

MILITARY DOCTRINE AND TECHNICAL-MILITARY COOPERATION AS DRIVERS OF INDUSTRIAL DEVELOPMENT IN DEFENSE: STRATEGIC LESSONS FROM SOUTH AMERICA APPLIED TO THE ECUADORIAN CONTEXT

DOCTRINA MILITAR E COOPERAÇÃO TÉCNICO-MILITAR COMO MOTORES DO DESENVOLVIMENTO INDUSTRIAL EM DEFESA: APRENDIZADOS ESTRATÉGICOS A PARTIR DA AMÉRICA DO SUL COM APLICAÇÃO AO CONTEXTO EQUATORIANO

DOCTRINA MILITAR Y COOPERACIÓN TÉCNICA-MILITAR COMO MOTORES DE DESARROLLO INDUSTRIAL EN DEFENSA: APRENDIZAJES ESTRATÉGICOS DESDE SUDAMÉRICA CON APLICACIÓN AL CONTEXTO ECUATORIANO

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ABSTRACT

The new contexts in the fields of defense demand flexible strategies and policies that enable adaptation and immediate responsiveness in crisis scenarios. This research focuses on analyzing doctrine as a regulatory category within technical military cooperation processes and how this relationship shapes policy progress and the development of defense industrial capacities in South America. Through a theoretical qualitative approach, based on a descriptive analytical and comparative document analysis, 23 academic articles and official documents were examined, highlighting doctrinal experiences, cooperation initiatives, and policy implementations aimed at strengthening the regional defense industrial base. The results reveal the need to transform doctrine, consolidate its adaptive nature, and foster the emergence of technical military cooperation programs as key pillars for the technological advancement of States. Furthermore, the study emphasizes the necessity of reformulating Ecuador's defense doctrine to integrate national capabilities, reinforce technical ties with regional strategic partners, and promote a civil – military technological innovation ecosystem.

Keywords: Military Doctrine. Technical-Military Cooperation. Defense Industry. Adaptive Doctrine. Military Interoperability.

RESUMO

Os novos contextos na área da defesa exigem estratégias e políticas flexíveis que possibilitem adaptação e capacidade de resposta imediata em cenários de crise. A presente investigação concentra-se na análise da doutrina como categoria reguladora dos processos de cooperação técnico-militar e na forma como essa relação condiciona os avanços das políticas e o desenvolvimento das capacidades industriais de defesa na América do Sul. Por

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meio de uma metodologia de abordagem teórico-qualitativa, baseada em análise descritivo-analítica e documental, com perspectiva comparada. São examinados 23 artigos acadêmicos e documentos oficiais que evidenciam experiências doutrinárias, de cooperação, desenvolvimento e aplicação de políticas voltadas ao fortalecimento da base industrial de defesa regional. Os resultados revelam a necessidade de transformação da doutrina, da consolidação de seu caráter adaptativo e da emergência de programas de cooperação técnico-militar como alicerces para o avanço tecnológico dos Estados. Ademais, destaca-se a necessidade de reformulação da doutrina equatoriana, de forma que integre capacidades nacionais, fortaleça os vínculos técnicos com parceiros estratégicos regionais e promova um ecossistema de inovação tecnológica civil-militar.

Palavras-chave: Doutrina Militar. Cooperação Técnico-Militar. Indústria de Defesa. Doutrina Adaptativa. Interoperabilidade Militar.

RESUMEN

Los nuevos contextos en defensa requieren estrategias y políticas flexibles que permitan adaptación y capacidad de respuesta inmediata en escenarios de crisis. La presente investigación se enfoca en el análisis de la doctrina como categoría reguladora de los procesos de cooperación técnico-militar y esta relación como reguladora de los avances de las políticas y el desarrollo de las capacidades industriales de defensa en América del Sur. Mediante una metodología de enfoque teórico-cualitativo, basado en un análisis descriptivo-analítico- documental con visión comparativa, se examinan 23 artículos académicos y documentos oficiales que visibilizan experiencias de doctrinas, cooperación, desarrollo y aplicación de políticas que generan desarrollo de la base industrial de defensa regional. Los resultados evidencian la necesidad de la transformación de la doctrina, la generación de su carácter adaptativo y la necesidad emergente de programas de cooperación técnico-militar como base de generación de avance tecnológico de los estados. Además, la necesidad de la reformulación de la doctrina ecuatoriana que integre capacidades propias fortalezca los vínculos técnicos con socios estratégicos regionales y promueva un ecosistema de innovación tecnológica civil-militar.

Palabras clave: Doctrina Militar. Cooperación Técnica-Militar. Industria de Defensa. Doctrina Adaptativa. Interoperabilidad Militar.

1 INTRODUCTION

In the dynamic geopolitical landscape of the twenty-first century, Latin American states are challenged to strengthen their strategic defense capabilities without reproducing patterns of technological or doctrinal dependence. In particular, in the case of South America, there is a growing need for the coherent articulation of military doctrine, military-technical cooperation and the development of a defence industrial base that responds to national interests. This interrelationship not only reconfigures the classic notion of security, but also consolidates itself as a central axis in the construction of technological sovereignty and strategic autonomy. In this sense, military doctrine ceases to be an isolated body of legislation and becomes a policy tool that serves as a guide in the operational and industrial spheres. In this study, the existence of a structural gap in the Ecuadorian case will be assumed: thus, despite the relative advances with professionalized armed forces and a geostrategic location of relevance, it presents serious deficiencies at the doctrinal level, little linkage between international cooperation and technical-industrial capabilities, and a scarcely integrated productive base for defense. In fact, the latter has led to a historical dependence on external inputs, little capacity for technological absorption and a markedly reactive doctrine, inappropriate for its regional environment and the emerging hybrid challenges. In this way, this work should focus on this scheme. Thus, the central purpose of this paper is to analyze the strategic role of military doctrine as an articulating axis for the integration between military-technical cooperation and defense industrialization, in the light of regional experiences such as those of Brazil, Colombia, Chile, Argentina, the Dominican Republic, and Venezuela. Within this framework, the specific purpose lies in identifying doctrinal patterns, structural tensions and opportunities for convergence between these three dimensions in order to formulate proposals applicable in the Ecuadorian case. Methodological, the research is framed in the field of strategic and defense sciences, with a qualitative, theoretical-descriptive and comparative approach. The documentary analysis, supported by a bibliographic selection of 23 academic and official sources, supports the study based on cases of South American countries selected for their doctrinal and industrial importance. This analysis aims to contribute to the collection of knowledge that serves as an input for information that allows the formulation of inclusive and independent national policies, among doctrines, cooperation and industrial capacity, to contribute to the design of coherent, sustainable and sovereign national strategies. Therefore, it can be located that the present proposal is located in the category of peace and war, more specifically in studies that link the doctrine and formulation

of militarist policies. It also seeks to enrich the current discussion on strategic autonomy with a critical and proactive vision. Based on experiences learned in South America, it is proposed to argue that the doctrine is no longer just the engine of the operational thinking of the Armed Forces, but an activator of innovation, regional integration and autonomous industrial development.

2 THEORETICAL FRAMEWORK

2.1 MILITARY DOCTRINE AS A STRUCTURING AXIS

According to Jordán (2023), military doctrine is composed of three elements: theory, culture, and authority, this forms the fundamental trilogy, by which the Armed Forces orient their actions to the achievement of objectives, encompassing a generalized concept that is applied to the different levels of military operations. Military doctrine has traditionally been understood as a normative and conceptual body that prepares and guides the military organization for efficient use in predefined scenarios. However, when executing the planning of military operations, uncertain scenarios are presented, characterized by their unpredictability and ambiguity, so flexibility is required in their application and, above all, the analysis, evaluation and correct decision-making of the human factor, also taking into account that the academic interest, specifically of the doctrine, has had a significant decrease in strategic studies.

According to Piedrahita and Torres (2022), it is constituted as a dynamic system of institutionalized ideas that articulates strategic, operational, and technical knowledge, responding to both national realities and external influences. Cardona (2022), on the other hand, when studying the Colombian case, states that the doctrine is not a priori, but derives from operational experience, institutional transformation, and international cooperation efforts. Therefore, it is necessary to take into account military doctrine as a priority and fundamental issue.

From a conceptual point of view, it is quite possible to identify at least three fundamental approaches to the meaning and function of military doctrine in general. First, as a prescriptive phenomenon, doctrine is described as a set of norms, which are formal and limiting in terms of establishing the requirements that just mentioned guide the "action" of military forces at all levels of their command. In other words, the doctrine is a kind of "anchoring," and it is something that offers the military "a total of structurally anchored guidance" by providing a unified standardized reference basis for decision-making; the

second, more pragmatic, sees doctrine as a flexible tool, aimed at providing an effective response to harsh operational realities. Here, flexibility and the ability to adapt to constantly evolving factors are superimposed on doctrinal rigidity, allowing a better connection between strategic and tactical principles; and, the third approach sees doctrine as a symbolic instrument, a bearer of institutional meaning that strengthens the identity of the armed forces and gives legitimacy to decisions at the high command level (Angstrom, Widen, 2016; Posen, 1984; Kier, 1997). This typology allows us to understand how doctrines are shaped by internal strategic demands, such as organizational culture or national political needs, external demands derived from the geopolitical environment or emerging threats, and technology transfer processes that incorporate innovations through military-technical cooperation or the defense industrial base (Farrell, 2008; Posen, 1984).

A recurring pattern in military doctrinal evolution is its ability to adapt to local, regional, and global scenarios in constant transformation, especially based on the analysis of lessons learned by like-minded organizations. Along these lines, Angstrom and Widen (2016) argue that modern doctrines often contain a fusion of prescriptive and pragmatic principles. It notes that "all current operations are prescriptive, but they also all have sufficient flexibility and room for manoeuvre to allow those who use them to take a more pragmatic approach."; This approach is critical to respond to a challenge as dynamic as hybrid conflicts, which contain elements of regular tactics and irregular warfare. In this sense, doctrinal responses must be both revolutionary and adaptive. At the same time, cyber dimension is increasingly reflected in contemporary military doctrine. This transformation, identified by Libicki (2009), has resulted in the development of doctrinal frameworks that focus particularly on cyber defense capabilities and working together with international allies and partners. It is not just a technical exercise: it is clearly a signal that public policy must build institutional capacities for specialized education and training in new technology and make international cooperation more effective. Along the same lines, Posen (1984) warns that doctrine fulfills functions that transcend the operational, as it is frequently aligned with national political interests, serving as a mechanism of legitimation and institutional cohesion. These elements allow us to affirm that the design of public policies in defense must contemplate a sustained investment in technological innovation, supported by versatile and effective regulatory frameworks.

However, there are also underlying tensions that drive this doctrinal process. One of the clearest is the distance between regulatory invariability, which is essential for a uniform operation in which a response of cohesion and stability is necessary, as well as the need for

greater flexibility in a world that is so susceptible to variability in which what is a greater good today, a damage tomorrow. On the one hand, regulatory frameworks must support organizational cohesion and control when actions occur in a predisposed environment. On the other hand, tactics must be flexible when the enemy presents an unconventional asymmetric threat. For example, Angstrom and Widen (2016) warn that regulatory reinforcement is beneficial for the use of different weapons in an operational environment, equally required as reinforcement of military action, because an operational environment in which the rules of engagement are not previously stipulated becomes an uncertain environment. Similarly, Farrell (2008) highlights how a more pragmatic approach supports greater control and promotes decision-making in a mobile theater of operations. Hoffman (2007) confirms that hybrid conflicts challenge the rigidity of traditional doctrines and that we win the war through speed. This tension is exacerbated in multinational operation scenarios, where the requirements for coordination between forces with different institutional cultures and technological levels increase complexity. Farrell et al. (2013) insist that this type of friction requires more flexible doctrinal frameworks, supported by training processes adapted to strategic volatility and the intensive use of emerging technologies, as Klein (1998) already anticipated. In this sense, it is crucial that military doctrines are periodically subjected to revisions and practices that allow adaptation without undermining discipline, as proposed by Libicki (2009).

On the other hand, from a critical point of view, one could also state that, while the doctrinal prescription helps to shed light on some of the procedures, it can also quickly turn against dealing with situations of extreme uncertainty such as cyberattacks or hybrid threats. In such cases, autonomous decision-making and the ability to integrate multiple vectors of action become decisive factors. Hoffman (2007) stresses that this type of conflict demands complex operational structures that often come into friction with traditional models of rigid command.

In addition, another structural tension emerges: the one between the aspiration to national sovereignty and the need for technical-military linkage with external actors. With regard to interoperability with potential allies, Farrell et al (2013), with a certain NATO framework, cautions that the integration of distinctive military capabilities not only improves collaboration, but also increases vulnerability in terms of strategic autonomy. With numerous reasons for concern, countries can also become overly dependent on technologies from other countries. Such dependence is not only applicable, but also a problem for essential areas

such as cybersecurity assurance and artificial intelligence. In addition, according to the same author, the relationship between prioritizing investments in conventional capabilities or in new and emerging domains, such as space and digital, leaves governments with insoluble strategic dilemmas. Therefore, these tensions require public policies that combine standardisation with flexibility, and that, in addition, promote the development of a defence industrial base capable of guaranteeing margins of technological autonomy and operational sovereignty. Resolving these frictions is key to ensuring operational effectiveness in volatile contexts.

In terms of opportunities, the need to integrate emerging technologies, such as artificial intelligence and autonomous systems, allows the development of predictive and rapid response capabilities, according to Singer and Brooking (2018). This opens the door to policies that promote research and development in the defense industrial base, seeing doctrine as a base element of military-technical cooperation, to standardize procedures, align common objectives, and share intelligence, strengthening collective resilience (Farrell et al., 2013).

A critical examination of the patterns, tensions, and opportunities identified leads to the fundamental broad outlines that should guide the formulation of public policies in national defense. First, a more adaptable military doctrine must be encouraged. It should be a doctrine that allows commands to make adjustments to the running of their operations in real time, a level of dynamism that is adaptable enough to work in volatile and ever-evolving environments. This doctrinal adaptation must also be reflected in the need for a radical change in training and training processes, which must emulate "realistic" environments characterized by uncertainty and be in constant change. This approach is needed as tools will eventually become more sophisticated, and artificial intelligence, in particular, would be a no-brainer in supporting operational and emergency decision-making (Klein, 1998). This doctrinal flexibility must be consolidated as a strategic competence, not as an exception in the face of the unexpected.

Secondly, it is a priority to advance in the development of a robust and technologically sovereign defence industrial base. To this end, public policies must direct investments towards the local production of dual-use technologies – civilian and military – that reduce structural dependence on foreign inputs and systems, as suggested by Alic et al. (2006). This industrial autonomy will not only strengthen the strategic-operational capacities of the State, but will also boost key sectors of the national and regional productive apparatus, as well as

the direct connection with new technological scenarios, improving the capacity to respond at critical moments.

Thirdly, it is necessary to intensify military-technical cooperation, prioritising agreements that promote interoperability without sacrificing strategic autonomy. It is not only a matter of aligning with common standards, but of doing so from a position that safeguards national interests and allows the transfer of knowledge and technologies under conditions of reciprocity (Santos, 2020). In addition to allowing the strengthening of the capacities of each state, sharing learning and lessons learned and promoting joint technological developments.

Finally, it is crucial to claim the place of doctrine as a strategic instrument of national security, not only in its operational dimension, but also as an articulating axis of communicational and technological capacities. In this sense, it is urgent to move towards a public policy of strategic communication that makes it possible to raise awareness among both institutional actors and citizens about the need to have their own, up-to-date and functional doctrines. In terms of domestic policy, such a strategy would have to be directed in the sense of generating internal legitimacy, strengthening internal cohesion and fostering greater social support to ensure that it is in the process of doctrinal modernization. This raises the need for a systemic approach that connects continued investment in military capabilities, support gained in the training of highly skilled technical and strategic cadres, and defense diplomacy that supports civilian leaders implementing substantive transformation. Therefore, only in this way, the evolution of doctrine will have the relevance and opportunity necessary to keep pace with a rapidly changing global environment.

2.2 MILITARY-TECHNICAL COOPERATION AS A DOCTRINAL VECTOR

Military-technical cooperation, conceived as the framework of relations between states, international organizations and industries for the development, transfer and sharing of technological capabilities applied to defense, is today an unavoidable strategic component to strengthen national security in an international context marked by uncertainty and complexity (Johnson, 2025). Far from being a simple mechanism for external assistance, this form of cooperation operates as a true doctrinal vector, capable of directly influencing the configuration of regulatory frameworks, operational structures and high-level political decisions.

Critically analyzing the patterns, tensions, and opportunities that run through this dimension allows us not only to understand their impact on the military capabilities of states,

but also to guide the formulation of public policies that favor the efficient use of resources, promote sustained processes of technological innovation, and achieve a prudent balance between regional and international interoperability. on the one hand, and strategic autonomy, on the other (Bonsenberg, 2020).

That is why the definition of military-technical cooperation will be used as the form of defense diplomacy that involves technology transfer, joint training, doctrinal exchange, and operational assistance. Ionescu (2022) demonstrates how Brazil-Russia cooperation was simultaneously a path of technological modernization and a process of doctrinal convergence. In addition, Kurylo (2024) and Pyatakov (2022) point out how the United States, China, and Russia have used military assistance as a mechanism of doctrinal influence in Latin America. These dynamics reveal that cooperation is not a neutral process: imported doctrinal frameworks are adapted, resisted, or transformed according to the institutional capacities of the recipient countries (Mijares, González, 2021).

Thus, the doctrine becomes an interface between external military assistance and strategic national appropriation. A dominant pattern in military-technical cooperation is the search for interoperability among allies to face common threats. In a similar achievement, Farrell et al. (2013) underline that alliances such as NATO have managed to establish a high degree of technological and procedural standardization; therefore, joint operations are perfectly coordinated. By carrying out joint projects, NATO has also shown that interoperability can lead to greater operational capability if planned strategically (Cheung, 2021), i.e., affirms the existence of the pattern. Although, in military-technical collaboration, this pattern refers to the joint use of technology, including missile defense equipment and AI. At the same time, it is taking place with motivations driven by the urgency to fight modern threats, which can come from both non-state actors and emerging regional powers.

In this regard, Alic et al. (2006) argue that technology transfer agreements not only raise the operational level of the armed forces, but also promote innovation within defense industrial bases, especially in dual-use technologies. These processes suggest that public policies should prioritize the signing of agreements that not only strengthen shared capabilities, but also promote joint research projects, positioning military-technical cooperation as a key instrument to maintain and project strategic advantage.

However, various barriers and sources of tension mark the evolution of the field of military-technical cooperation. Among the most obvious—and perhaps most substantive—sources of tension is that concerning the relationship between state sovereignty and the

growing dependence on foreign technology. As Bitzinger (2016) warns, states whose own defense architecture is based on critical systems supplied by outsiders expose themselves to risk in terms of the deterioration of their own strategic autonomy, particularly in terms of changing geopolitical conditions. It is not, therefore, a tangential or peripheral phenomenon, but a key aspect concerning the room for maneuver of states in conflict or other forms of international extortion. A second source of tension is provided by the tension between standardization—favored by multilateral frameworks—and the capacity for endogenous doctrinal innovation. While interoperability arrangements allow for the deployment of joint forces more efficiently, they also impose constraints on the ability to determine doctrines contextually tailored to national history, geography, and socio-political idiosyncrasies. This is evidenced by Farrell's (2008) NATO case, whose research suggests that interoperability arrangements can serve as an anchor that prevents the evolution of more flexible and contextually sensitive local doctrinal approaches. A third source of relevant tension is given by the risks around the transfer of sensitive technology. In the absence of appropriate regulatory and safeguarding frameworks, technology can result in a leakage of key strategic knowledge and, therefore, an erosion of the host state's structural security capacity. Libicki (2009) already warned that, in an environment of increasing cyber-interdependence, sharing critical information without adequate protection measures can open deep cracks in the national defense system.

Faced with this panorama, it is essential that public policies achieve a delicate balance: consolidating strategic alliances without giving up on the protection of fundamental interests. Developing a robust national defense industrial base—capable of absorbing, adapting, and even innovating based on cooperation—is a necessary condition for reducing dependency and mitigating strategic risks (Andrade, 2020). Reconciling these tensions implies assuming a clear and lucid negotiating position, but with a long-term perspective, when defining military-technical cooperation agreements. However, beyond the tensions, there are also relevant opportunities that cannot be missed. Joint research and development—especially in areas such as artificial intelligence and cybernetics—allows states to access recent technological advances, but without having to bear the high costs that such development may entail in its entirety, as Alic et al. (2006) point out. In the same vein, practices such as tied military exercises and routine intelligence sharing—also highlighted by Farrell et al. (2013)—are not only instruments for raising the standards of hybrid threat preparedness, but are also elements that can be converted into strategic trust among allies. As long as they are part of

a long-term perspective, they allow for the generation of operational synergies and the construction of more robust and sustainable ties of cooperation. To this end, it is necessary for public policies to adopt a proactive approach of concluding bilateral and multilateral agreements with concrete incentives for technological co-production, together with robust clauses that ensure the protection of sensitive information aligned with this long-term vision. In this sense, it is worth remembering what Bitzinger (2009) outlined regarding the importance of traditional partners in regional technological development. The effective implementation of these measures will require not only a fine balance between international collaboration and national development, but also coherent strategic diplomacy and a forward-looking vision that articulates sovereignty, innovation, and security in an integrated manner.

2.3 DEFENCE INDUSTRIAL BASE AND STRATEGIC AUTONOMY

The IDB is a more complex piece than a simple system of deep factories for the supply of military equipment. The IDB forms an interconnected judgment ecosystem of relationships through technologies, critical infrastructure and facilities, laboratories and research centers, design firms, and logistics networks. This set of special relationships forms the production of goods and provision of services in the direction of improving the strategic capabilities of the armed forces. As a result, the IDB consists of weapons systems, electronic platforms, next-generation tactical vehicles and disposition, disruptive technologies such as artificial intelligence.

Alic et al. (2006) emphasize that the IDB does not only fulfill an operational supply function, but also constitutes a driving force for dual-use technological innovation, with direct impacts both on defense and on key civilian sectors. Therefore, its role is not merely logistical: it is projected as a structural element of national development. Along the same lines, Bitzinger (2016) states that: "first, a robust industrial base not only expands the margin of state strategic autonomy but also drastically reduces exposure to external vulnerabilities in supply, given the decreasing dependence on foreign suppliers in critical areas." Consequently, strengthening the defence industrial base is a necessary condition for technological sovereignty and defence autonomy. In effect, the IDB stands as the industrial mainstay of a country's military capacity, providing it with structural resilience in the face of global threats and room for maneuver for autonomous decision-making in defense matters. However, the development of a robust and sustained IDB over time cannot be conceived apart from a clear and functional military doctrine. The specialized literature underscores this interdependent relationship:

Cheung (2022) and Bitzinger (1994) warn that innovation in defense does not occur in a vacuum, but within doctrinal ecosystems that integrate strategic vision, technology, industrial capabilities, and human talent.

In this way, it is constituted as the guiding axis that makes it possible to comply with operations, with a vision to walk hand in hand with technological advances within the framework of a defense policy aimed at the consolidation of strategic autonomy. Its function is not restricted, then, to the definition of operational guidelines; acquires, as a structure, the ability to give meaning and direction to the different components involved in the defense system – technology, industry, training and international cooperation – under an articulating gaze. In the case of the South American region, the development of the A-Darter missile, conceived from a process of technological cooperation between Brazil and South Africa, clearly demonstrates the risks of advancing on complex initiatives without the support of a robust doctrine that guides, supports and projects long-term efforts. As Santos and Oliveira (2023) foresee: the lack of a doctrinal framework ends up encouraging institutional fragmentation, political discontinuity and lack of technical sustainability, weakening the strategic power that such undertakings could result. In addition, Magnani (2020) reinforces this idea by pointing out that the countries of the region have transitioned between import substitution models, South-South cooperation schemes, and periods of high external dependence, without managing to consolidate a comprehensive defense policy model based on technological sovereignty and strategic autonomy. In this scenario, it is evident that the doctrine cannot be a mere regulatory compendium: it can constitute a tool for political leadership and industrial planning.

Finally, the insertion of the IDB, as a link between the IDB and military-technical cooperation, materializes in co-production agreements, technology transfer schemes and joint development of strategic capabilities. As instances of articulation that both optimize available resources and redistribute risks more equitably, as well as enable the creation of sustainable synergies between States, armed forces and national industries. However, for such processes to reach their transformative potential, it is imperative that public policies recognize the IDB not as a simple operational instrument, but as a long-range strategic asset. This recognition must be firmly anchored in a proactive doctrinal vision, coherent with the needs of the environment and focused on the real strengthening of national autonomy in matters of defense. Farrell et al. (2013) highlight that alliances such as NATO facilitate the exchange of critical technologies, such as cyber defense systems, strengthening the IDB of

member countries.

Bitzinger (2016) recognizes that, in the best of cases, this collaboration allows the IDB to access foreign innovation but also poses ties of dependence. In addition, military doctrine relates to the IDB since it needs it to translate operational requirements into technological solutions. Angstrom and Widen (2016) highlight that modern doctrines impose the need for advanced technologies, such as autonomous systems, which means that the IDB needs them to achieve strategic objectives. For example, a doctrine that is aware of hybrid warfare requires the IDB to produce dual equipment, such as drones or electronic countermeasures. Another pattern in the IDB is a direct connection to technological innovation since all modern BIBs are highly dependent on it to maintain strategic advantage. Alic et al. (2006) explain that modern BIDs have adopted a focus on dual-use technology, which is artificial intelligence and which is crucial for the civilian economy and defense in a complementary way. Today, one of the most significant patterns in the recent evolution of the defense industrial base is the astonishingly increasing globalization of supply chains. Therefore, to this day, many States can still obtain highly specialized components in technological terms, which only a few decades ago, would be inaccessible to their local capabilities. However, this degree of integration and internationalization of technology transfer at the IDB at the same time raises several new issues. However, along with increased interdependence, new sources of vulnerability to geopolitical conflicts emerged. In this sense, Bitzinger (2016) warns that dependence on strategic nodes located in foreign territories can significantly compromise the operability and security of national defense systems, becoming a latent threat to strategic autonomy.

Added to this dynamic is the proliferation of co-production schemes with strategic allies, which, while expanding national capacities, also introduce external constraints. A case in point is the multinational development of the F-35 fighter, where technical interoperability and transnational collaboration are seen less as options but rather as front-line strategic imperatives (Farrell, 2008). Moreover, it is increasingly clear that the IDB's doctrinal agendas and innovation pathways are converging. This transversality allows technological advances to better respond to emerging, cyberspace, and orbital region threats, thus creating a new battlefield, constructions, and challenges (Johnson, 2021). These trends not only reflect the substantive rules of change in the forms of production and cooperation on this issue. In addition, they illustrate the inevitable urgency of examining public policies from the perspective of the military-industrial ecosystem and the urgent need to prioritize their agility

and innovation. However, they also set the most pervasive structural stresses. The most fundamental says that situations of protectionism are too untenable because of the desire to guarantee our national autonomy and not allow larger-scale foreign states to influence our militaries. While collaboration with external partners facilitates access to cutting-edge capabilities, it can also condition sovereign decisions, especially when it comes to critical components or sensitive strategic technologies (Bitzinger, 2016). Added to this problem is budgetary pressure: the development of cutting-edge technologies requires substantial investments that force States to establish hierarchies between conventional and emerging capabilities, as Alic et al. (2006) point out. This strategic choice does not always respond to technical criteria, but to political or logistical factors. In addition, the competition between the public and private sectors within the IDB introduces another source of friction: while states demand solutions with a high national impact, companies prioritize economic profitability.

In the same vein, Libicki (2009) adds that, when sensitive technologies such as cyber defense systems are incorporated, security risks also increase if intellectual property rights are not adequately safeguarded. Finally, the IDB's subordination to strongly centralized and rigid doctrines limits the ability to investigate disruptive innovations that are not within the scope of prioritized military concerns. In the face of the set of tensions already mentioned, it is imperative to design public policies that combine sustained investment, clear regulatory frameworks and flexible international cooperation mechanisms. This is the only way to make the IDB's strategic role possible without compromising innovative development or jeopardizing national security.

In contrast, clear opportunities are also emerging that can be capitalized on through informed policy decisions. Strategic investment in emerging technologies—particularly artificial intelligence, autonomous systems, and space capabilities—allows states to access high value-added technological niches (Johnson, 2021). Military-technical cooperation, on the other hand, opens up the possibility of reducing high research and development costs through joint projects, accelerating implementation times and expanding interoperability margins (Farrell et al., 2013).

On the other hand, the Defense Industrial Base (IDB) is a multiplying factor for the national economy, since it allows the generation of qualified employment, energizes local industry and promotes applied research in strategic civilian sectors, especially invoking the dual use of technologies. The integration between the doctrine and the IDB makes it possible to boost the operational capabilities of a State, accompanied by anticipated solutions to

threats such as hybrid conflicts or cyberattacks, through the implementation of innovative and contextualized solutions proposed. In this sense, given technological evolution and internationalization, it implies paying attention to synergy, that is, the efficient coordination between the State and the market to capitalize on potential; therefore, a specific public policy is needed that implements tax incentives for innovation in defense, regulations that ensure the co-production of safe technology, and concrete training of operational skills at the IDB's demand. With these analyses, the concept of the IDB ceases to be simply a logistical link and takes center stage as a strategic investor in national security and development, according to Johnson (2021). In short, countries must form an active and equitable engagement with allied countries without sacrificing the politics of decision-making. With this in mind, several strategic recommendations are proposed that can facilitate the future development of defence policy. First, investment in new technologies, particularly in artificial intelligence and semi-autonomous systems, must be strengthened and oriented towards an application of IDB research. In addition, the supply chain must be more diverse, both to reduce operational disruption and to allow consumers to enter controlled industries such as the defense sector. Third, according to the Governments, they must sign military-technical cooperation agreements. Finally, to ensure alignment with the interests of the military defense doctrine, it is necessary to ensure mechanisms that allow the viability of operational demand in industrial projects. In this order of ideas, public communication has an active role in making visible the economic and strategic value of the defense industrial base. The technical policies designed are not enough, it is necessary to build a solid and convincing narrative that poignantly presents the synergies between defense, technological innovation and collective well-being. Our argument has been to propose a radial and long-term vision that combines strategic autonomy, institutional collaboration and promotion of applied research. In this framework, positioning the defense industrial base as a true engine of national development implies the identification of concrete links with sectors such as technical education, science and advanced industry. To do this, people must identify at the base not only an isolated or exclusively military expenditure, but a source of specialized jobs, technological sovereignty and productive capacities. The construction of a coherent, sustained and transversal narrative also has the potential to politically shield investments in defense, preventing setbacks due to partisan ups and downs or international pressures. When the IDB is integrated into the civilian agendas of innovation, sustainable development, and higher education, its legitimacy expands beyond the military sphere. Thus, a defense model is

consolidated that not only fulfills deterrent functions, but also actively contributes to the country.

3 METHODOLOGY

3.1 TYPE OF RESEARCH

This study is based on a theoretical-qualitative, descriptive-analytical approach and with a regional comparative perspective. This approach involves the use of the form of documentary analysis involving historical material and contemporary documentation, facilitated by an approach to content speech analyzed in terms of the interpretive argument of the underlying discursive patterns. Within the categories of analysis: doctrine, military-technical cooperation and defense industrial base, the process focused on determining the subcategories: patterns, tensions and opportunities, which allow future public policies in the field of national defense to be guided.

3.2 SOURCES AND DOCUMENTARY CORPUS

23 documents were analyzed, including academic articles, books, case studies and official documents published between 2003 and 2024. They were found in the Scopus, SciELO and Web of Science databases, located by the following Boolean search engines: doctrine category: "military doctrine" AND "technical military cooperation" OR "military doctrine*" AND "military-technical cooperation" OR "technical cooperation" AND "doctrine". It includes experiences from Brazil, Colombia, Argentina, Chile, the Dominican Republic, Venezuela, and Ecuador, selected for their doctrinal, technical, and industrial relevance.

3.3 ANALYSIS TECHNIQUE

Although the present research is based on a thematic documentary analysis, the use of axial coding techniques allowed the organization and interpretation of the analyzed material in a systematic and rigorous way. Through this qualitative methodology, three main analytical categories were identified: doctrine, military-technical cooperation and defence industrial base. Likewise, each of them corresponded to three cross-cutting subcategories: patterns, tensions and opportunities. This structuring not only facilitates the establishment of conceptual links between the contents analyzed, but also unravels the underlying dynamics that sustained and sustain the development of strategic capabilities in the field of defense, especially in the South American region.

3.4 LIMITATIONS

The study is based on secondary sources; It does not include interviews or original empirical data. Therefore, there is no access to the perspective of the actors involved. The comparison focuses on selected cases; it does not cover the entire continent. Therefore, the vision is not complete, however, it is counteracted by including in the analysis the cases of the countries with the greatest doctrinal relevance on the continent. The applicability to the Ecuadorian case is exploratory, in the absence of recent publicly available official doctrinal documentation.

4 RESULTS AND DISCUSSIONS

The documentary analysis made it possible to establish the existing relationships between the categories: doctrine, military-technical cooperation and defense industrial base with their fundamental contribution to the generation of defense public policies in the different countries of South America. In addition, it was possible to establish the axes of regional analysis regarding: the forms of development and application of the doctrine (patterns), the sources of tension that drive apparent conflicts (tensions) and the various defense strategies that can be combined with technology transfer processes (opportunities).

The findings show that there are countries with greater doctrinal development in South America (Colombia and Brazil), and that by maintaining doctrines with a pragmatic emphasis they can adapt and guide their applicability in complex operational scenarios, which respond to the current requirements of conflicts. Above all, considering technological, tactical and weapons innovation and transformation, from the perspective of the contribution of technology and the establishment of new forms of conflict such as: cyber warfare, the use of drones that guarantee the effectiveness of the attack and multinational operations. Adaptability that guarantees the application of conventional and unconventional tactics, conjugation of tactical-operational levels, developing a strategic vision according to the new world scenarios.

4.1 MILITARY DOCTRINE

Regarding the patterns observed, we can verify that in all the South American countries analyzed there has been a significant doctrinal evolution in recent years; one that has ranged from a relatively prescriptive set of initial models to hybrid operations that combine regulatory contexts, structured framework with flexible practices. In this sense, the transition

would seem to have been more of a search for a balance between institutional standardization – necessary for cohesion and interoperability – and tactical autonomy – essential to be able to interact effectively with an increasingly uncertain environment of combat scenarios. At the same time, military doctrine has acquired a greater articulation in relation to emerging technological threats, although cyberwarfare, hybrid operations and, in certain cases, projections of quantum scenarios. This complex of doctrinal mandates not only requires operations to be more innovative, but also represents that more frequent and systematic doctrinal review mechanisms should be adopted that could be developed around massive changes in results in the strategic environment.

In terms of tensions, to a large extent, military doctrine faces friction between the need to be unifying through common norms and procedures and the requirement to respond immediately to ever-changing realities, such as asymmetrical conflicts and unconventional events. In this sense, a basic structural tension is identified between, on the one hand, the national doctrinal orientation and, on the other, the need for, in contexts of cooperation, doctrines of another type, supranational. This friction establishes the danger of strategic coherence if it is not managed with a vision of complementarity and not of doctrinal subordination.

In terms of opportunities, doctrinal dynamism could be transformed into an instrument of strategic projection if it is channeled into the construction of capacities that are, at the same time, interoperable and flexible. This would make it possible for the Armed Forces to insert themselves into multinational security networks without granting operational sovereignty. It could also function as a tool for the formation of a national defence innovation agenda, if it is used as a framework for combined exercises, artificial intelligence simulations and validation of new operational concepts, as a bridge between strategic planning and technological transformation.

4.2 MILITARY-TECHNICAL COOPERATION

A dominant pattern in the region is the use of military-technical cooperation as a channel for indirect doctrinal transfer. Military assistance and bilateral agreements not only deliver equipment, but also entail operational principles that ultimately modify local practices. International cooperation has tended to consolidate itself in regional or hemispheric interoperability schemes that generate common platforms for instruction, doctrine and crisis management that, in turn, promote the standardization of responses to globalized threats.

There are also permanent frictions resulting from the conflict, between the need to adopt doctrinal frameworks, platforms and/or equipment that allow the Armed Forces to respond to the world in a national context and to safeguard the national operational or professional security identity with strategic partners. Worse, these frictions will not disappear when there are no agreements. There are also socio-political frictions that emerge from an inherent technological imbalance between a country and its ally. In many cases, recipient countries do not have sufficient capacity to absorb these technologies, culture and doctrine independently and autonomously, entering into structural capitulations with their "donors".

On the other hand, as opportunities, it can be mentioned that military-technical cooperation can be redirected towards co-design and collaborative research schemes, where not only products but also processes are shared, which would allow greater internal strengthening of industrial and doctrinal capabilities. In addition, this type of cooperation would position the countries of the region as partial producers of dual and priority technologies, especially if agreements with shared intellectual property clauses and local production are prioritized.

4.3 DEFENSE INDUSTRIAL BASE

Most South American experiences express a fragmented and dependent IDB, where production patterns are bordered on "opportunistic" acquisitions rather than purchases that will attend to future operations. However, it is a fact that some countries have begun to incorporate technological innovation as the axis of their IDB. The IDB-doctrine cooperation qualification is still incipient. However, a number of countries are beginning to emerge in which the doctrine has begun to operate as a guide to bring industrial production to real operational requirements, closing the circle between production and income in the operating cycle.

However, there is a structural tension between the logics of efficiency entrenching the defense industry and the possibly idiosyncratic demands that military doctrines impose. While operating logic facilitates scalability based on economic sustainability and large-scale production economics, it is less effective in the specific operational contexts of each doctrine. Those are defined as threats, geographies, or local capabilities. Such dissonance may imply that, in many cases, industries will not be able to adapt supporting products through each doctrine without significant cost or losing competitiveness. Additionally, this tension can be particularly problematic when the defense industrial base is critically dependent on foreign

technologies, especially in critical areas or critical technologies. In such circumstances, such dependence undermines the strategic autonomy of the State and exposes the defence industrial base to structural vulnerabilities. These weaknesses can be exploited in contexts of geopolitical imbalances, diplomatic or commercial pressures from third parties. Consequently, the integration between doctrine and industrial production cannot be limited to efficiency criteria, but must seriously consider the factors of sovereignty and technological resilience.

The IDB can leverage these forms of military-technical cooperation not only to acquire technology, but to foster innovation processes and regional value chains, allowing it to strengthen autonomous capabilities without giving up its ability to learn from and with others. There are also windows of opportunity in the promotion of dual-use technologies, which extend the financial and political basis for the development of a solid IDB and the increase of its impact on state and private investment.

Table 1

Comparison of Latin American countries

COUNTRY	DOC	CTM	IDB
Brazil	High doctrinal institutionalization with a focus on strategic autonomy and multiple missions.	High levels of technology transfer with Russia, Israel and south-south programs.	Robust industrial base, with state investments and export capacities.
Argentina	Doctrine influenced by border operations and peacekeeping missions.	Technical relations based on defense production and cooperation from neighboring countries.	Industrial capacity in the process of recovery with a focus on regional self-sufficiency.
Chile	Professionalized evolutionary doctrine oriented towards regional interoperability.	Participation in combined exercises and strategic bilateral agreements.	Industrialization that focuses on the alliance in innovation and cyber defense.
Colombia	Post-conflict doctrinal transformation and adaptive flexibility in the face of hybrid threats.	Partnerships with the U.S. and South-South cooperation for training and assistance.	Moderate development of productive capacities, focused on maintenance and logistics.
Ecuador	Doctrine in the process of restructuring, marked by foreign regulatory dependence.	Specific military-technical relations, low sustainability and limited interoperability.	Incipient capacity, limited public investment and lack of integrated industrial policy.
Dominican Republic	Incipient doctrinal development with orientation to basic formation.	Limited cooperation with emphasis on basic assistance and donations.	Limited capacity, dependent on imports and external assistance.
Venezuela	Doctrine marked by territorial focus and ideological influence.	Russian and Chinese influence on modernization programs.	IDB oriented to national development with strong state control.

Source: Authors' elaboration based on documentary analysis (2025).

4.4 IMPLICATIONS AND CONTRIBUTIONS TO THE ECUADORIAN CONTEXT

In general, Ecuador faces serious structural limitations in the field of national defense, which are manifested through the weak connection between military doctrine, military-technical cooperation in the defense sector, and its industrial base. The existing doctrine does not have a systemic vision that allows it to respond effectively to emerging and complex operational scenarios; instead, it remains tied to outdated conceptual frameworks and with a very low degree of practical applicability.

At the same time, the country's military-technical relations have been reactive and fragmented, based on acquisitions rather than effective technology transfer or even the construction of domestic doctrine, which continues to perpetuate operational and strategic dependence. The country's defense industrial base is also strongly dissociated, presented with a high degree of institutional fragmentation and no effective investment in innovation or alignment with doctrinal priorities or technologies. There is no possibility of moving towards real strategic autonomy. The three dissociations underlined strongly limit the resilience of the defence system and its possibilities of responding with sovereignty to today's threats.

From the perspective of the Ecuadorian case, a delay in updating the doctrine in the face of current operational challenges is identified. Taking the South American experience, the dynamics towards flexible doctrines necessarily require joint experiences and simulations of emerging technologies, which simultaneously consider imperativity and adaptation. In the Ecuadorian case, therefore, the lack of real technique has generated an incipient doctrine. Ecuador did not transcribe foreign manuals with technical instructions, nor was it inspired by lessons learned in neighboring nations. Military-technical cooperation was therefore circumstantial and, in the long run, is not projected in terms of acquisition and sustainability. When compared with the region, it can be seen that the integration of real technologies is necessary and urgent, not only versatile, but also inducing doctrinal development, and reinforcing an industrial base for national defense. Ecuador reflects institutional fracture, disjointed competition in the sector, as well as a critical disconnect between the doctrine and the dynamics of the defense industrial base. Not only is this lack of coherence a weakness, but also the effectiveness of modernization processes and progress towards greater autonomy are compromised. South American experiences suggest, on the other hand, that a synergistic approach – where doctrine guides strategic requirements, international cooperation facilitates access to critical technologies and national industry is able to land

these requirements in contextualized operational solutions. it is a step towards the strategic of an autonomy that is, for a change, both realistic and far-reaching.

Thus, the delay in updated theorizing does not allow us to guide the operational challenges of the present. The South American experience opts for the institutionalization of flexible doctrines, supported by joint exercises and simulations with emerging technologies, in which prescription coexists with adaptation. Since the above, our country's military-technical cooperation has historically focused on spot assistance, without absorption or maintenance mechanisms. The comparison of experiences confirms the need to reach agreements with a true technological legacy, focused on energizing national doctrines and capacities.

Ecuador's defense industrial base is highly fragmented and insufficiently integrated with military doctrine. Taking into account the region's experience, the synergistic approach – in which doctrine informs demand, cooperation facilitates access and industry provides contextualized solutions – can be vital to move towards a genuinely realistic and sustainable strategic autonomy.

Military doctrine, beyond its internal function of standardization and training, has been consolidated in South America as a key tool to guide and sustain military-technical cooperation. This relationship is evident in experiences such as that of Colombia, where the implementation of the Damascus Doctrine has facilitated interoperability with strategic partners such as the United States, Chile, and NATO, while promoting a doctrinal structure consistent with the processes of technical assistance and internationalization of capabilities (Armed Forces Colombia, 2022; Mijares, González, 2021).

In the Brazilian case, the consolidation of a doctrine of joint use, formalized in strategic documents such as the National Defense Policy and the White Paper on National Defense (2012, 2020), has served as a key enabler for the development of large-scale military-technical cooperation initiatives. In a sense, the doctrine does not establish operational guidelines. Rather, the doctrine is a broader strategic framework that helps ensure coherence between defence sector planning, boosting the industrial base and international integration. Among other things, this doctrine guided and allowed Brazil to place its capabilities on the regional and international stage, uniting technology, doctrine, and industry under a coherent strategic vision. From this logic, Brazil carried out emblematic projects, such as the A-Darter missile, in collaboration with South Africa (Santos, Oliveira, 2023). Another example is the KC-390 military transport aircraft, in partnership with Portugal and India. Even the ambitious

submarine program, thanks to French technology. In all cases, Brazilian doctrine acts as a kaleidoscope, progressively promoting technological autonomy, aligning national capacities with long-term strategic objectives. As Piedrahita and Torres (2022) point out, a solid doctrine allows "structuring military thinking as a guide for institutional action", which translates into clarity of strategic objectives when negotiating or implementing cooperation agreements.

5 CONCLUSIONS

Based on the analysis carried out, it can be established that the findings affirm what was mentioned by Farrell et al. (2013), when they consider that: doctrine, military-technical cooperation and defense industrial base, are issues that are directly and strategically related, and that they are unfailing modulating variables of the defense policies that are established in the different countries. This articulation also allows the development of sustainable technological innovation processes that generate processes of institutional strengthening and institutional insertion. On the other hand, the cases analyzed from Colombia and Brazil show fundamental aspects such as the consideration that the doctrine allows for the articulation of strategic partners through cooperation, technical assistance and technological development.

Colombia, with the application of the Damascus doctrine, implemented by its Armed Forces, has not only favored operability with strategic partners, but has also made it possible to integrate training, technical assistance, and progressive industrialization, ratifying what Mijares and González (2021) proposed. In addition, Ionescu (2022) ratifies the proposal, considering that the Brazilian doctrinal strategy, based on the notion of gradual technological autonomy, has led to high value-added projects, such as the KC-390 aircraft or the submarines in cooperation with France. These examples confirm that a structured doctrine with a long-term vision becomes a catalyst for technical alliances and its own industrial capabilities.

However, this scenario does not avoid contradictions and tensions. Fragmented doctrines, detached from current operational needs or subjected to old models, are presented as a contradiction to the principles of progress and the thinking of cooperation and innovation. As Vitelli (2018) warns: Argentina is a concrete example, which has an industrial critical mass, which includes the Argentine Aircraft Factory FAdA; however, their inability to articulate doctrine, science and production impede the sustainability of strategic projects. The same situation is replicated in Ecuadorian doctrine, in which, according to Andrade (n.d.), the doctrine lacks organization, structure and articulation with technical processes.

In this sense, the implications for Ecuador are referents that require immediate attention, especially from the consideration that, lacking a flexible and modernized doctrine, which places us as lacking a doctrinal vision adaptive to technological contexts and prevents military-technical cooperation as a sustainable process that strengthens the scope of a national strategy. In comparison with Brazil and Colombia, which have managed to establish assertive processes of cooperation that have marked the path of their technological autonomy. Ecuador has not made significant progress in this regard, without even being able to generate effective defense investments (Cheung, 2022) that would allow it to insert itself into regional technological consortia and execute combined operations.

The basis of a flexible doctrine with a clear vision allows the strengthening of strategic technological niches in which Ecuador has not been able to act, such as: simulators, logistical maintenance and cyber defense, areas that do not require large investments but that seek articulation and technical-military cooperation, which ratifies what Albano (2017) proposed, who proposes the importance of the doctrine in achieving the technological development of weapons. In addition, it will allow it to establish strategic alliances with countries in the region that have developed a medium technological level, facilitating co-production processes and progressive technology transfer (Malafaia, 2021).

The findings of this research show that the consolidation of strategic autonomy in defense cannot be achieved without the effective articulation between military doctrine, military-technical cooperation and defense industrial base. Based on the comparative analysis of the cases of Colombia, Brazil, Argentina, Chile, the Dominican Republic, Venezuela and Ecuador, it is found that the countries that have managed to integrate these three dimensions have advanced in military modernization processes that are more sustainable, resilient and in accordance with their geopolitical contexts. In particular, the Colombian case demonstrates how an adaptive doctrine, nourished by internal operational experience and international assistance processes, allows institutional reform to be guided based on its own capacities (Cardona, 2021; Mijares, González, 2021). Similarly, Brazil has shown that military-technical cooperation, combined with strategic investments in its defense industrial base, can energize a virtuous cycle of innovation and autonomy (Malafaia, 2021; Ionescu, 2019).

Unlike these processes, Ecuador continues to operate under a doctrinal system largely based on foreign documents, without its own regulatory structure that consolidates national experiences or aligns with regional strategic objectives. This doctrinal dependence limits the

country's ability to interpret its threats from a sovereign perspective and formulate coherent strategic responses. The findings of this research confirm what Ionescu (2019) proposed, that the doctrine, understood as a technical-administrative product of high strategic sensitivity, should stop being conceived exclusively as a normative discourse for internal use, and start operating as a tool of public management in defense, connected to processes of international cooperation, institutional design and technological production.

In this sense, the models analyzed demonstrate that a functional and adaptive doctrine not only regulates military action, but also acts as a critical interface between operational decisions, technologies in use, and defense policies. Argentina and Chile, for example, have generated doctrinal reforms that integrate elements of regional interoperability without renouncing their own decision-making frameworks, while the Dominican Republic has managed to position its joint doctrine as a basis for more cohesive cooperation with a greater geostrategic vision (Ministry of Defense RD, 2020). These examples underscore why it should be a very urgent task to reformulate Ecuadorian doctrine and to direct this reformulation to a model that reflects national operational lessons, that incorporates technical standards shared in the regional environment and minimizes the risk of uncritical reproduction of foreign doctrinal frameworks. It was also concluded that the doctrine is not a merely functional artifact in collaboration in the military-technical field, but a structurally significant actor in the creation and maintenance of the national project, or rather in the strategy that may or may not exist in one way or another. In the cases of Brazil, Colombia and Venezuela, it was proven that military technical cooperation, if supported by solid doctrines and an industrial base under construction, became an effective tool to increase the degrees of autonomy from two perspectives at the same time, the political and the military. In the case of Ecuador, the pattern of integration of collaboration seemed much more dispersed and weak in the doctrinal dimension. In this context, it is imperative to rethink this relationship, adopting a proactive approach that prioritizes the construction of regional strategic alliances aligned with common and sustainable goals in the long term.

Finally, the research shows that, without a national defense industrial base articulated to a reformed doctrine and an effective cooperation policy, Ecuador will continue to be limited in its capacity to respond to contemporary scenarios of hybrid threat, cybersecurity, and geopolitical pressure. Based on this, it is proposed to formulate a national doctrine that integrates its own capabilities, strengthens technical links with regional strategic partners and promotes an ecosystem of civilian-military technological innovation. This task cannot be

postponed: doctrinal sovereignty and strategic autonomy are today sine qua non conditions for effective, resilient and legitimate national defense.

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REFERENCES

- Albano, M. A. C. (2017). Processos de obtenção de tecnologia militar: O caso da Marinha do Brasil. *Revista da Escola de Guerra Naval*, 23(1), 75–109. <https://doi.org/10.21544/1809-3191.v23n1.p75-109>
- Andrade, I. (2020). Doctrina y estructura militar ecuatoriana: Una mirada a los procesos de transformación institucional. *Revista Científica General José María Córdova*, 18(28), 129–152. <https://doi.org/10.21830/19006586.637>
- Bitzinger, R. A. (1994). The globalization of the arms industry: The next proliferation challenge. *International Security*, 19(2), 170–198. <https://doi.org/10.2307/2539199>
- Bitzinger, R. A. (2006). *Modernizing China's military: Progress, problems, and prospects*. Naval War College Press.
- Bosenberg López, R. H. (2020). La presencia militar alemana en Colombia: 1929–1940. *Revista Historia y Sociedad*, (38), 1–29. <https://doi.org/10.15446/hys.n38.87366>

- Cardona, A. F. (2021). Colombian military doctrine in officers' practices during the internal armed conflict. *Revista de Ciencia Política*, 41(2), 235–254. <https://doi.org/10.4067/S0718-090X2021000200235>
- Cheung, T. M. (2021). A conceptual framework of defence innovation: Systemic and evidence-based understanding. *Journal of Strategic Studies*, 44(4), 453–485. <https://doi.org/10.1080/01402390.2021.1937246>
- Colômbia, Ministério da Defesa Nacional. (2021). La asistencia militar colombiana en el exterior: Perspectivas y retos para la política exterior y de defensa. Imprenta Nacional.
- Ionescu, C. (2019). La cooperación técnico-militar entre Brasil y Rusia: ¿Una relación estratégica en construcción? *Revista Brasileira de Política Internacional*, 62(1), e002. <https://doi.org/10.1590/0034-7329201900102>
- Johnson, J. (2021). The rise of military AI: Implications for strategic stability and nuclear risk. *The RUSI Journal*, 166(5–6), 66–78. <https://doi.org/10.1080/03071847.2021.1977046>
- Kurylo, A. (2022). Comparative analysis of U.S., Russian and Chinese military cooperation with Latin America and the Caribbean. *Connections: The Quarterly Journal*, 21(4), 81–100. <https://doi.org/10.11610/Connections.21>