de los sistemas de lecciones aprendidas a la luz del modelo SECI

Abstract: The Lessons Learned Systems are important tools for the innovation on military doctrine. This research aimed in compare the knowledge creation theoretical model known as SECI – Socialization, Explication, Combination and Internalization – with the way these systems operate. Through a literature review, the models of NATO and the Brazilian Army were analyzed, and compared with the SECI cycle, in order to observe the similarities between them. With this, it was possible to perceive a proximity between the theoretical and practical models, thus allowing the use of this framework as an element of analysis for the Lessons Learned Systems. In this way, this work intends to contribute to the advancement of knowledge management studies within the Armed Forces, enabling the application of models established in the literature where similarities are observed and seeking to improve these theories to better meet the particularities of military environments.

Keywords: Innovation Index; Incrementalism; Global Innovation Index GI; National Innovation Systems.

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Keywords: Knowledge management; knowledge creation; lessons learned systems; literature review; military doctrine.

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1 Introduction

The Lessons Learned Systems (SLA, acronym in portuguese) have been used by various types of civil and military organizations as a tool for learning and disseminating knowledge acquired through organizational experience (PATRICK; JIMMY, 2006; WEBER; AHA; BECERRA-FERNANDEZ, 2001). This type of knowledge is of great value to organizations, since it originates within their environment, thus being better adapted to their reality and organizational culture, in addition to its practical character (DAVENPORT; PRUSAK, 1998). The ability to transform the knowledge deposited in the human element into something that can be incorporated into an institution's own repository is a powerful tool for developing the knowledge capital of any organization.

The concept of lesson learned has varied over time. In its most recent form, there is an important emphasis on validation and on the impact caused in the organization by the knowledge absorbed:

A lesson learned is knowledge or understanding gained through experience. The experience can be positive, as in a successful test or mission, or negative, as in an accident or failure [...]. The lesson must be significant in the sense that it has an actual or perceived impact on operations; valid, in the sense of being factually and technically correct; and applicable, in the sense of identifying a specific form, process or decision that reduces or eliminates the potential for failures or accidents, or reinforces a positive result (SECCHI; CIASCHI; SPENCE, 1999, apud WEBER; AHA; BECERRA-FERNANDEZ, 2001, p. 18).

This concept is compatible with the one used by the Brazilian Army, which distinguishes “lessons learned” (knowledge that collaborates with the land military doctrine assuming innovation) and “best practices” (related to techniques, procedures and methodologies identified as the best way to act, but that do not generate doctrinal innovations) (BRASIL, 2017a). Therefore, the lessons learned work as a way to oxygenate current knowledge, incorporating novelties arising from the observation of practice, avoiding the crystallization of concepts and the stagnation of organizations.

Despite already having their own structures for absorbing lessons learned since at least the mid-twentieth century, the topic of knowledge management has received little academic attention within the Armed Forces (DYSON, 2019). In view of this, this article aims to shed light on the topic, highlighting the similarities between theories of knowledge creation and the way in which the military SLA works. In addition to serving as a stimulus for academic debate on the subject, it can serve as a theoretical basis for other more applied studies focused on the SLA.

In order to achieve these goals, this article will begin by explaining the main concepts related to the theory of organizational knowledge creation. Then, it will analyze how the North

Atlantic Treaty Organization (NATO) and Brazilian SLA work, highlighting the similarities of these two systems with the concepts previously presented. Finally, it will put into perspective the importance of the SLA for the armed forces, especially with regard to their doctrinal evolution.

2 Organizational knowledge creation

The theories of Organizational Knowledge Creation are considered by some authors as a subarea of Knowledge Management, although this is not a consensus (LOERMANS, 2002). Authors such as Gore and Gore (1999), Nonaka and Takeuchi (1995), Swan, Scarbrough and Preston (1999) consider creation to be an essential management process, being, therefore, framed by it. Others, such as Davenport and Prusak (1998) and Loermans (2002), claim that the term “management” is misused when working with something as personal and immaterial as tacit knowledge.

Regardless of the nature of this relationship, the most important aspect to note is that both share a relevant theoretical load. The main divergence perceived in the consulted works is found, mainly, in the approach they employ: while knowledge management theories look at the objects of study from a higher position, having the company as a focal element and individuals as satellites of the processes, theories of knowledge creation have a greater focus on understanding the roles of individual actors, placing the business environment as something that contextualizes them.

The use of information to generate innovation goes beyond the activities of gathering, cataloging and distributing data. The mere accumulation of these does not produce something new (DAVENPORT; PRUSAK, 1998). Only individuals in possession of data and within a given context are able to innovate. Organizational Knowledge Creation theories seek to understand the way in which organizations “amplify the knowledge created by individuals and crystallize it as part of the organization’s knowledge system” (NONAKA; TAKEUCHI; UMEMOTO, 1996, p. 834).

2.1 Data, information and knowledge

One of the fundamental points to study knowledge management is to understand what knowledge itself is, and what differentiates it from data and information. Broadly, data can be defined as meaningless stimulus patterns, provoked by changes of state in the physical world and detected by an agent’s ability to perceive (AAMODT; NYGÅRD, 1995; BOISOT; CANALS, 2004). Data are raw facts, measurements and statistics, which say nothing about the contexts, motives or relationships of the events they report. By its nature, data does not have meaning by itself and its excess can even be harmful, given that extracting meaning from large amounts of data can be an arduous task. Even so, they are important, since they are the raw material of information (DAVENPORT; PRUSAK, 1998; AL-ALAWI; -MARZOOQI; MOHAMMED, 2007).

Information, in turn, can be defined as “a message, usually in the form of a document or a visual communication. [...] Think of information as data that makes a difference” (DAVENPORT; PRUSAK, 1998, p. 3). Chyi Lee and Yang (2000, p. 783) define it as “data organized into a pattern of significance” and Aamodt and Nygard (1995, p. 197) as “data with meaning; the output of an interpretation of data and the input to, or output from, a knowledge-based decision-making process”. Information, like any message, has both a sender and a receiver. The objective of information is to cause an impact on the receiver, to the point of altering their perception, or, as explained by Boisot and Canals (2004, p. 47) “information is an extract of data that, by modifying the distributions of relevant probabilities, has the ability to do useful work on an agent’s knowledge base.

Although it has a greater added value than the raw data, information by itself is not capable of generating knowledge, in the same way that having a racing car does not transform its driver into a Formula 1 driver. To become knowledge, information needs to be worked on in people’s minds, being placed within a context that allows it to give rise to something new (BALESTIN, 2007; ISKE; BOERSMA, 2005).

Levitt and March (1988) argue that organizations learn more from their interpretations of the past than from anticipations of the future, encoding these inferences from their history into routines, which are transmitted among their members through socialization, education, imitation, professionalization, personnel movement, mergers and acquisitions. Along the same lines, Davenport and Prusak (1998, p. 5) define knowledge as:

[...] a fluid mix of structured experience, values, contextualized information and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of its possessor. In organizations, it can still be incorporated not only in documents or repositories, but in organizational routines, processes, practices and standards. [...] It is a mixture of several elements; it is both fluid and formally structured; it is intuitive and therefore difficult to grasp in words and to understand completely in logical terms.

Some authors also define knowledge as a “grounded true belief”, built on the basis of the individual’s interactions with the world and used to prepare, take concrete actions or understand the context and be ready to solve the situations encountered (NONAKA, 1994; NONAKA; TAKEUCHI, 1995; NONAKA; VON KROGH, 2009). From this perspective, knowledge can be tacit or explicit.

Tacit knowledge is related to the being’s intimacy. They are formed by both a cognitive and a technical dimension, in a system of analogies composed of a mixture of mental models, schemes, paradigms, beliefs, points of view, know-how and skills (NONAKA; VON KROGH, 2009). This knowledge is continuously mobilized on demand, in specific contexts, according to the user’s

need. As it is more related to practice and intuition, tacit knowledge is difficult to formalize, which makes its dissemination more complex. Its transmission needs to involve interaction between the carrier and receivers through joint work, controlled practices, meetings, seminars, videoconferences, virtual reality technologies or online communities. (CHOI; LEE, 2002; NONAKA; TAKEUCHI, 1995; POPADIUK; CHOO, 2006).

Explicit knowledge, in turn, is codified in a formal, systematized and materialized language, or even symbolic (words, numbers, forms, formulas). In this format, they have a universal character that makes them more easily shareable with other people (NONAKA; TAKEUCHI; UMEMOTO, 1996; NONAKA; VON KROGH, 2009; POPADIUK; CHOO, 2006) and transmitted through traditional information processing technological systems (CHOI; LEE, 2002). Reports, texts, assessments, spreadsheets, models, tables, images, rules, routines, standard operating procedures, are all examples of explicit knowledge (POPADIUK; CHOO, 2006).

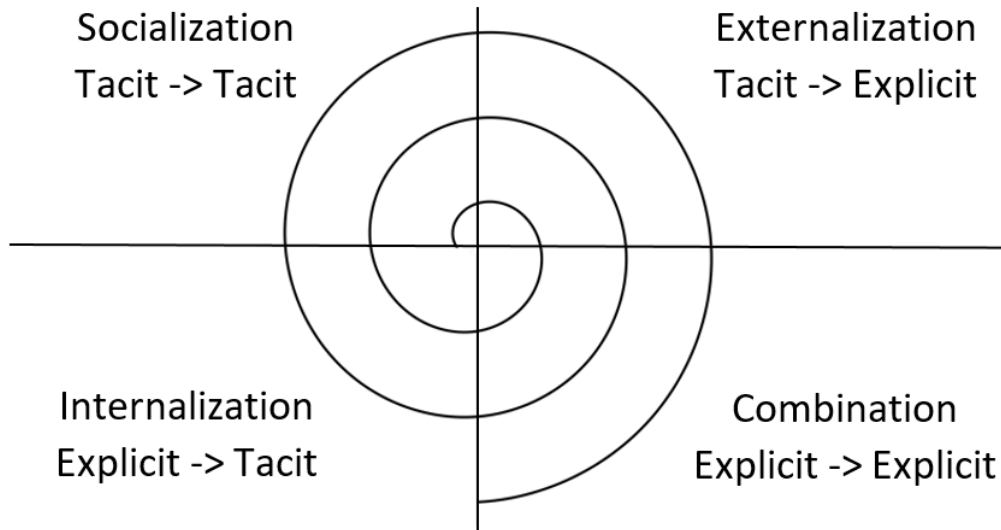
Tacit and explicit knowledge are not watertight elements in their forms, or even the antithesis of each other, but something like two mutually complementary entities, which interact and transform themselves along a continuous flow (NONAKA, 1994; NONAKA; TAKEUCHI; UMEMOTO), 1996; NONAKA; VON KROGH, 2009). This distinction between tacit and explicit was incorporated and widely used in theories of organizational knowledge creation and promoted a break with previous theoretical paradigms that equated information and knowledge (NONAKA; VON KROGH, 2009).

2.2 The SECI model

In order to explain how knowledge creation happens within organizations, Nonaka and Takeuchi (1995) and Nonaka, Takeuchi and Umemoto (1996) proposed the SECI model (acronym for Socialization, Externalization, Combination and Internalization). This model seeks to understand the creation and transmission of knowledge as an interconnected phenomenon (CHOI; LEE, 2002; POPADIUK; CHOO, 2006).

In their theory, the authors postulate that “knowledge is created and expanded through social interaction between tacit and explicit knowledge” (NONAKA; TAKEUCHI; UMEMOTO, 1996, p. 835), a process they call knowledge conversion. This conversion process takes place in four different ways: socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to explicit) and internalization (explicit to tacit). When tacit and explicit knowledge go through a flow of interactions and conversions, innovations are created. This flow was called by the authors the knowledge spiral (NONAKA; TAKEUCHI; UMEMOTO, 1996), and is illustrated in Figure 1

Figure 1 – Knowledge Spiral



Source: Nonaka, Takeuchi and Umemoto (1996).

Knowledge, on its way through the spiral, goes through four quadrants associated with the way in which its holders interact with each other and transform them (knowledge conversion). The socialization quadrant is where the conversion of tacit knowledge to other tacit knowledge occurs, through social interaction, joint activities and learning through experience, among other activities of this nature (POPADIUK; CHOO, 2006). Through socialization, individuals share experiences, mental models, techniques, skills through observation, imitation, and practice (NONAKA; TAKEUCHI; UMEMOTO, 1996). However, tacit knowledge, due to its highly subjective nature, needs to be articulated more efficiently – that is, transformed into explicit knowledge – so that it can be transmitted to a greater number of people (NONAKA; VON KROGH, 2009).

The externalization sector is characterized by intellectual work that aims to consolidate tacit knowledge into explicit concepts, through constructions such as metaphors, concepts, hypotheses, models or prototypes, aiming to facilitate their sharing (POPADIUK; CHOO, 2006). This sector “carries the key to innovation, because [it is where] explicit new concepts are created from tacit knowledge” (NONAKA; TAKEUCHI; UMEMOTO, 1996, p. 838). This creation of new concepts occurs through dialogue processes or collective reflections (CHOI; LEE, 2002). The discrepancies arising from the crystallization of knowledge in metaphors and analogies promote the reflection and dialogue of individuals, who make new concepts emerge when they interact (POPADIUK; CHOO, 2006).

In the combination sector, the varied pieces of explicit knowledge created in the previous phase are processed within the knowledge management systems. Through ordering, adding, combining and categorizing tools, explicit knowledge is recombined and reconfigured, giving rise to emerging knowledge. Diffusion and recombination are the keywords in this sector (POPADIUK;

CHOO, 2006), which normally occurs at mid-management levels, and where explicit knowledge is converted into new explicit knowledge (NONAKA; TAKEUCHI; UMEMOTO, 1996).

Finally, this knowledge is disseminated by the rest of the organization and absorbed by its members through training, simulations, and other dissemination and learning tools, converting into new tacit knowledge, in a process called internalization. Internalization works through practical learning (NONAKA, 1994; POPADIUK; CHOO, 2006), and is facilitated when knowledge is externalized in the form of oral presentations or diagrammed in documents and manuals.

Several authors emphasize the importance of the company's performance in creating an environment conducive to the creation of knowledge and innovation (NONAKA; TAKEUCHI, 1995; NONAKA; TOYAMA; KONNO, 2000; POPADIUK; CHOO, 2006; BALESTRIN, 2007; DYSON, 2019; FRANCO-AZEVEDO, 2018; VON KROGH; NONAKA; RECHSTEINER, 2012). Situations in which individuals are exposed to new challenges and demanded to break pre-existing routines, habits and cognitive structures favor the creation of new knowledge. In the case of the Armed Forces, the employment in combat situations provides an environment of great potential for the emergence of innovations, given the due degree of freedom for troops to experiment and adapt previously organized concepts (DYSON, 2017, 2019; MARCUS, 2015, 2019).

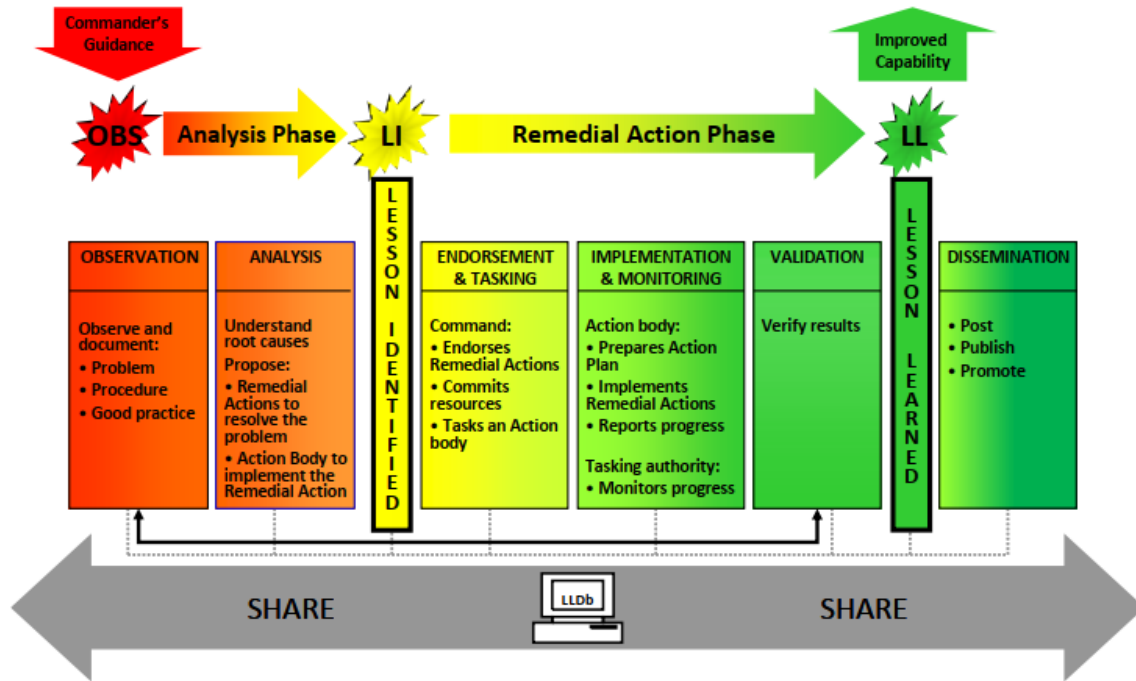
3 Knowledge creation in military institutions

Military innovation systems can be top-down or bottom-up. In top-down systems, innovations arise through changes proposed by the upper echelons of forces, which are adopted by all subordinate echelons (GRISSOM, 2006). An example of this model is the process of planned cultural change¹ proposed by Farrell and Terriff (2002). In bottom-up models, new ideas can arise from anywhere in an organization and reach its highest levels, being adopted as an institutional project (GAYNOR, 2013). The SLA are the best example of a system of bottom-up innovations existing in military institutions (DYSON, 2019; MARCUS, 2019).

The lessons learned systems are intended to collect knowledge and promote innovation within military institutions. These systems, such as the North Atlantic Treaty Organization's Lessons Learned System (NATO Lessons Learned System) or its national equivalent, the Doctrinal Monitoring and Lessons Learned System (SADLA), function as a means of "learning efficiently and providing valid justifications to improve the way of doing things, seeking to improve performance, both during operations and in the following moments" (DYSON, 2017, p. 3). Below, the Figure 2 illustrates the way in which the NATO Lessons Learned System works, in order to produce a doctrinal innovation.

1 Process by which an organization's leadership engages in a process of reshaping the organization's culture to allow for innovative behavior.

Figure 2 – NATO Lessons Learned System



Fonte: North Atlantic Treaty Organization (2011).

Analyzing the figure above and the description of the system presented in the NATO Lessons Learned Handbook, it is possible to draw a parallel between the doctrinal innovation process and Nonaka and Takeuchi's Knowledge Spiral. In the observation phase, the soldier is faced with situations, typical of their function or not, which, through interaction with other professionals or with the environment that surrounds them, leads them to acquire new tacit knowledge, different from what is recommended in the military doctrine (NORTH ATLANTIC TREATY ORGANIZATION, 2011). This phase can be seen as a moment of Socialization.

Then, in the analysis phase, the soldier, alone or in a group, carries out an intellectual work to describe the observed problem, analyze its causes and propose measures or changes in the doctrine to solve this problem. The findings are outlined in a standard report and transmitted through the NATO Lessons Learned Portal² (NORTH ATLANTIC TREATY ORGANIZATION, 2011). In other words, the soldier performs a mental work of reflection on their knowledge, seeking to materialize it in the format of a report and transmit it to others through the system. This activity aligns with the concept of Externalization.

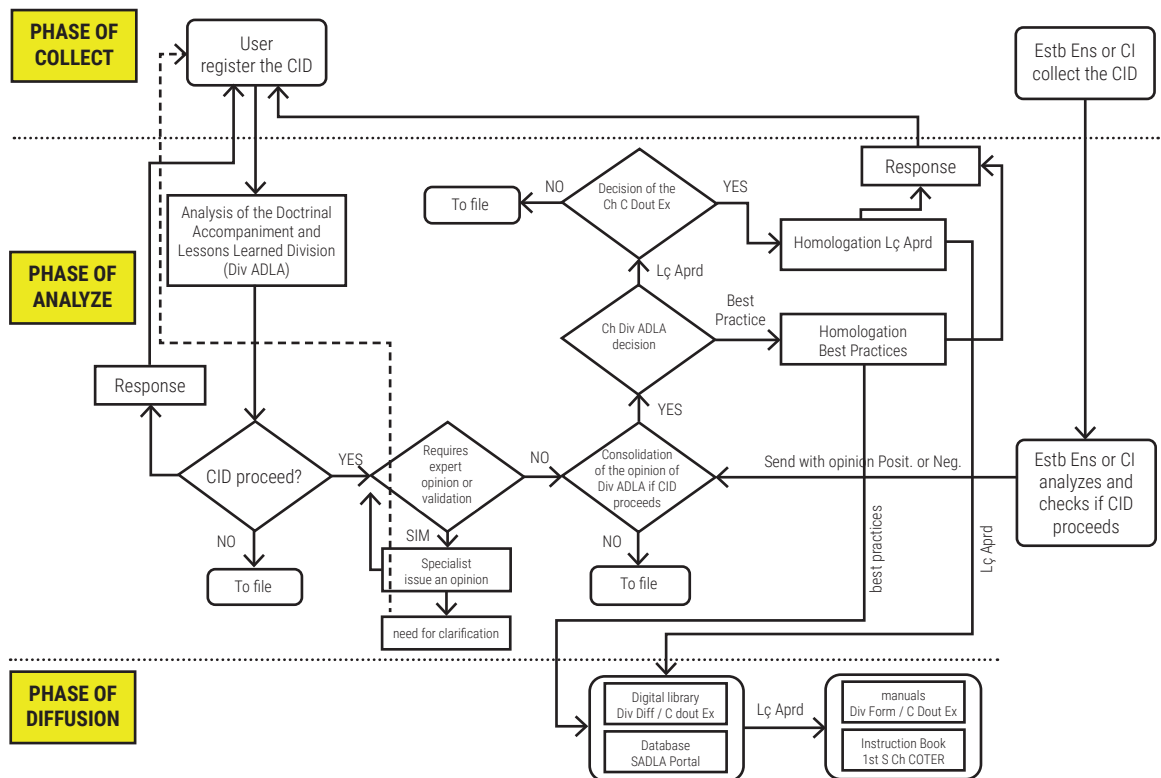
2 Available at: <https://nllp.jallc.nato.int/Pages/HomePage.aspx>. Access on: Mar. 25, 2022.

In the following three phases, this information is tested by a series of mechanisms that act on demand from the Lessons Learned Center. These mechanisms generate reports (other explicit knowledge) that will be confronted with the knowledge submitted and will validate, refute or improve it. The result of this process is a new Lesson Learned, a new knowledge that causes a change in the current military doctrine (NORTH ATLANTIC TREATY ORGANIZATION, 2011). Roughly speaking, this phase can be compared to the Combination phase of the Knowledge Spiral.

The last phase, called dissemination, comprises the dissemination of the lesson learned with the rest of the organization. The NATO publication emphasizes that it is not enough for the knowledge created to be only published in manuals, it is necessary to communicate it through different means, such as training, communities of interest and other information technology means so that it reaches those who need it (NORTH ATLANTIC TREATY ORGANIZATION, 2011). This last phase is in line with the idea of internalization proposed by Nonaka and Takeuchi.

SADLA, in turn, works in a very similar way, despite having its own system, illustrated in Figure 3. In it are also detailed phases of collection (externalization), analysis (combination) and diffusion (internalization). The socialization phase is not detailed in the systematics itself, but it is possible to perceive it implicit in the process by the way in which the concepts are presented in the collection phase (BRASIL, 2017a).

Figure 3 – SADLA Flow Diagram



For a member of the Brazilian Army to share their tacit knowledge with the institution, they must first materialize this knowledge in the form of a product, such as reports, work of a professional nature or articles for specialized publications (BRASIL, 2017a, 2017b). These products can be transmitted to the SIDOMT through the command channel³ or through the SADLA portal, characterized as an Externalization process (NONAKA; TAKEUCHI; UMEMOTO, 1996).

After being received by the system, this knowledge will undergo a validation process by a series of mechanisms coordinated by the Army Doctrine Center (C Dou Ex). Approved in the analysis phase, this knowledge will be classified according to its impact. If it is considered as capable of implementing changes in the current military doctrine, it will be considered as Lessons Learned; otherwise, it will be classified as Best Practices. At the end of this process, it becomes part of the force's doctrinal databases (in particular, the SADLA Lessons Learned and Best Practices base), so that, in due course, it will be recombined to create doctrinal innovations. This part of the process presents the characteristics of the Knowledge Spiral Combination phase (NONAKA; TAKEUCHI; UMEMOTO, 1996).

The final phase of this process consists of disseminating new knowledge through the publication of various doctrinal products, such as campaign manuals or doctrinal update bulletins, which will be absorbed by the troops in military instructions and training exercises (BRASIL, 2017a). The new knowledge produced will be included in these publications and will reach the troops through the Force's teaching and training mechanisms. This last phase is in line with the idea of internalization proposed by Nonaka and Takeuchi.

4 The importance of the lessons learned systems for military doctrine evolution

At this point in the debate, it is interesting to observe how Davenport and Prusak's concept of organizational knowledge⁴ dialogues with the concept of military doctrine⁵. In both, it is remarkable the fact that both knowledge and doctrine go beyond the limits of the primary objective of their creation and end up pervading all sectors of its organization's life. The authors also emphasize the practical character of knowledge, and its connection with experience. For them, practical experience is what allows the contextualization of information by the human mind, providing a historical basis for comparing events and creating inferences about its applicability in future events.

3 This remittance process through the command channel involves the knowledge process explained by a series of echelons of the Force, starting from the unit where the military is framed up to the highest management levels (Sectoral and Operational Management Bodies).

4 Apresentado na seção 2.1.

5 According to Barros (2021), Military Doctrine is "the harmonious set of ideas and understandings that defines, orders, distinguishes and qualifies the activities of organization, preparation and employment of the Armed Forces". It is a set of diverse knowledge, such as norms, concepts, beliefs and values, which, combined, enable the Armed Forces to organize, prepare and act in the fulfillment of its missions".

On these same bases, Murray (1996) builds the argument that military doctrine must always be built based on real operational experiences and taking into account the analysis of lessons from previous conflicts. Not surprisingly, Davenport and Prusak use the US Army's Lessons Learned Center as an illustrative example of the importance of incorporating previous experiences for the creation of organizational knowledge (DAVENPORT; PRUSAK, 1998).

The authors highlight how the ability to transfer knowledge from the past to future actions is critical for the military, and how this need was met by establishing lessons learned frameworks. Within these structures, the performance of Post-Action Analyzes⁶ Another relevant function of lessons learned centers in the context of organizational learning theories is to promote a constant judgment on the pertinence of established knowledge. "Knowledge can be compared to a living system, growing and changing as it interacts with the environment. When knowledge stops evolving, it becomes opinion or dogma" (DAVENPORT; PRUSAK, 1998, p. 10). The same can be said of military doctrine. Given that the war is a phenomenon characterized by opposing efforts, it is natural that new strategies, tactics and technologies are constantly created in order to make their previous versions obsolete and guarantee the advantage on the battlefields to the holders of the state of the art (CLAUSEWITZ, 2015). Military history is full of cases in which a power considered as a military reference is overcome by an emerging element by repudiating the innovation based on the justification that what worked in the past would continue to serve indefinitely for the future (MURRAY, 1996, 1997; STEPHENSON, 2010).

Although the Brazilian Army has its own lessons learned system, it is possible to observe that the Force has adopted a model of doctrinal innovation that privileges the knowledge that arrives through formal command channels or that is obtained abroad through the officers of connection – what Farrell and Terriff (2002) call emulation (BARROS, 2019). In other words, the Army has privileged the acquisition mode over the allocation of resources for the production of knowledge, and even when using the latter, it prefers a top-down model. In addition to this being, from the start, a point that shows the distance between the organizational culture of the Armed Forces and that of business organizations, where the prevalence of aversion to ideas brought from outside is more common (AGRAWAL; COCKBURN; ROSELL, 2010; ANTONS et al., 2017; ANTONS; PILLER, 2014; KATZ; ALLEN, 1982), this fact also leads us to think about its applicability, for Brazil, in the production of doctrinal knowledge.

⁶ An exercise where the military, together, analyze a recently completed operation from the perspective of what was planned, what was effectively executed, the reasons for the difference between the two and what can be learned from this difference.

The area of Political Sciences, during the mid-1990s, witnessed an increase in studies related to the phenomena of convergence, diffusion and transfer of public policies. According to Dolowitz and Marsh (2000), these phenomena have been enhanced by the telecommunications revolution, the pressure exerted by the global economic system and the growing influence of international organizations. These factors have made political actors in a country increasingly interested or even compelled to adopt policy solutions developed in (and designed specifically for) other countries.

The actors in question can see in this transfer process the advantages of having a solution that can be quickly applied, with low development time and cost, and with the guarantee of previous success. However, the literature on the subject points out that not all transfers are successful, especially for three reasons: lack of information about the policy or its implementation (ill-informed transfer); some essential elements that promote the success of the policy in the country of origin are not imported (incomplete transfer); and the importing country pays little attention to differences in political, social, economic and psychosocial contexts between itself and the exporting country (inappropriate transfer) (DOLOWITZ, 1998; DOLOWITZ; MARSH, 1996, 2000). Therefore, the policy transfer process, despite appearing to have a number of advantages over the development of an own solution, has pitfalls that can completely make the application of a given solution in another context unfeasible.

Looking through this prism, it is possible to observe that the same advantages and risks associated with the transfer of public policies can be applied to the process of military doctrine emulation. Mattis (2008) uses the example of adopting the Effect Based Operations (EBO) doctrine as one of the main reasons for the failure of the Israel Defense Forces (IDF) in their campaign against Hezbollah in 2006:

Doctrines inspired by the Effects-Based Operations (EBO) and Systemic Operations Design (SOD) that heavily embrace air power over a classic ground maneuver campaign was, of course, a decisive factor in the disappointing performance of the IDF. [...] According to Ron Tira, one of the IDF's biggest problems was 'the over-enthusiasm with which they adopted the American EBO idea. EBO aims to paralyze the enemy's operational capability, rather than destroying its military strength. This is achieved by reaching its headquarters, communication lines and other critical nodes of the military structure. EBO was used most vividly in the Shock and Awe campaign that opened the Iraq War in 2003. However, Americans used EBO to pave the way for their land maneuvers, not as an alternative to them' (MATTHEWS, 2008, p. 61-62).

In the report by Israeli general Ron Tira presented by Matthews (2008), it is possible to recognize characteristics of ill-informed and inappropriate transfers pointed out by Dolowitz and Marsh (2000). In this case, the IDF did not understand the way in which the EBO doctrine was applied in the larger context of operations in the US military doctrine, as well as they did not understand that the context of the two conflicts was different - in the case of the Iraq war, a conventional combat with the massive use of military power to achieve a quick and overwhelming victory, whereas the war against Hezbollah was an unconventional combat against an irregular force in an urban environment.

The case of failure presented by Mattis and Mathews contrasts with the success cases presented by Marcus (2015, 2019) when analyzing the same conflict. Marcus suggests that the development of an agile and efficient knowledge management system, based on the rapid production and dissemination of lessons learned in combat by IDF soldiers, enabled the continued adaptation of Israeli forces to Hezbollah guerrilla tactics (in turn, a small, poorly hierarchical and matricial organization, which gives it great adaptability). The lessons learned system adopted in 2006 was based on three main mechanisms:

First, a network formed by the Lessons Learned Officers present in the field, acting as liaison elements between the units and sharing lessons from the bottom up, enabled real-time learning. Second, the Post-Action Review process emphasized the reflection, flexibility, and adaptability among ground units for future combat scenarios. Third, the GFC CALL [IDF Lessons Learned Center] analyzed and disseminated tactical lessons from the top down. While tactical-level lessons were collected at lower levels of the IDF, changes were usually made to Standard Operating Procedures or even quickly codified into doctrine by the GFC, quickly moving up the command channel to the highest levels of the IDF (MARCUS, 2015, p. 19).

This procedure, very similar to the SECI cycle, moved the IDF's lessons learned process, which was encouraged by an organizational culture characterized by initiative, autonomy and risk appetite, as well as a non-punitive mentality for those who challenge traditionally established knowledge. Marcus (2019) also emphasizes that the presence of a structure dedicated to the recording, analysis, codification and dissemination of lessons learned is essential to preserve the knowledge built by the end of the line.

Despite the comparison made between the modes of knowledge creation, it is important to emphasize that it is not the objective of this work to demonstrate the superiority of one model over the other, but only to point out that privileging only one of them tends to weaken the capacity for doctrinal innovation. Dyson (2020) and Farrell (1998), for example, point out a number of advantages of the acquisition/emulation model, but emphasize that the existence of a formal structure of lessons learned is a key factor for military emulation processes. In this way, it is clear the importance of systems of lessons learned, within the context of innovation systems for the constant evolution of military doctrine.

5 Conclusion

Today, the SLA are a fundamental part of the evolution and innovation processes of military doctrine within the Armed Forces, either as a bottom-up innovation system or in support of emulation processes. In modern battlefields, where volatility, uncertainty and ambiguity reign, just as important as being able to present innovative solutions to unprecedented problems is having the ability to absorb, incorporate and disseminate these innovations throughout the operating environment. Systems designed to convert the tacit knowledge that circulates among the troops and transform them into institutional knowledge are a key part of this process.

Throughout this article, it was possible to perceive how these systems are aligned with the theories of knowledge creation, incorporating the cycle of socialization, externalization, combination and internalization to its working methodology. These similarities allow the study of the SLA in the light of a theoretical framework consolidated in the academic literature, expanding the range of tools for their analysis and understanding, in addition to framing them within the sphere of knowledge management.

As a tool for the evolution of military doctrine, the SLA fulfill a highly relevant function by enabling the connection of holders of tacit knowledge with the echelons responsible for formulating doctrine in a quick and unbureaucratic way, thus avoiding the loss of relevant information along the command chain. This role is of capital importance to avoid the crystallization of military doctrine, especially in hierarchical institutions such as the Armed Forces.

The study and development of processes related to the SLA within military institutions should be encouraged, in order to enable their continuous improvement. This constant improvement must aim not only at the systemic point of view, but also seek to recognize and improve other areas related to knowledge management, such as organizational culture and the motivating factors of knowledge sharing. In this sense, the understanding and use of the theoretical framework already consolidated in the academic literature can be of great help.

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