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Time of homeland altruism in favor of naval defense*

Tiempo de patrio altruismo a favor de la defensa naval

Laís Raysa Lopes Ferreira
Escola de Guerra Naval.
Programa de Pós-graduação em Estudos Marítimos.
Rio de Janeiro, RJ, Brasil.
lalaraysa@hotmail.com

Abstract: For better or worse, all the nations of the world will be forced to respond to the effects of exponential scientific-technological changes in the near future, according to Romano (2018). In this perspective of scientific innovations and by prospecting for unusual threats to the expression of National Power, investments in defense become necessary for the improvement of naval power, aiming to keep up with global trends. According to Deger and Sen (1995), the existing literature on the causes and effects of military spending in developing countries is controversial, without definitive answers. Through the analysis of studies related to Defense Economics, the present work demonstrates the importance of political-economic-social decisions, of an altruistic nature and of an organic-nationalist character, in an attempt to balance public expenses, regarding to the trade-off "butter *versus* gun", in relation to Defense (Naval). The benefit is, in any case, positive for the nation, as altruistic culture is intrinsic to a strong, conscious people committed to future generations.

Keywords: Brazilian naval defense; new technological era; science and technology; defense economy.

Resumen: Para bien o para mal, todas las naciones del mundo se verán obligadas a responder a los efectos de cambios científico-tecnológicos exponenciales en un futuro próximo, según Romano (2018). En esta perspectiva de innovaciones científicas, y en la prospección de amenazas inusuales a la expresión del Poder Nacional, se hacen necesarias inversiones en Defensa para la mejora de la fuerza naval, con el objetivo de acompañar las tendencias mundiales. Según Deger y Sen (1995), la literatura existente sobre las causas y efectos del gasto militar en los países en desarrollo es controvertida, sin respuestas definitivas. Mediante el análisis de estudios relacionados con la Economía de la Defensa, el presente trabajo demuestra la importancia de las decisiones político-económico-sociales, de carácter altruista y de carácter orgánico-nacionalista, en un intento de equilibrar los gastos públicos, en cuanto al *trade-off* "mantequilla versus cañón", en relación a Defensa (Naval). El beneficio es, en todo caso, positivo para la nación, pues la cultura altruista es intrínseca a un pueblo fuerte, consciente y comprometido con las generaciones futuras.

Palabras clave: defensa naval brasileña; nueva era tecnológica; ciencia y tecnología; economía de defensa.

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1 INTRODUCTION

According to Romano (2018), the rapid pace of advancement of science and its practical applications (with technology becoming the most dynamic, powerful and transformative instrument in human hands) will determine the future of a nation – as viability or sentence; depending on the clear understanding about exponential technologies and the determination for action in favor of the social (for the common benefit). The challenge for developing countries is accentuated at a time configured as a transition to a new era, in which inappropriate political actions that do not safeguard national interests may lead to a critical and polarized economic and social state.

Also, the moment is specific in relation to Naval Defense, which is National, since there is a need to improve the force in the face of transformative technological changes (which can be revolutionary)[1], for the maintenance of state sovereignty by strengthening its Naval Power. Thus, the use of resources in defense becomes necessary.

According to Santos (2018), a barrier to the policy and management of Science, Technology and Innovation (STI) in the defense area is that governments present budgetary constraints and face other many primary agendas.

The relationship between defense spending *versus* economic development in a state, since non-traditional security issues are being faced by countries (in an era of globalization), Franco (2000) points out that a decision-making structure that enables greater investment in defense can be systematically thought out.

In fact, there are a number of future threats and contingencies, known and unknown, to be met by the armed forces, according to Hartley (2011)[2].

And, especially for the case of developing countries, in addition to facing threats, which is a matter of necessity; according to Franco (2000), the use of resources in defense would not be at all unproductive, since it makes possible the construction of infrastructure in a state and investment in human capital.

Adams and Leatherman (2011) portray as a myth the deduction that investment in national defense is related to an increase in national security.

However, if the full level of security is not a guarantee, at least, there must be public-conscious support for the national theme, the commitment of the state, and satisfaction for the fulfillment of duty regarding the fundamental objectives of the National Defense Policy, in relation to proper preparation for war or against unusual threats. Especially in a near future perspective, in which science and technology are applied to the maritime and naval sector.

1 Expert opinion on a "revolution in military affairs" (RMA) is highlighted in Baylis, Wirtz, and Gray (2018, p. 144) – in development since the Gulf War (1991). The period is characterized by the aggregation of disruptive technology (robotics and artificial intelligence) to activities previously performed by humans (BAYLIS; WIRTZ; GRAY, 2018; FERREIRA, 2021; FERREIRA, 2022a, 2022b).

2 "Defence spending also resembles an insurance policy designed to meet a range of known and unknown future threats and contingencies"(HARTLEY, 2011, p.11).

Franco (2000) makes it clear that to ensure that the contribution to security will certainly outweigh the increased cost, the final decision criterion about defense spending must recognize national objectives, alternative ways to achieve them, a model or set of decision-making rules to standardize them, and cost information.

Warning the natives about the preparation for the future (not too distant) of Brazil, this work aims to demonstrate the importance of sound decisions being made regarding the *trade-off* "butter *versus* gun" concerning investments in Defense (Naval).

In the first section, a perspective on the transition to a coming era, particularly in relation to the scientific-technological advance that will definitely reach the civilian environment (modifying previously established paradigms), will be addressed; in the second, a perspective of future use of technology (due to its dual use) for the naval military scope will be presented, in a follow-up of trends. Questions about decision-making concerning the trade off "butter *versus* gun" will be analyzed in the third section. Due to the global moment of transition to a new exponentially advanced scientific-technological era (in which naval improvement is a worldwide trend) and according to threatening challenges and already accessible technology, altruistic political-economic-social decisions (in the organic-nationalist sense) are relevant and positive.

2 PERSPECTIVE ON THE FUTURE "OF THINGS"

According to Romano (2018), the future will be very different from today (and uncertain) – something between utopian and dystopian extremes – as humanity would be reaching an inflection point and entering a new era, much more transformative, in which physical capacities, and also human cognitive ones, can be overcome, in an accelerated way, by "intelligent" machines.

Currents of thought about the future can be classified between emotional optimists, emotional pessimists, rational optimists and rational pessimists, according to Romano (2018) – to optimists, the new technological age will provide a period full of opportunities, progress and abundance; in which all the historical afflictions of humanity will eventually be resolved (from hunger to war) and, for pessimists, it will be fraught with danger and conflict. As a matter of course, Romano (2018) points to a major transition, already underway (highly risky, unpredictable and long), which provides enormous challenges to states.

For much of the twentieth century, as cited in Romano (2018), technological change has played a positive role in improving social welfare (raising the standard of living), especially of marginalized sectors of the population; particularly, by increasing labor productivity. However, this effect has faded in recent decades, and this lethargy has led to an increasing concentration of income and wealth among an international elite (who now have more in common with each other than with their own fellow citizens). New technologies can radically exacerbate these trends in all countries, especially developing ones, if they are not directed to include, or protect, their own manual and professional workforce in productive efforts.

For Romano (2018), in the Twenty – First Century, innovation will no longer be aimed at generating jobs of a repetitive and predictable nature - some experts think that this reality will be more benign if all emphasis is placed on increasing productivity; however, this horizon is not the same for all countries: developed countries are much more likely to achieve the necessary adjustments, while the socio-economic impact can be sudden and dramatic when these changes reach developing countries.

Romano (2018) identifies some technological trends of this new era, inextricably related, resulting from the combination and greater recombination of new ideas and existing technologies: a) hyperconnectivity; b) intelligent digitization; c) self-learning machines; d) intelligent robotics; e) IoT (*Internet of Things*); F) autonomous vehicles; g) *blockchain*; h) total system design; i) virtual and augmented reality; j) universal translation; k) renewable energy; l) sustainable systems; m) nanotube electronics; n) advanced nanotechnology; o) genomics and synthetic life; p) neurotechnology; q) brain-computer interface; r) Individualized medicine; s) radical resource productivity; t) green chemistry; u) industrial ecology; and, v) progress of general artificial intelligence. Products and services resulting from these trends will follow the cycles of inflated expectations for technology, appearing on the market faster and faster.

In countries with not very inclusive and not very innovative economies, according to Romano (2018), new waves of technological change exacerbate the degree of socioeconomic polarization (a determining factor in how the effects of technological change will materialize in a major transition), since high polarization can inhibit positive consequences and amplify negative ones (such as job displacement, extreme inequality, stagnant wages, and technological deflation); and then, the consequences are, predictably, disastrous for their societies, bringing more injustices and social and political instability.

In fact, technological progress will be imposed on developing countries from the outside in, and they will have to adopt and adapt it in order to minimize its negative effects and take advantage of its enormous potential, focusing immediately on understanding the problem and searching for solutions - "if developing countries fail to take advantage of the latest wave of change and opportunity, they will probably be crushed by it" (ROMANO, 2018, p. 16) - the best thing to do is to respond in a timely manner to rapid changes, preparing society proactively, and undertaking the most ambitious training effort in the industrial and manufacturing sector, as well as in public and private administration, with the state specifically supporting companies, so that there is a rapid retraining and re-qualification of their workers (especially regions and more vulnerable sectors).

According to Romano (2018), each state will have to face the great transition according to its circumstances, with the general objective of sponsoring and adapting technologies to reverse, or at least delay, its negative effects:a) redefining its nature, objectives and practices, to face the imminent challenges; b) diffusing ubiquitous access to new technologies (through financing and investment in infrastructure across the range of creative companies, to induce inclusive technological applications that create jobs and use the part of the wealth

that can be generated to take care of displacements and keep the market vibrant); and c) identifying new strategies (with the inclusion of new ways to support education, private initiative and innovative layers of society), as the pace and capacity for technological innovation achieved will define the nature of the economy and, therefore, wealth and social structure.

3 SEA POWER AND THE NAVAL POWER OF THE FUTURE

A powerful maritime nation possesses the expertise on the technical, scientific, industrial, commercial-economic and military aspects of maritime activity, from the way maritime security is idealized by the state; and its military fleet will arise in a natural way, according to Mahan (1965).

According to the *Global Marine Technology Trends* By 2030 (LLOYDS REGISTER; QINETIQ; UNIVERSITY of SOUTHAMPTON, 2015), the world is in the midst of a global technological revolution and advances in informatics and information technology, biotechnology, nanotechnology and materials technology are occurring at a rapid pace, with the potential to bring about radical changes in all dimensions of life. Despite the challenges, technological transformations can contribute with opportunities for the future. By analyzing socio-economic, political, environmental, scientific and technological trends (within the global environment), the document made use of the interdisciplinary horizon scanning methodology , management tool (raw material for the development of strategic thinking, innovation and risk and problem management) – which does not point to absolute certainties (but rather, to comfort with uncertainty, ambiguity and complexity); and allows to answer the question of how the future will be different, identifying the bases for investments, opportunities and potential threats implied by these trends, situations and events: future challenges that will be faced by the maritime and naval sector.

By demonstrating that marine dominance will depend on interactions between people, economies and Natural Resources, the *Global Marine Technology Trends* 2030 (LLOYDS REGISTER; QINETIQ; UNIVERSITY OF SOUTHAMPTON, 2015) presents three possible scenarios by degrees of global political cooperation (closely linked to social trends, sustainable resource exploitation, jobs, wealth, peace and war), namely: *Status Quo*, *Global Commons* and *Competing Nations*. In the first scenario (*Status Quo*), which is the current, the main interest of the people is focused on social development (especially, standard of living and jobs), with the government striving to satisfy the needs of the people from short-term solutions. In the second scenario (*Global Commons*), primary interests shift to concern for resource limitation and environmental degradation – the desire for a more sustainable world will be developed, with fairness in the distribution of wealth (organizations will act to forge international agreements for the common good). In the third scenario (*Competing Nations*), the state will act primarily in its own national interest, with little effort made on agreements between governments for sustainable development and international standards.

The fact is that in all scenarios, the shipbuilding industry will grow and play positive and expansion roles, according to the *Global Marine Technology Trends* 2030 (LLOYDS REGISTER; QINETIQ; UNIVERSITY of SOUTHAMPTON, 2015), as the use of technologies will increase the Navy's ability to project military power, which directly depends on obtaining wide access to battle-space (including the cyberspace), and the ability to coerce, deter and intervene in their combat role to protect national interests (fundamental skills for the case of naval conflict, for example).

Similarly, for the case of humanitarian operations, naval capability can make a significant contribution, by providing humanitarian aid and disaster relief in times of crisis – an important international strategic role (thus, the naval function involves working with international partners and civilian authorities to provide evacuations and repatriations, life-saving aid, and infrastructure restoration), as cited in *Global Marine Technology Trends* 2030 (LLOYDS REGISTER; QINETIQ; UNIVERSITY OF SOUTHAMPTON, 2015).

Naval projection capability is also relevant to maritime security, necessary for the protection of a nation's citizens, territory, and commerce against terrorists, criminals, pirates, state-sponsored insurgents, and unlawful restrictions on freedom of navigation. *Global Marine Technology Trends* 2030 (LLOYDS REGISTER; QINETIQ; UNIVERSITY OF SOUTHAMPTON, 2015) – the naval role is to support the identification of national security threats and prevent wrongdoing, both independently and with international partners.

According to the *Global Marine Trends* 2030 (LLOYD'S REGISTER; QINETIQ; UNIVERSITY OF STRATHCLYDE, 2013), the understanding about the possible futures and how to shape them, contributes to the understanding of the relationship between victory in battles and the defense budget, because precise thinking about the expected operations will have a substantial impact on the cost employed in the naval platforms that will be used, in view of their useful life (a little more than 25 years) - thus, it is observed the importance of thinking about operational concepts for 2030 and beyond.

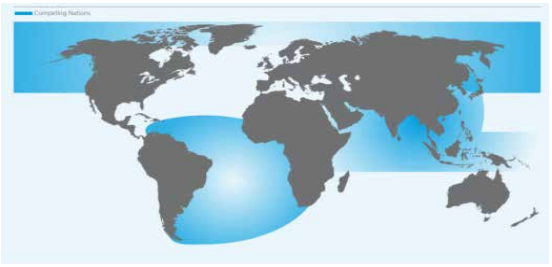
Overall, defense spending has increased:

> Global military spending is estimated to have been $ 1.917 billion in 2019, the highest level since 1988. The total was 3.6% higher in real terms than in 2018 and 7.2% higher than in 2010. Brazilian military expenditures fell slightly in 2019, by 0.5 percent, after two consecutive years of growth (SIPRI, 2020, p. 1).

There will always be hope that increasing levels of education and knowledge sharing will increase peace and decrease conflict, but navies are deployed where (and when) that perspective fails. Based on the potential for future conflict, in the event that humanity does not develop in cooperation, such failures may occur in places of maritime interests (zones of tension), according to the document *Global Marine Trends* 2030 (LLOYD'S REGISTER; QINETIQ; UNIVERSITY OF STRATHCLYDE, 2013) (Figures 1 and 2 – - with respect to the South Atlantic, this space was highlighted for the scenario case *Competing Nations* (Figure 2); which broadens the perception of the strategic importance of the Brazilian coast.

Figure 1 – Tension zones – ***Global Commons***

Figure 2 – Tension zones – ***CompetingNations***



Source: Lloyd's Register, Qinetiq and University of Strathclyde (2013, p.108).

As for the recent evolution of ships and naval systems, their development has been more significant in information technology (IT), to the detriment of personnel or mechanical platforms and systems. And, the adoption of naval technology from mechanical systems to electromechanics and electronics of the twentieth century will continue, according to the *Global Marine Trends* 2030 (LLOYD'S REGISTER; QINETIQ; UNIVERSITY OF STRATHCLYDE, 2013). In this way, navies will be increasingly complex and integrated by military information networks, with their own potential for repair and autonomy; and the need to put personnel out of harm's way, especially for the technology-focused naval modality of warfare, is growing.

According to the *Global Marine Trends* 2030 (LLOYD'S REGISTER; QINETIQ; UNIVERSITY OF STRATHCLYDE, 2013), the rise in naval capacity suggests that there will be growth opportunities for the naval sector. The main factors of naval power (naval platforms, weapons and manpower) will be maintained for 2030, with armament capacity growing, while the number of platforms and personnel will be renewed, rather than expanded. As for the weapons to be developed for the naval platforms, they will be significantly more powerful, as remote operation will have increased, directed energy weapons will have matured, and the cyberspace will be the new battlefield. The size and speed of these platforms will depend on technological advances and the availability of resources. The operation and control of autonomous marine systems will be a key issue.

O *Global Marine Technology Trends* 2030 (Lloyd's REGISTER; QINETIQ; UNIVERSITY OF SOUTHAMPTON, 2015) cites that the role of the warship in 2030 will begin to change with the use of autonomous systems and remotely piloted systems, providing greater range with less risk, as well as greater mission flexibility. Autonomous systems will operate above (at the waterline) and below the sea surface, implementing innovative concepts in the conduct of naval operations, offering the potential to radically change the nature of maritime security. Artificial intelligence (AI) and machine learning techniques will be greatly explored, as supporting technology and enabling such systems. However,

> [...] autonomous systems will also be widely available, for general use by any consumer; providing low-cost technologies that can be exploited by smaller nations, terrorist organizations, and non-state actors, many of which will not comply with legal and ethical constraints (LLOYD'S REGISTER; QINETIQ; UNIVERSITY OF SOUTHAMPTON, 2015, p. 102).

4 "BUTTER AND GUNS": ONE (OTHER) DECISION

According to Smith (1999), by means of a military force, the sovereign has the duty to protect society from violence and the invasion of other independent societies, since the natural habits of the people make them totally incapable of defending themselves, unless the State takes up new measures for public defense. Hence it is only by means of a standing army that the civilization of any country can be perpetuated, or even preserved for a considerable time, enjoying a degree of order and internal peace by its influence.

However, the defense of a society becomes more and more expensive as it advances in civilization, according to Smith (1999), because the art of war, a very intricate and complicated science (although noble), also gradually grows in the progress of improvement. The revolution in the art of war makes it much more difficult and consequently much more expensive to defend a society; however, the great expense of war superiority gives an evident advantage to the nation that can afford this expense.

Defense spending can be defined as "the cost of maintaining personnel, equipment and facilities, both in times of peace and in conflict, with the objective of ensuring an adequate level of deterrence and security" (FONFRÍA, 2013, p. 178); it can generate positive or negative effects on the economic growth of a country, according to Almeida (2001); there is no definitive consensus on the relationship between defense spending and the development of the nation, on the contrary, different possibilities stand out, different possible relationships, in which each case must be treated individually.

Deger and Sen (1995) address the complex issues that arise about the theme of military spending on defense, in relation to economic growth, security and governance of developing countries – by central and fundamental aspects of the interrelation between defense and development, which are difficult to formally model and quantify (some econometric analyses suffer from the lack of a firm theoretical model).

Regarding the economic sciences, Santos (2018) mentions the need to significantly reassess the theoretical and methodological bases of defense economics for a better understanding of the area, due to its particularity and nature, eminently interdisciplinary.

Because it is a public good, the existing predisposition to pay for national defense is difficult to estimate, according to Franco (2000); hence, the acquisition of weapons and the defense budget ends up being a decision-making process, involving a complicated set of issues, and which must balance the military need for confidentiality with the objective of making government decisions justifiable for a wider public. On the subject, Santos (2018) quotes the trade-off between investment in the defense area and in the social area.

One of the most easily applicable economic concepts to defense analysis, trade-off concerns the very limitation of choice in the face of scarcity, according to Almeida (2001); also traditionally known as the "butter *versus* gun" dilemma. According to this point of view, the nation should allocate its resources in order to produce civilian or military goods according to its need and, at the same time, ensure that the production of both goods occurs with

the use of available resources in the most efficient way possible, under penalty of incurring an unforgivable waste of national potential. It turns out that the notion of trade-off operates a sensitive change in the very concept of cost in decision making, which is no longer evaluated in purely financial terms to incorporate the idea that the cost of producing something corresponds to the option of not producing something else that is also necessary.

But, for the current moment experienced in Brazil, giving up any production whatsoever (butter or gun) should definitely not be an option. At a certain level of political-managerial commitment, joint pro-social work, public awareness and altruistic nationalism-organic, a possible intercession would be ideal. It is important that Brazilian political, economic and social decisions be sound and serious, focused on education, development of the nation and anti-corruption.

Regarding the economic consideration of defense issues, it is necessary to understand its uniqueness and its essential characteristic of public good, according to Almeida (2001); and this notion must be explained to society, directly or through its representatives, in order to undo the citizen-soldier divorce, framing the analysis of defense budgets according to a coherent logic and appropriate to its peculiarities, in particular, the difficulty of measuring results.

Faced with the scarcity of resources to meet infinite demands, the idea of doing "more with less" acquires capital importance, according to Almeida (2010), bringing together notions of effectiveness and efficiency, linked to the concept of transparency and *performance* of public management.

A cost-effectiveness analysis can be used, according to Franco (2000), selecting a method that minimizes the potential costs of defense spending and maximizes profits, for example, considering improvements in the efficiency of defense resources, so that more defense can be produced with less money, or, in times of defense cuts, maintaining the same level of Defense and applying surplus resources to other national objectives - a proposal that implies having a more creative thinking in relation to the combination of resources.

Ambros (2017) also addresses the main discussions that permeate the relationship between defense and development (whether military spending generates economic growth and technological development in society as a whole), and cites that, although it is not possible to confirm the positive or negative relationship between economic growth and military spending, the technology involved in the processes of defense-related companies can contribute to the development of a country.

According to Almeida (2001), the economy does offer the opportunity to study the theme (as an analytical tool for national defense issues) from an integrative perspective (between the civil and military sectors) in relation to national policy; and this integration can generate a mutual reinforcement of the two fields of knowledge, with significant benefits for both.

As defense is a typical activity of the state, non-delegable to the private sector, defense policy constitutes public policy because its execution is only possible with the intervention of the state force, as highlighted in Almeida (2010) – and yet, from the political point of view, national defense should constitute a state policy and not a government policy.

Thus, there must be a political arrangement underlying the national defense structure, which, by bringing together military and civilians, political parties and society, allows it to be conducted above simple rivalries, enabling active participation in the definition of priorities, allocation of resources and preparation of the budget.

Furtado (1962) argues that the development of the Brazilian economy has reached a degree of progressive differentiation that allows the country to achieve self-determination in the economic plan, being able to make the most fundamental decisions concerning it. With implicit responsibilities in this enormous decision-making power, there is a need for an increase in the conscious action of public power, with the state properly equipped to exercise its functions as the main instrument of development.

Economic analysis limits itself only to coldly exposing reality, which in practice is much more challenging, and therefore points to the need for action, according to Furtado (1962). A guiding philosophy of action would be necessary for the subject of development to be approached with absolute frankness, in order to be able to identify the strategic factors that act in the social process, for the implementation of a conscious policy of social reconstruction. Full awareness of the objectives of national political action in relation to the destiny of the people and their culture would be a duty, which leads to a positive and optimistic attitude, with respect to the self-determination of the community.

Also in Almeida (2001), the country should be led to think economically about its defense, with the purpose of better managing its possibilities and making the most of its potential; that is, it needs to guide the analysis of its defense issues from the recurring and limiting relationship between infinite needs and scarce resources. It is an opportunity to lend adequate theoretical basis to an integrated analysis of the planning and execution of the defense budget, from a decision-making process, especially with regard to the need to define strategies, the use of appropriate means and purposes appropriate to the available means and the general interest of the nation.

Therefore, to understand the nature of military spending in developing countries, it is necessary to go beyond the domain of economics, for Deger and Sen (1995); in particular, tools of political economy are appropriate to the theme, since the issues of military spending and heated discussions about security, legitimacy and governance are linked to *ethos* social, cultural and political rights of the country in question.

5 FINAL REMARKS

According to Romano (2018), in the face of accelerated technological change, the very concept of life is changing for the majority of the world's population and, in the near future, for all of humanity. Adapting to new circumstances is complicated; but doing so in a rapidly changing world is really challenging – one can hardly conceive of an accelerated and exponential adaptation about the environment. In addition, organizations, institutions and markets are even slower, as they move in a linear and clumsy way, without realizing that the moment of transition experienced is particular, because it affects economic and social

aspects due to disruptive innovations that represent a technological leap, as highlighted in Longo (2007).

Longo (2007) mentions that the importance of Science and Technology (S&T) is strategic in a state, and the intervention of governments in its development is increasing in countries that perceive it; in addition, the "growing cost of research and the complex physical infrastructure and social environment for it to flourish" (LONGO, 2007, p. 10) should be considered. Hence the importance of directing the government, in the formulation of policies and strategies, to articulate and coordinate activities in order to meet the demands, current and future, relevant to the nation.

Defense budget decisions may seem off course if the nation is unlikely to be involved in wars or threatened in a short period of time, according to Adams and Leatherman (2011).

However, defense investment should not be limited to momentary circumstances. On the contrary, it must be continuous and, mainly, prospective; according to world trends (which accompany the frantic technological rhythm), for the fulfillment of the objectives of the Brazilian National Defense Policy.

Moreover, the possibility of new and frightening forms of threats exists, according to Sandler and Hartley (2007); since the post-Cold War world has not become a place of peace, but remains dangerous (regional conflicts, transnational terrorist networks, rogue states and weapons of mass destruction – chemical, biological, radiological and nuclear, are examples).

With the intense commercial exchanges between states and the accessible technological advance, the threatening situation begins to assume global dimensions (especially if the world order is not maintained). Sandler and Hartley (2007) identify this new era due to globalization, which involves new technologies, new business practices, and improved international flows. These ever-increasing flows mean that armaments and armies would be less equipped to keep out unwanted invaders; posing a set of challenges to collective security, which confronts governments with expensive and elusive countermeasures. There are also challenges in developing effective collective action responses and in confronting costly nuclear proliferation.

Such threats therefore represent a direct challenge to the legitimacy of governments, according to Deger and Sen (1995); a purely economic analysis of said subject tends to be partial and will be able to capture only a part of the complexities involved.

Thus, "nations must reconfigure their defenses to face new contingencies" (SANDLER; HARTLEY, 2007, p. 612).

Moreira (2011) explains a new Brazilian reality, to stimulate discussion about defense from a lower external dependence in terms of military equipment (so that the country is a partner in the production and development of the technologies involved, leveraging native capabilities), generated by the issuance of high-level political guidelines for the sector – the National Defense Policy and the National Defense Strategy (both updated in 2020), in which the Brazilian government specifies its understanding of the theme, part of the national agenda, aiming to induce the technological leap directed at new Brazilian international insertion (MOREIRA, 2011).

Preparing and maintaining an effective defense system for a country like Brazil is not trivial, according to Moreira (2011), and with the advances in science and its technological applications (which has one of its most sophisticated expressions in the arms industry), the material bases that make up the means of state force have gained enormous weight in the defense equation, because investments in combat systems and platforms are of high value, and also long-term (which provides a generational dimension to the enterprise).

Hartley (2011) portrays the idea of public-social sacrifice in favor of defense (opportunity costs), on the part of the government, national defense ministries and the armed forces, to ensure the formulation of an efficient defense policy by decision makers.

For Brazil, homeland defense is inseparable from the country's development and takes into account its socioeconomic situation (among other fundamental objectives) (BRASIL, 2020). And the improvement of Naval Defense is relevant in prospective scenarios, as it concerns the expression of national power (BRASIL, 2020).

Therefore, in a time like the current one, the challenges imposed by transformational technological change (ongoing) must reach the way of thinking of Naval Defense.

The Naval Military Doctrine (BRASIL, 2017) describes that the implementation of innovative projects and the incentive to the construction of naval means in national shipyards contribute to the strengthening of the Brazilian shipbuilding infrastructure and the increase in the supply of jobs in the sector. And, technological absorption, enables the elevation of technological level in areas of naval interest, with the possibility of technological hauling to civil society (by dual application); as well as, the adaptation or development of new technologies, with the nationalization of defense products, and the strengthening of the Industrial Defense Base.

Due to the scientific-technological heritage and the successive advances of the maritime and naval industry, the relevance of navies will only tend to grow in the Twenty-First Century, along with the importance of the oceans and international trade in the globalized world, according to Moreira (2018).

Also, the challenge in favor of the country's development has a dimension never imagined before, given the prospective configuration of advancement in STI. Hence, the Brazilian population needs to be aware of the delicate situation, to position themselves correctly regarding political-representative choices, as well as morally and culturally awakened to the intrinsic intellectual improvement, which will be mandatory in the near future.

Moreira (2011) highlights the need for a balance between policies, strategies, institutions, budgets, human and material resources, with the concerted and continued action of various sectors of the state and society (academia, industry, entrepreneurship, among others), being an "inalienable duty of each generation to decide what resources the next will have to defend itself from contingencies that may befall it" (MOREIRA, 2011, p. 129).

As a human pro-social behavior, which can govern the relationship of generations with commitment to tomorrow, experimental evidence indicates that altruism is a powerful and unique force (FEHR; FISCHBACHER, 2003).

The application of such a tool points to the awareness of all nationals, as well as to the seriousness of decisive political actions, dissociated from corruption, related to national western culture, aimed at the common good (including using STI for this purpose) - in an attempt to guarantee the dignified "*butter and gun*" for the Brazilian nation, at such a critical moment; since, in the near future, the exponential technological growth will be demanding a new reality "of things", in which this classic dichotomy may be more pragmatically (or relatively) associated like this: butter will be more "*olive oil*" and the gun a "*laser gun*", for example.

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