NPS-AM-25-248

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Implications of Annual Budgeting on the Execution of Brazilian Navy Investments

June 2024

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Prepared for the Naval Postgraduate School, Monterey, CA 93943.

ACQUISITION RESEARCH PROGRAM
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The research presented in this report was supported by the Acquisition Research Program of the Department of Defense Management at the Naval Postgraduate School.

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ABSTRACT

Brazil has a vast maritime area called the "Blue Amazon," which is rich in natural resources. To improve the protection of the Blue Amazon, in 2008, the Brazilian Navy (BN) started multi-year investments in long-term defense projects such as the Submarine Development Program (PROSUB). Brazil's budgetary framework operates on an annual appropriation cycle, and this thesis assesses its impact on the BN's capital investments. The research focuses on PROSUB's execution from 2020 to 2023, compares Brazil's and the United States' budgetary systems, and evaluates an alternative budgetary system's ability to increase defense investments' effectiveness in Brazil. Findings suggest Brazil's current budget system leads to work stoppages, timeline extensions, and price increases, hampering PROSUB's progress and predictability. Although the BN has implemented strategies to increase efficiency and align actions to the budget, issues persist. The research suggests that incorporating a multi-year appropriations mechanism into Brazil's annual budget system could provide a more efficient framework for long-term execution. This approach may balance annual oversight with the need for long-term fiscal planning, improving the BN's means to develop and maintain capabilities necessary to protect the Blue Amazon.

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ACKNOWLEDGMENTS

To God, for my blessed life, for the opportunities provided, and for the people He placed in my path, I am very thankful.

To my wife, Giselle, thank you for understanding when I was absent, studying, and writing my thesis. I love you.

To my daughters, Maria Clara and Maria Luiza, thank you for being in my life. You are my best motivation to never give up and always to do my best.

To my parents, thank you so much for putting my education first.

To my advisors, Dr. Phil Candreva and Dr. Amilcar Menichini, thank you for being patient with me and providing the necessary knowledge and guidance to support this thesis. Your help was invaluable. Without both of you, this mission would have been much more challenging.

To Daniel J. Lehnherr and Michael Thomas, writing coaches from the Graduate Writing Center (GWC), who were tireless in helping me write in English as a second language, thank you so much!

To the personnel of the Directorate of Budget Management (DGOM), thank you for providing data and supporting this research.

To the Brazilian Navy and my former naval chiefs, thank you for the opportunities offered to me and for all the knowledge provided. I would not be where I am today without the Navy. So, viva a Marinha do Brasil! Tudo pela Pátria!

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LIST OF ACRONYMS AND ABBREVIATIONS

ADA	Anti-Deficiency Act
AEN	Ações Estratégicas Navais (Naval Strategic Actions)
AMRJ	Arsenal de Marinha no Rio de Janeiro (Rio de Janeiro Navy Arsenal)
BES	Budget Estimate Submission
BID	Base Industrial de Defesa (Defense Industrial Base)
BN	Brazilian Navy
CR	Continuing Resolution
CY	Calendar Year
DOD	Department of Defense
DPG	Defense Planning Guidance
EMGEPRON	Empresa Gerencial de Projetos Navais (Naval Projects Management Company)
END	Estratégia Nacional de Defesa (Brazilian National Defense Strategy)
FY	Fiscal Year
FYDP	Future Years Defense Program
GAO	Government Accountability Office
GDP	Gross Domestic Product
HAC	House Appropriations Committee
HASC	House Armed Services Committee
IMF	International Monetary Fund
IPCA	Índice Nacional de Preços ao Consumidor Amplo (Extended National Consumer Price Index)
LDO	Lei de Diretrizes Orçamentárias (Budget Guidelines Law)
LOA	Lei Orçamentária Annual (Annual Budget Law)
MCDA	Multicriteria Decision Aid
MILPERS	Military Personnel
MPM	Metas Prioritárias da Marinha (Navy's Priority Goals)
NDAA	National Defense Authorization Act
OBNAV	Objetivos Navais (Naval Objectives)

OECD	Organisation for Economic Co-operation and Development
OMB	Office of Management and Budget
O&M	Operations and Maintenance
PB	Presidential Budget
PE	Program Element
PEC	Proposta de Emenda à Constituição (Constitutional Ammendment Proposal)
PEM	Plano Estratégico da Marinha (Strategic Planning of the Navy)
PLOA	Proposta de Lei Orçamentária Anual (Annual Budget Law Proposal)
POM	Program Objective Memorandum
PPA	Plano Plurianual (Multi-Year Plan)
PPBE	Planning, Programming, Budgeting, and Execution
PPBS	Planning, Programming, and Budgeting System
PPP	Public-Private Partnership
PRODE	Produto de Defesa (Defense Product)
PROSUB	Programa de Desenvolvimento de Submarinos (Submarine Development Program)
RDT&E	Research, Development, Test, and Evaluation
RP	Restos a Pagar (Remains Payable)
SAC	Senate Appropriations Committee
SAD-ORC	Sistema de Apoio à Decisão para a Otimização de Orçamento (Decision Support System for Budget Optimization)
SASC	Senate Armed Services Committee
SisGAAz	Sistema de Gerenciamento da Amazônia Azul (Blue Amazon Management System)
ToT	Technology Transfer
UFEM	Unidade de Fabricação de Estruturas Metálicas (Metal Structures Manufacturing Unit)

I. INTRODUCTION

Pereira (2019) pointed out that with 7,400 kilometers of coastline, Brazil has 3.5 million square kilometers of maritime area under its jurisdiction, where around 95% of the country's global trade occurs. As Pereira highlights, this maritime area supplies 45% of Brazil's seafood and contains pre-salt oil reserves, which contribute to about 85% of Brazil's oil production and 75% of its natural gas output. In an allusion to the Amazon Forest, this maritime area was named the "Blue Amazon," due to its considerable size, economic importance, and large quantity of natural resources (Pereira, 2019).

The discovery of oil reserves within the "Blue Amazon" in 2006 prompted the Brazilian Navy (BN) to increase its investment in strategic defense projects in 2008 to ensure adequate monitoring and protection of these valuable resources in this maritime area (Pereira, 2019).

The BN identified some essential investment programs, such as the Submarine Development Program (PROSUB), the Blue Amazon Management System (SisGAAz), and the Tamandaré-class Frigate Program, as strategic to the country's national defense under the Brazilian National Defense Strategy (END; Ministério da Defesa, 2012). These programs are decisive in improving Brazil's defense capabilities and are the foundation for developing the defense industrial base (BID).

A. BACKGROUND

In 2012, recognizing the significance of budgetary consistency in enhancing national defense, the END established regular budgetary appropriations as its third defense strategy (ED-3; Ministério da Defesa, 2012). The ED-3 highlights the importance of financial planning and resource allocation for defense programs (PRODE), seeking to ensure the effective and uninterrupted execution of these projects.

Historically, executing these multi-year defense projects under Brazil's annual budgeting framework has been challenging. This framework, governed by the annual principle, requires annual legislative approval of expenditures and prohibits the carry-over of funds not obligated to the subsequent fiscal year (FY), as noted by Alves (2022). This

principle acts as a political control tool, maintaining a system of checks and balances, and as a potential barrier to long-term projects due to funding uncertainties and inefficiencies.

As Alves (2022) pointed out, Brazil's budgetary process is normally rigid and, therefore, all too often driven by a "use it or lose it" mentality. This generally hurried spending tends to undermine the efficacy of state action in general, corresponding to a broader debate in public financial management about the optimal budgeting cycle for peculiar government functions.

In 2017, Minister of Defense Raul Jungmann spoke with representatives of companies in the defense sector, stating that he was negotiating with the federal government to implement a multi-annual budget for the armed forces, as reported by the Ministério da Defesa (2017). Jungmann emphasized that the adoption of this measure would be extremely important to guarantee the continuity and effectiveness of PRODE, enabling the completion of these developments without pauses or adversities due to budgetary limitations (Ministério da Defesa, 2017). In broad terms, the proposal intended to ensure more financial stability in the activities related to national defense.

Similarly, in 2024, the current Minister of Defense, José Múcio Monteiro, mentioned that the lack of budget predictability affects national security, saying, "We buy without being sure that we will pay" (SBT News, 2024). As a result, defense companies are not guaranteed to receive their payments on time, which could motivate them to increase the price of defense projects in their bid prices. Moreover, this unpredictability has other consequences, such as delays and stoppages in projects.

In regard to budgetary stability, it is worth remembering the case of the corvette Barroso, whose construction began in 1994 at the Rio de Janeiro Navy Arsenal (AMRJ). The construction of the corvette was expected to last five years, but according to Martini (2022), the project was completed in 14 years due to the absence of an adequate flow of resources, with stability, regularity, and predictability. Martini further notes that the extended deadline led to numerous technical and administrative issues, putting additional pressure on the project and reducing the operational readiness of the naval force.

Furthering this discussion, in 2019, the government proposed through Constitutional Amendment Proposal (PEC) 188 the adoption of a multi-year budget rather than the current annual budget (Mendes et al., 2021). This proposal sought stronger stability and predictability in funding long-term projects, particularly those considered critical to national defense. Despite these efforts, Brazil has not yet imposed a multi-year budget.

Internationally, some defense forces, such as the U.S. Navy, have used multi-year appropriations, which provide greater financial stability for long-term projects. Theoretically, this aligns the financial resources with the extended timelines in which defense procurement and defense development projects occur.

This thesis evaluates the Brazilian budgeting system compared to alternative systems, seeking to identify the most effective approach for funding long-term defense projects efficiently and effectively.

B. METHODOLOGY

This thesis employs a qualitative approach to examine the implications of annual budgeting on the execution of BN investments. The literature review explains the nuances of defense projects, issues that usually arise regarding annual budgeting, and some instruments used to budget beyond one year. It examines the budget processes of both Brazil and the United States to identify how each addresses the limitations of the annual budget cycle. The issues related to Brazil's budget are addressed, and data is gathered from Secretaria do Tesouro Nacional (n.d.) to assess the execution of the PROSUB from 2020 to 2023.

Throughout this thesis, monetary values originally in Brazilian currency have been converted to U.S. dollars to provide a consistent and easily understandable basis for analysis and comparison. All conversions were performed using an exchange rate of 5 Brazilian reais per U.S. dollar. This simplified conversion rate was chosen to facilitate calculations and maintain clarity in the discussion of financial matters.

The findings and the comparative analysis are then synthesized to determine which budgeting system, whether annual, biennial, or annual with multi-year appropriations, is likely to enhance project execution capabilities within the BN. Based on the knowledge gained through the research, some recommendations are made about the budgeting system that are most appropriate for the BN's projects.

C. RESEARCH QUESTIONS

Discussions about the effectiveness of the budgeting systems for the armed forces often raise different opinions about the long-term planning and sustainability of strategic projects. This is even more true for the BN, where the annual budgeting system is the backbone of financial planning and execution. However, its system presents several inherent challenges that could raise serious questions about its efficacy. Thus, the primary research question emerges: Does the current annual budgeting system cater to the needs of significant projects in the BN, or are there alternative budgeting systems that might offer a more effective framework for the execution of funds for such projects?

To support this study, the secondary questions are presented next.

1. What are the general characteristics of defense projects?
2. What are the issues that arise from annual appropriations?
3. What are the multi-year characteristics of the budgets in Brazil and the United States?
4. What are the means implemented by the BN to cope with the annual budget's limitations?
5. How do annual budgets currently affect the capital budget of the BN?

D. SCOPE AND LIMITATIONS

The basis for the research implies that other programs, areas, and countries have experienced, at one time or another, similar problems. It is also important to realize that each country has its own customs, traditions, and political institutions. Therefore, a budget

system that may work in one country is only sometimes transferable or only partially transferable or applicable in another.

The study is restricted to only government resources, leaving out alternative sources like public-private partnerships (PPPs). This thesis does not address system management aspects since the objective is to draw a clear, comprehensive picture regarding the budgeting practices for defense funding and obtain insights into the broader fiscal strategies of the countries.

E. ORGANIZATION OF STUDY

Chapter II answers secondary research questions one and two. It includes a literature review, starting with defense projects and moving on to the challenges inherent in the annual budget process, the concepts of budgeting for operating and capital, and finally, some frameworks used to avoid the problems raised with the annual budget.

Chapter III addresses the budget systems of both Brazil and the United States, exploring the two countries' approaches to multi-year budgeting, answering secondary question three.

Chapter IV compares the defense budget allocation strategies of Brazil and the United States, encompassing personnel, operations and maintenance (O&M), investments, and other relevant areas. Additionally, the chapter provides strategic solutions implemented by the BN to mitigate the problems presented by the current budget system and evaluates the execution of defense investment budgets in Brazil, focusing on the PROSUB project. Finally, it answers secondary questions four and five.

Chapter V responds to the primary question, and Chapter VI provides recommendations that would improve the budget efficiency for multi-year defense projects and a conclusion.

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II. LITERATURE REVIEW

This chapter addresses two secondary questions: 1) What are the general characteristics of defense projects? and 2) What are the issues that arise from annual appropriations? To begin, we discuss defense projects, the public budget, and the problems associated with annual appropriations; examine the differences between budgeting for operating and capital expenditures; and review the instruments applied to increase the flexibility of annual budgets.

A. DEFENSE PROJECTS

According to Greiman (2023), defense projects are a type of megaproject. He states that megaprojects are characterized by their size, duration, and complexity, involving multiple systems to construct large-scale infrastructure such as sports venues, nuclear power plants, and transportation networks. Military programs share these characteristics, including the development of weapons systems, submarines, and aircraft.

Flyvbjerg et al. (2003) discuss that megaprojects are characterized by their complexity, vast scale, and staggering cost, often exceeding $1 billion. Funding for projects of this nature (e.g., the Hoover Dam, the Chunnel, and Boston's Big Dig) almost always involves several funding sources, sometimes combined from both the public and private sectors (Greiman, 2023). Since defense programs are sensitive, this thesis focuses only on government funding sources, particularly those allocated to the Department of Defense (DOD).

The temporally extended nature of defense projects is fundamentally attributable to their inherent complexity, as Figure 1 visually reveals. The figure denotes a positive correlation between the manufacturing time and the complexity of various defense equipment, which is a sign of the complex production processes of such equipment.

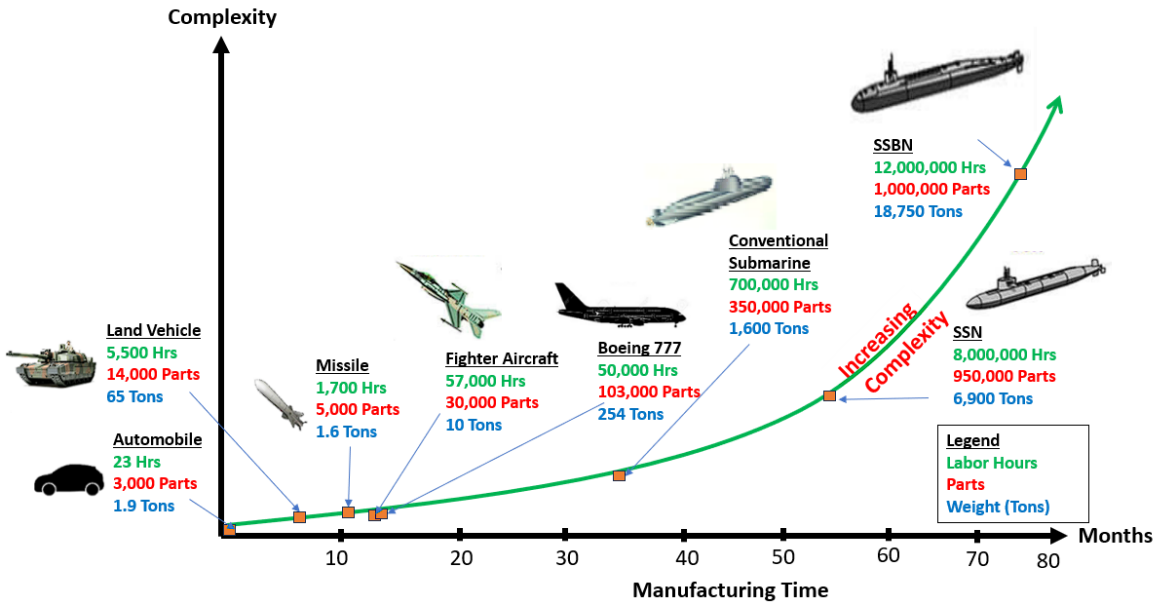

Figure 1. Relative Complexity of Commercial and Military Equipment. Adapted from Ong et al. (n.d.).

Figure 1 shows that building a conventional submarine, the most straightforward kind of submarine, with 1,600 tons and 350,000 components, takes over 30 months. To compare complexity and time, a Boeing aircraft is built in less than 15 months.

Despite being complex, spanning several years, and being expensive, defense spending promotes growth, according to Rooney et al. (2021), who state that "the best available evidence suggests that defense spending promotes growth, even if there are disagreements about how much" (p. 6). Therefore, defense spending, besides fostering national defense and BID, also helps the nation to grow, generating jobs and income.

In summary, defense projects are complex, vast in scale, expensive, and require careful planning at all stages. Substantial manufacturing time, varying from thousands to hundreds of thousands of hours, is needed, not including requirements definition, life cycle management, and procurement processes.

Having discussed the inherent characteristics and challenges associated with defense projects, it is now appropriate to introduce the concept of public budgeting and the problems associated with annual budgeting.

B. THE PUBLIC BUDGET

The public budget is a fundamental instrument of the governance of public activities, having immense political impact. According to Baleeiro (2010), the public budget is the legislative act that allows and qualifies the executive branch to manage determined expenditures and collect revenues, which must be authorized by prior legislation.

As underlined by Fortis and Gasparini (2017), two pivotal elements emerge from conceptualizing the public budget. The first is that the budget expresses the delegation of authority from the legislative branch to the executive branch, revealing its intrinsic nature as a political fact. Second, delegating the budget to the executive branch for a limited time allows the legislative branch to monitor and assess its execution. This limited time is called the FY. For example, the FY in Brazil runs from January 1 to December 31, while in the United States, it runs from October 1 to September 30.

As demonstrated in the previous section, defense projects often extend several years beyond the FY or Congress's deadlines. This tendency creates substantial political tension between Congress's authorization and the executive branch's need for time to effectively implement public policies and other programs. The accuracy of predictions affects the management of longer-term authorities. This means that, at some point, the authorized budget will likely need to be revised.

As shown in Brazil and the United States, an annual cycle has become the most pragmatic way to deal with public budgeting. However, as the following section clarifies, the annual budget is not a complete solution.

C. CHALLENGES RELATED TO THE ANNUAL BUDGET

Fortis and Gasparini (2017) have described several problems associated with annual budgeting. They point out that annual budgeting includes intertemporal fiscal and economic constraints, which are usually neglected due to a short-term focus on the one-year cycle. Moreover, they explain that this short-sighted view could also lead to heightened bargaining in the government's allocation process. They also argue that there is a tendency for each executive body to concentrate only on a small portion of the

expenditure, which they would naturally think would be the most important and worthy of scarce resources. Fortis and Gasparini (2017) suggest that annual budgeting will engender an inflated and unrealistic program and even further incite a second problem: strategies of overestimating revenues and hiding expenditures.

Moreover, Fortis and Gasparini (2017) claim that the prioritization of expenditures becomes a significant challenge in the budgeting process, which can result in a less strategic utilization of appropriated funds. According to them, this issue is particularly apparent in the public sector, where actions frequently span multiple FYs and necessitate longer-term planning compared to the standard 12-month budget cycle. They note that the disconnect between budget and planning occurs due to public actions being planned over a more extended timeframe than the budget authorization period. This discrepancy creates a natural gap between the planned actions and the available resources allocated through the annual budget. Fortis and Gasparini explain that the gap tends to increase when planning is revised at a different pace than the budget, further exacerbating the challenges in aligning resources with long-term objectives. As a result, organizations may encounter difficulties in effectively allocating funds and executing their plans, leading to suboptimal outcomes and reduced efficiency in public spending (Fortis & Gasparini, 2017).

Furthermore, various expenditures, such as investment expenditures, have execution timelines exceeding one year, inducing a recurrent approval process capable of generating instabilities in the face of risks of revision or even interruption in each budget negotiation (Fortis & Gasparini, 2017). Fortis and Gasparini (2017) say that even in cases where action can be taken within one year, most of the period is often taken up by the administrative processes generally involved in the requirements for project development, such as tender processes, draft contracts, and issuance of environmental and operational licenses.

These administrative processes result in an accumulation of expenses made in a rush at the end of each FY. Such expenses are seen as generating inefficiency in the public sector, as they are implemented to avoid the "loss" of the appropriations already authorized by Congress. If such appropriations are not used, the funds return to the treasury, signaling that there was an "excess" of resources, and in the next budget, the unit runs the risk of

receiving fewer resources. Each unit then naturally tries to avoid this situation by pressing for poorly planned or unnecessary expenses. The literature captures this phenomenon with the phrase use it or lose it (Liebman & Mahoney, 2017). In fact, it should be just "use it" because Congress expects that the authorized resources be fully used "since budgets create expectations and serve as social and legal contracts between branches of government," as Candreva (2017, p. 310) points out. Thus, the DOD feels compelled to use all the money authorized by the legislature.

Lastly, as one of the DOD officers interviewed by the Commission on PPBE Reform (2024) stated, the use-it-or-lose-it mentality motivates managers to do "some crazier things to try and get some of the money obligated and spent" (p. 77), emphasizing the problems generated by the annual budget cycle

So, we have answered the second question of this research—"What are the issues that arise from annual appropriations?"—and established that annual appropriations, which expire at the close of each FY, could jeopardize the continuity and stability of complex and multi-year defense projects. In the next section, it is necessary to explain some budget concepts that are naturally interrelated with the objective of this thesis.

D. OPERATING BUDGETING VERSUS CAPITAL BUDGETING

As defined in the previous section, the challenges and constraints inherent in annual budgeting processes indicate the necessity of distinguishing between two budgeting approaches: operating budgets and capital budgets. These two budgeting methods, although interconnected, meet distinct financial planning needs and are applied across a wide array of sectors, each serving a unique purpose and following different time horizons and strategic considerations.

1. Operating Budgets

According to Candreva (2017), operating budgets play a central role in short-term financial planning since they aid in the estimation of sales, costs of production, and other related expenses. In a family scenario, an operating budget aids in setting priorities regarding the most critical expenses, including housing, transportation, utilities, and food.

On the other hand, the government's operating budget includes many other costs, such as staff remuneration, training programs, supplies, and minor repair works. In the military sector, a substantial portion of operational expenses is allocated to military personnel (MilPers) and O&M appropriations, which play a critical role in defense budgeting.

2. Capital Budgeting

Candreva (2017) expresses that capital budgeting is the financial plan that a business makes so that the estimates of expense and funding can be calculated for significant investments such as buildings, machinery, or factories. Candreva (2017) states that these budgets consider the entire investment life cycle and will cover the total cost to acquire, finance, and operate the asset, along with the projected returns on the investment. So, in the example of household finance, a capital budgeting decision might apply when one purchases a home or a car for the family: they must consider an up-front cost, the costs of maintenance over time, interest on loans taken out to cover the purchase, and overall worthiness of the investment over the long term. Similarly, capital budgeting is used mainly by governments to decide on public projects where the capital is the project's initial cost, including the construction of new highways or the improvement of new infrastructure, with the long-term benefits that the public will derive. This form of budget involves investing in new ships, improving technology, and developing infrastructure in the Navy.

In summary, while the operating budget process is tied to the FY, which allows for responsive operational needs, capital budgeting calls for a more strategic multi-year outlook, with the scale and duration of the projects involved extending beyond the annual financial cycles.

Hence, PROSUB and the Tamandaré Frigate Program are capital budgeting examples of how the BN's investment in these programs would enhance Brazil's maritime defense capabilities over the long term. Similarly, the U.S. Navy's investment in new aircraft carriers and the next-generation weapons systems it is developing are also part of capital budgeting.

3. Capital Budgets and Multi-Year Funding Practices

Despite the previous concepts, the Organisation for Economic Co-operation and Development (OECD; 2014) highlights that capital budgeting varies across countries. It can refer to governments maintaining separate budgets for investment and operational expenses, segregating investment from current spending while ultimately merging them into a unified budget that includes depreciation and capital asset write-offs, or integrating distinct decisions into a single budget later. A survey by the OECD (2014) showed that 61% of OECD nations organize distinct capital and operating budgets. In addition, most OECD countries fund the total project cost upfront. This is the case of the U.S. DOD system, which this study addresses in Chapter III.

With the distinctions that characterize the capital budget for investments and the budget for operating expenses thus established, the following section addresses strategies to budget beyond the FY.

E. BEYOND THE ANNUAL BUDGET

Many countries use multi-year planning instruments to increase the flexibility of implementing and executing their annual budgets, following guidance from institutions including the World Bank and the International Monetary Fund (IMF; Mendes et al., 2021). Some examples of these instruments include the biennial budget used by some states in the United States, the English carry-over, the "Restos a Pagar" (Remains Payable [RP]) in Brazil, and the multi-year budget for investments and major purchases in the U.S. federal government.

1. Carry-Over

Carry-over, also known as end-year flexibility or carry forward, is the right to use an unspent appropriation after the period for which it was initially granted (Liernet & Ljungman, 2009). In the United States, this practice can be compared to investment accounts where appropriations span a few years, and in Brazil, to RP to a certain extent.

Liernet and Ljungman (2009) say that the objective of carry-over is to avoid the concentration of expenditure commitments at the end of the financial year, which leads to

often inefficient and low-quality spending due to higher prices paid to suppliers and the acquisition of unnecessary or non-priority goods or services with the sole purpose of consuming remaining appropriations. As a result of carry-over, public administrators do not need to use their budget allocations in a hurry, having more time to spend more efficiently and with higher quality and planning.

However, to prevent fiscal control from being undermined, Liernet and Ljungman (2009) suggest some limitations for the implementation of carry-over, such as applying it only to certain types of expenses, restraining the number of resources from budget allocations that can be carried over, containing the number of resources from accumulated carried-over budget allocations, and limiting the time for which carry-over is accepted. For developing countries, the authors suggest introducing carry-over only for capital expenditures and assessing the pertinence of extending the mechanism to operating expenditures.

2. Biennial Budgeting in the United States

The Congressional Budget Office (1987) describes biennial budgeting as "the practice of preparing and adopting budgets for two-year periods" (p. 1). It is designed to reduce the frequency of the budgeting process, allowing for more strategic long-term planning and potentially reducing political pressure associated with annual budgets (Fichtner et al., 2016).

Fichtner et al. (2016) state that due to problems such as successive continuing resolutions (CRs), the biennial budget proposal has obtained considerable attention in Congress. According to Kogan et al. (2012), supporters of biennial budgeting argue that it represents a reform that would enable more careful and considered budget planning and provide Congress with additional time for oversight.

However, a study conducted by Kogan et al. (2012) based on the experiences of states that have used biennial budgets has shown that the drawbacks surpass the benefits.

Kogan et al. (2012) address that biennial budgeting diminishes congressional control and the flexibility to react to changing conditions. They argue that this budgeting

approach can lead to outdated decisions and dependencies on large supplemental appropriations, which may undermine fiscal discipline. It also hampers the ability to quickly address emergencies and adapt programs based on new effectiveness data, leading to prolonged reliance on potentially less effective government programs (Kogan et al., 2012).

Additionally, Kogan et al. (2012) explain that biennial budgeting can slow the reallocation of funds to higher-priority projects because of the protection of existing programs, complicating efforts to shift budgetary priorities effectively. They assert that the extended budget cycle may make congressional oversight difficult, and frequent budget revisions could result in a fragmented budgetary process.

Finally, this approach also contrasts with the trend observed in many states, where there has been a shift from biennial to annual budgeting, indicating practical difficulties with managing complex budgets over a two-year cycle (Kogan et al., 2012). According to Kogan et al., most states in the United States, particularly the more populous ones, have adopted annual budgeting over biennial budgeting.

In conclusion, Kogan et al. (2012) exposed that switching from an annual to a biennial budget may have more negative consequences than beneficial effects for the U.S. federal government.

3. Multi-Year Appropriations in the Annual Budget Process

In addition to using multi-year budgeting instruments described in the previous sections, another approach to increase fiscal flexibility, predictability, and stability is incorporating multi-year appropriations in the annual budget process.

The Government Accountability Office (GAO; 2004) defines a multi-year appropriation as "an appropriation that is available for obligation for a definite period of time in excess of one fiscal year" (p. 5-7). Unlike biennial budgets, where all expenses are executed in a two-year fiscal cycle, Fortis and Gasparini (2017) state that multi-year appropriations are usually for specific accounts, especially investment expenditures.

Fortis and Gasparini (2017) address the fact that multi-year appropriations are more common than multi-year budgeting. For example, the U.S. federal government adopts various appropriation periods for investments and large government procurements depending on the completion time of these acquisitions.

Based on King's (2021) research, multi-year allocations increased flexibility and provided stable funding during multi-year project execution. This stability allowed contractors to plan their projects and labor more accurately, reducing risk for themselves and the public administration.

In summary, these appropriations allow funds to be used for longer than the one-year cycle for specific accounts, permitting agencies and departments to plan and execute long-term projects without obtaining annual approvals for continued funding, which is particularly beneficial for large-scale projects or programs that require consistent funding over several years. At the same time, these funds provide more stability for the execution of the project, avoiding work stoppages, the extension of timelines, and price increases.

III. BUDGET SYSTEMS

This chapter addresses the Brazilian and U.S. budget systems, focusing on expenses that span more than one year.

A. THE BUDGET OF THE UNITED STATES

1. The Budget Formulation

Saturno (2023) explains that federal budgeting is a recurring sequence that starts with formulating the president's budget for the year and ends with evaluating budget implementation. According to Saturno, this process encompasses key phases: the drafting of the president's budget, actions taken by Congress on the budget, the execution of the budget, and its subsequent audit and review. Throughout this process, federal agencies find themselves juggling three distinct FYs simultaneously—they are executing the budget of the current year, requesting funding from Congress for the upcoming year, and planning for the budget for the year that follows (Saturno, 2023).

Figure 2 outlines the FY calendar, which begins on October 1 and ends on September 30. According to this schedule, the executive branch is required to submit its budget proposal to Congress by the first Monday of February each year. At the end of February 2024, the execution phase of the FY2024 budget would be nearing the completion of its fifth month. For those accounts benefiting from appropriations that span multiple years, this period signifies entering the second year for the 2023 budget allocations, the third year for those of the 2022 budget, and so on. Assuming the budget was submitted on schedule in early February, Congress is advancing through the enactment process for the FY2025 budget. As highlighted by Candreva (2017), this crucial stage includes holding hearings and collecting testimonies from various governmental agency officials. Meanwhile, within the executive branch, preparations for the FY2026 budget are underway.

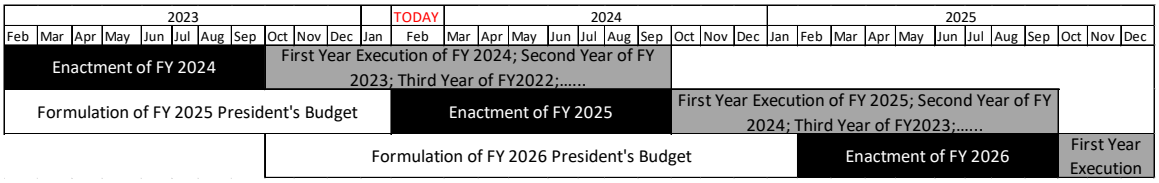

Figure 2. Federal Budget Calendar.
Adapted from Candreva (2017).

According to Saturno (2023), the president of the United States is responsible for developing a budget and fiscal policy. Saturno points out that the Office of Management and Budget (OMB), an agency under the White House, initiates this process by issuing a budget call and providing guidance to federal agencies, marking the beginning of the budget preparation phase.

As Saturno (2023) explains, government agencies create budget proposals for the upcoming FY during the spring and summer months. Then, the OMB reviews these proposals, conducts hearings, and makes adjustments. After that, the president approves the final budget around December, and the budget document is submitted to Congress in January. The presidential budget (PB) is presented to Congress by the first Monday in February (Saturno, 2023).

The process of budget approval and allocation within Congress involves a structured sequence of actions, primarily orchestrated by three key committees: the Budget Committee, the Armed Services Committee, and the Appropriations Committee (King, 2021). Initially, according to King, the Budget Committees, one in each chamber of Congress, formulate the budget resolution after the presentation of the PB. As King (2021) asserts, this resolution delineates the fiscal parameters for the approaching year, establishing the framework for federal spending without necessitating presidential consent.

King (2021) reports that, in the following phase, the focus shifts to the authorizing committees, who draft legislation that establishes and governs federal programs and agencies, setting spending boundaries for them. The House Armed Services Committee (HASC) and the Senate Armed Services Committee (SASC) authorize defense programs. For example, the HASC and SASC are responsible for authorizing the procurement of new

aircraft carriers, destroyers, and ballistic missile submarines. Their work finishes with the draft of the National Defense Authorization Act (NDAA), a document that authorizes appropriations and individual programs (King, 2021). King says that these committees operate simultaneously, engaging in a series of hearings and markups, which precede a vote within the respective committees. In instances of discrepancy between the House and Senate versions of the NDAA, King explains that a conference committee comprising members from both HASC and SASC is organized to reconcile the differences. The harmonized version of the NDAA is then subject to approval by both legislative bodies before being forwarded to the president for enactment (King, 2021).

Parallel to this, the House Appropriations Committee (HAC) and the Senate Appropriations Committee (SAC) are responsible for the 12 appropriations bills, including the DOD Appropriations Act, which provides the funds for defense initiatives (King, 2021). King describes that the fiscal cycle necessitates that these appropriations are enacted before the beginning of the FY, failing which, a CR may be implemented to ensure interim financing. Typically, a CR maintains funding at the levels of the preceding year and excludes the initiation of new programs (King, 2021).

In essence, King (2021) says that the legislative framework for federal budgeting and defense funding is a collaborative work involving the Budget, Armed Services, and Appropriations Committees. Each plays a separate yet interconnected role in setting spending targets, authorizing programs and expenditures, and ultimately providing the financial means to execute the defense plans. The mechanism ensures continuity of government operations, even in the absence of a new budget, through the provision of a CR.

2. Planning, Programming, Budgeting, Execution

The DOD Planning, Programming, Budgeting, and Execution (PPBE) process is a program budgeting system that identifies a set of programs that can achieve the goals of a government organization, as Candreva (2017) describes. Each program is priced individually, and the system selects the most suitable market basket of programs that can produce the desired goals (Candreva, 2017).

According to Candreva (2017), in the DOD, a program can encompass the procurement of new aircraft, ships, and tactical vehicles, as well as a range of activities, such as flight operations, depot maintenance, dental care, base support, and recruitment. Program elements (PEs) are assigned to each program, and the defense budget is allocated among the PEs over five years (Candreva, 2017).

McGarry (2022) explains that the PPBE process is a carefully constructed plan that generates the Defense Department's annual budget request to Congress. McGarry (2022) notes that this plan involves a detailed analysis of the department's anticipated expenses and requirements for the upcoming year, as well as updates to the Future Years Defense Program (FYDP), which outlines the department's projected spending over the next five years.

Hence, the PPBE process is designed to produce distinct outputs for each phase within a given year. As shown in Figure 3, the planning phase has a 5-year horizon and begins two years prior to the focal year. For instance, in calendar year (CY) 2021, the planning phase is already underway for 2023 to 2027. This forward-looking approach allows for the development of a comprehensive and cohesive strategy that aligns with long-term objectives and future requirements.

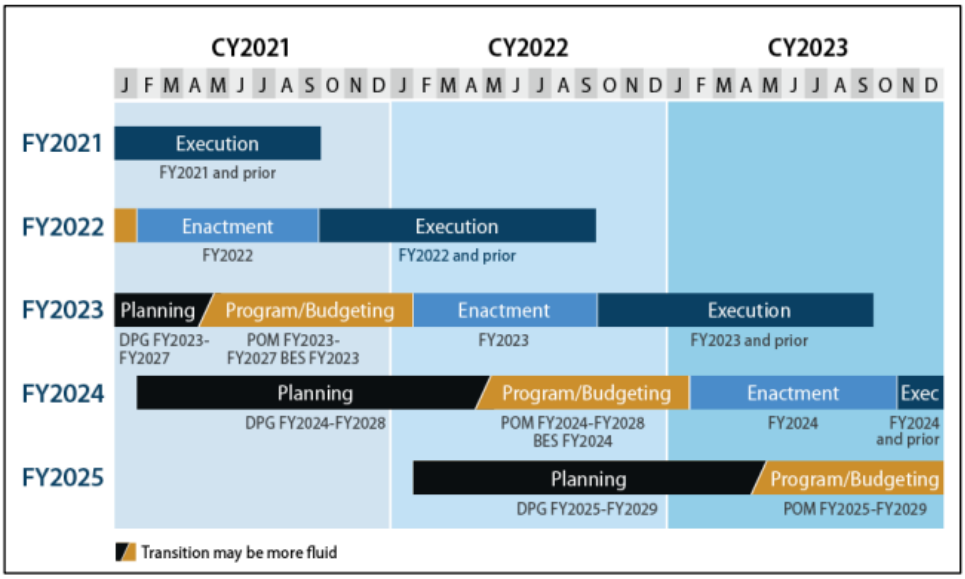

Figure 3. DOD Resource Allocation Process (Notional): FY Cycle by Calendar Year and Month. Source: McGarry (2022, p. 1).

During the planning phase, the Defense Planning Guidance (DPG) is drafted to outline the development priorities for the military force. In the programming phase, a program objective memorandum (POM) is generated, which serves as "a funding plan for each DOD component covering a five-year period" (McGarry, 2022, p. 1). Finally, the budgeting phase culminates in a budget estimate submission (BES) that "covers the first year of the POM and converts programs into budget terms for submission to Congress" (McGarry, 2022, p. 1). In the execution, the policy direction is implemented, and the desired capabilities are created. As McGarry (2022) explains, this phase entails a critical evaluation of how programs perform as opposed to their planned objectives.

3. Appropriations

As Congress holds the "power of the purse," all programs and their funding are a product of congressional action. Article I, Section 9 of the Constitution states, "[n]o money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law" (U.S. Const. art I, § 9). So, through appropriations, Congress gives budget authority to agencies, which allows them "to acquire goods and services, hire people, make loans, and provide grants and guarantees, all of which may result in outlays from the Treasury" as Candreva (2017, p. 301) explains.

Once agencies have budget authority (appropriations), they can make obligations, which means they can appropriate their funds and enter into an agreement with another party—for example, a contractor to provide food. After the contractor provides the services or goods, an expenditure is made, and the contractor is paid.

4. Purpose, Time, and Amount

According to the GAO (2004), all appropriations must meet three criteria to be available for a legal expenditure of funds: purpose, time, and amount.

Candreva (2008) describes that the purpose criteria, known as the necessary expense doctrine, states that appropriations must be used only for their designated purposes unless otherwise permitted by other laws. He explains that this doctrine adopts three steps to validate an expense as legal. First, the expense must be related to the appropriation.

Second, the expense must not be prohibited by law. Third, the expense must not have been provided for by another more specific appropriation. Candreva (2008) asserts that failure to satisfy these three criteria makes the expense illegal.

Candreva (2008) discusses that the Anti-Deficiency Act (ADA) sets the guidelines for the amount criteria. According to Candreva (2008), the ADA prohibits entities from exceeding their budgetary allocations, which can occur in three situations. First, an entity may spend more than what is authorized or allocated. Second, funds might be expended before they have been officially authorized or appropriated, often in anticipation of a new FY or CR. Third, an entity might accept "voluntary" services from a contractor expecting future payments. Candreva (2008) emphasizes that all of these actions constitute violations of the ADA and are subject to legal penalties.

With regard to the time criterion, the GAO (2004) states, "A time-limited appropriation is available to incur an obligation only during the period for which it is made. However, it remains available beyond that period, within limits, to make adjustments to the amount of such obligation and to make payments to liquidate such obligations" (p. 5-4). In the DOD, different funds have differing time frames in which to be used, which is usually referred to as the color of money. This classification determines the obligation availability length and guides how funds can be obligated and expended (AcqNotes, 2021).

5. Color of Money

The different types of accounts include O&M; MilPers; research, development, test, and evaluation (RDT&E); and procurement and construction. Each funding type is assigned a specific color of money based on its obligation period (AcqNotes, 2021).

Candreva (2017) describes that O&M and MilPers have an obligation period of one year, RDT&E obligation spans two years, procurement obligation extends three years, excluding shipbuilding, for which the obligation period is five years, and construction funds have permission of five years for new obligations.

After the obligation period, according to Candreva (2017), funds may be used only for adjustments, expenditures, and outlays during the expired phase. He mentions that each

funding category has a lifespan of five years before expiration. Figure 4 provides a visual representation of the duration for which each appropriation can be made.

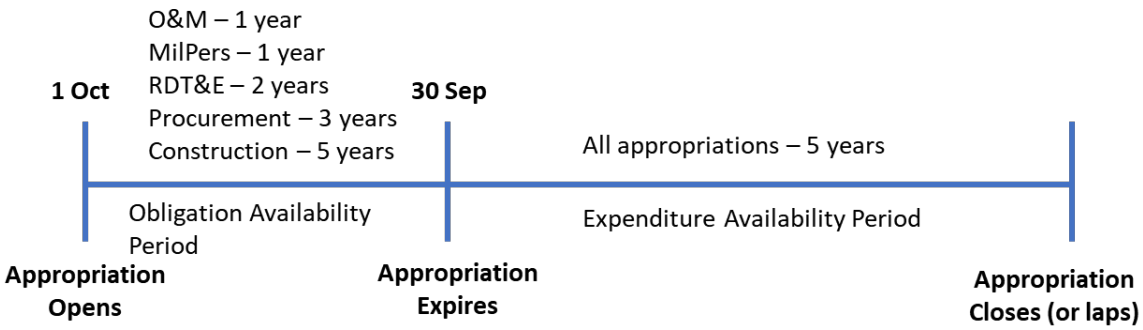

Figure 4. Appropriation Timeline.
Source: Candreva (2017, p. 302).

Problems with the timing of an obligation are treated by the bona fide needs rule. The bona fide needs rule (31 U.S.C. § 1502) states that "an appropriation or fund limited for obligation to a definite period is available only for payment of expenses properly incurred during the period of availability or to complete contracts properly made within that period of availability" (DOD, 2020, p. 18-10). This means that the funds must be used for needs that arise during the appropriation's availability period. For example, the Navy receives an appropriation for FY2024 specifically earmarked for the maintenance and repair of naval vessels. According to the bona fide needs rule, these funds must be used for maintenance and repair contracts that are needed and entered into within FY2024. If, in March 2024, the Navy identifies that a specific ship requires urgent repairs to remain seaworthy, it can obligate the appropriated funds towards a contract for those repairs, provided the contract is awarded, and the work begins within FY2024. The work might extend beyond the FY, but the key is that the need arose and the obligation (the contract) was made within the FY for which the funds were appropriated.

The concepts of expense- and investment-type budgets were studied in Chapter II. Accounts such as O&M, MilPers, and RDT&E are expense-type, while procurement and

MilCon are investment-type budgets. The characteristics of each type are shown in Figure 5.

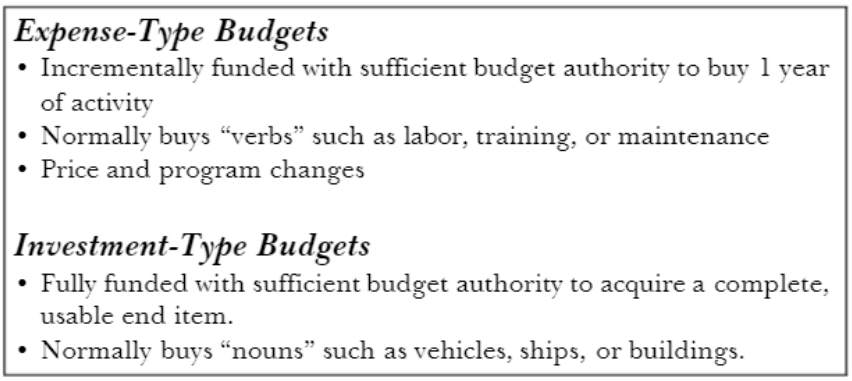

Figure 5. Expense- and Investment-Type Budgets. Source: Candreva (2017, p. 229).

As Figure 5 states, expense budgets are usually funded incrementally, while investment budgets are typically fully funded regardless of lead time.

6. Fully and Incrementally Funded

Candreva (2017) illustrates the difference between the fully funded and incrementally funded using the example in Figure 6, which shows the production schedule for a hypothetical system. From that example, it is possible to understand how difficult it would be to manage a long project using incremental funding. Unfortunately, this is the case in Brazil's investments.

From Figure 6, the author supposes that the items are complex and the production increased from three units in FY2014 to six units in FY2017. Due to its complexity, each item takes four years to complete, as demonstrated by the horizontal bar. In this case, Candreva (2017) addresses it first as being funded incrementally, illustrating how the funding process would work:

> Assume it is time to craft the FY2017 budget. If this program was budgeted incrementally, the analyst would need to compute the vertical dotted box: the cost of the work remaining for the first three units from

> 2014, the third year requirement for the four units from 2015, the second year effort for the six units from 2016 and the first year needs for the next six units for 2017. . . . And what if the Congress appropriating this money in FY2017 disagrees with the priorities of the last Congress (who appropriated FY2016 and FY2015)? They might not choose to appropriate the money and the result would be a bunch of partially built equipment sitting there. That is unfair to the contractor and adds risk (which drives up prices), it does not provide adequately for the military, and it is a waste of taxpayer resources. (p. 269)

Therefore, in the United States, unlike Brazil, this kind of program is fully funded, where the budget analyst calculates the total cost of the horizontal FY2017 bar, making the program easier to manage and ensuring more stability and confidence for defense companies (Candreva, 2017).

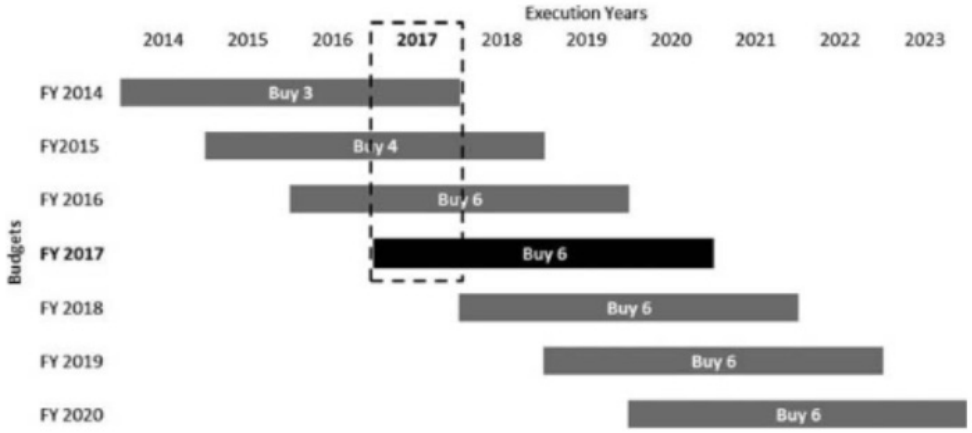

Figure 6. Full Versus Incremental Funding.
Source: Candreva (2017, p. 270).

According to Candreva (2017), in a full-funding scenario, the budget analyst calculates the cost of the horizontal FY2017 bar, which includes purchasing six end items and ensuring their delivery along with necessary support equipment, maintenance contracts, and spare parts. This approach more effectively matches funding with investments, safeguarding the interests of the manufacturer, the military, and taxpayers.

However, there is a risk associated with the full-funding approach when the cost estimate is too low. In the United States, the solution to this problem is the inclusion of a

budget item called "completion of prior year shipbuilding" as part of the annual shipbuilding budget (O'Rourke, 2023). According to O'Rourke, this budget item is a request for Congress to appropriate funding to cover the cost growth of ships they previously fully funded, but for which the estimate was insufficient. For example, in FY2025, the Navy requested $1.93 billion USD, which is 6% of the total shipbuilding budget, for the completion of ships (Department of the Navy, 2024a). This mechanism allows the Navy to address the challenges posed by underestimated costs and ensures the completion of shipbuilding projects without causing significant disruptions to current budget plans.

B. THE BUDGET OF BRAZIL

1. The Budget Formulation

The U.S. DOD created the Planning, Programming, and Budgeting System (PPBS) in the early 1960s. Following the DOD's lead, Brazil adopted a similar approach by introducing the program budget through Law No. 4,320 in 1964 (Oliveira, 2018). This legislation aimed to modernize the Brazilian budgeting system and align it with the principles of the PPBS, thereby promoting a more efficient allocation of resources and improved decision-making in public sector financial management.

Under this model, the federal public budget consists of elaborating and executing three laws: the Multi-Year Plan (PPA), the Budget Guidelines Law (LDO), and the Annual Budget Law (LOA). The executive branch elaborates each law and submits it to Congress for approval (Brazil Const. art. 48, item II & art. 85, item VI). This configuration allows deputies and senators to influence the budget, adapting laws to the population's most critical needs.

According to Albuquerque et al. (2008), the PPA is the instrument that explicates the way the government perceives and seeks to construct the development of the state and, therefore, represents a commitment to strategies, a vision of the future, and the allocation of budgetary resources in government programs. Albuquerque et al. say that this instrument seeks to influence actions that meet immediate needs in consonance with long-term strategies. The PPA comprises a period of four years.

The LDO serves as the link between the PPA and the LOA, acting as a facilitator for the operation of government programs (Albuquerque et al., 2008). In addition, Albuquerque et al. (2008) details that the LDO's role is to elucidate the goals and priorities of the government, indicating the projected expenses for the subsequent financial year, thereby becoming the principal guiding instrument in the formulation of the LOA.

The LOA contains all expenses that will be made by the government, and it is sent to Congress by the President of the Republic annually until August 31, when it is examined, modified, approved, and then returned for the president's sanction. The head of the executive power sanctions the project, thereby enacting it into law (Abreu & Guimarães, 2014). Figure 7 illustrates the flow of these three documents (PPA, LDO, and LOA) from 2023 to 2027.

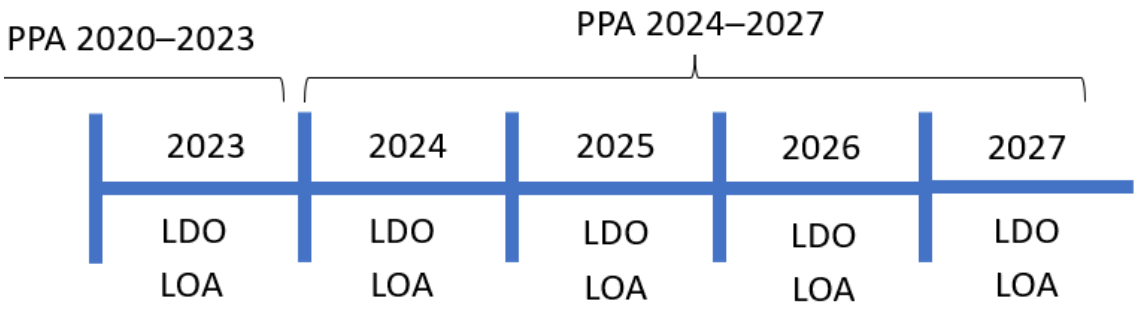

Figure 7. The PPA, LDO, and LOA

In Figure 7, the year 2023 is the first year of the elected president, so the PPA (2020–2023) established by the previous government is in the last year and still used. During 2023, the elected president prepares the PPA for the following four years (2024–2027), and submits it to Congress by August 31. Concurrently, the president prepares the LDO for the next year (2024), submitting it to Congress by April 15. Therefore, based on the LDO, the president formulates the LOA 2024, submitting it to Congress by August 31, where, once approved, it is returned to the president to be enacted. This model is followed by all states and cities in Brazil.

2. Appropriations

Alves (2022) describes that "appropriations are only valid for issuing obligations during the fiscal year under the annual principle" (p. 26). The annuity principle states that the FY must coincide with the calendar year, that is, from January 1 to December 31.

Agencies can incur obligations after receiving appropriations. The obligation is liquidated after the order is concluded, in other words, when the service or object is delivered. Then, an expenditure is made when the money leaves the treasury and the contractor is paid.

The one-year period is considered the maximum amount of time during which legislators can consent to delegate their powers and the minimum period necessary for governments to implement the budget. Therefore, each appropriation must be obligated within the FY, regardless of the categories; otherwise, they expire.

The Federal Constitution stipulates that no investment can be initiated without prior inclusion in the PPA or without a law authorizing inclusion (Article 167, paragraph 1). The Fiscal Responsibility Law also prohibits the LOA from allocating budgetary funds for investments extending beyond a FY that are not in the PPA or within a law authorizing their inclusion.

Even if these multi-year expenses are included in the PPA, they still depend on successive LOA to be authorized and executed, highlighting a conflict in the Brazilian budgetary system. This conflict often results in unfinished projects, as the annual fractions of the project expenses may not be included in the LOA, leaving them without the necessary resources for completion.

In many countries, such as the example provided of the United States, legislative authorization is given once, considering the total value of the project, so that the authorization for the inclusion of the expense fraction in subsequent years is waived or becomes almost automatic.

In Brazil, Remains Payable (RP) is the main tool used to extend the validity of obligations and allow the deferral of expense payments to subsequent years, thereby

"flexing" the principle of annual budget. RP are expenses that have been obligated but not yet paid by December 31. They are part of the Union's floating debt as per Article 115 of Decree 93.872/86.

RP is categorized as "processed" when they have gone through the first two stages of the expense process (obligated and liquidation) and "unprocessed" when they have only gone through the first stage (obligated). Processed RP are expenses for goods or services that have been completed and verified (liquidated). Unprocessed RP corresponds to goods or services whose delivery has not yet been completed and verified.

C. MULTI-YEAR BUDGETING INSTRUMENTS IN THE UNITED STATES AND BRAZIL

While the United States and Brazil are run primarily with annual budgets, they have different methods to facilitate longer-term budget planning and execution, particularly for multi-year investment projects. This section answers the secondary question, "What are the multi-year characteristics of the budgets in Brazil and the United States?"

As demonstrated in the previous section, the federal budget of the United States often spans more than one fiscal period since the activities related to a particular FY extend over a two-and-a-half-year period (or more). During the budget deliberation process, federal agencies are required to simultaneously manage three distinct FYs: executing the budget for the present FY, requesting budgetary allocations for the upcoming FY, and formulating plans for the subsequent FY.

Additionally, through appropriations spanning more than one FY, the U.S. budget system exhibits more effectiveness in managing multi-year expenditures. Various "colors of money"—each with its specific obligation period—allow for an effective and efficient approach to budgeting for defense projects, which often extend beyond the FY. It guarantees that projects like shipbuilding or the procurement of advanced defense equipment are fully funded at their initiation. This approach minimizes financial uncertainties and supports the smooth execution of long-term projects.

Furthermore, the Commission on PPBE Reform (2024) recently reported the recommendation to increase the availability of operating funds from one to two years,

demonstrating an engagement to switch more accounts to a multi-year budget. According to the Commission (2024), "the one-year period of availability creates incentives to obligate these funds in the final days of a fiscal year to avoid losing use of those funds" (p. 75), as shown in Figure 8.

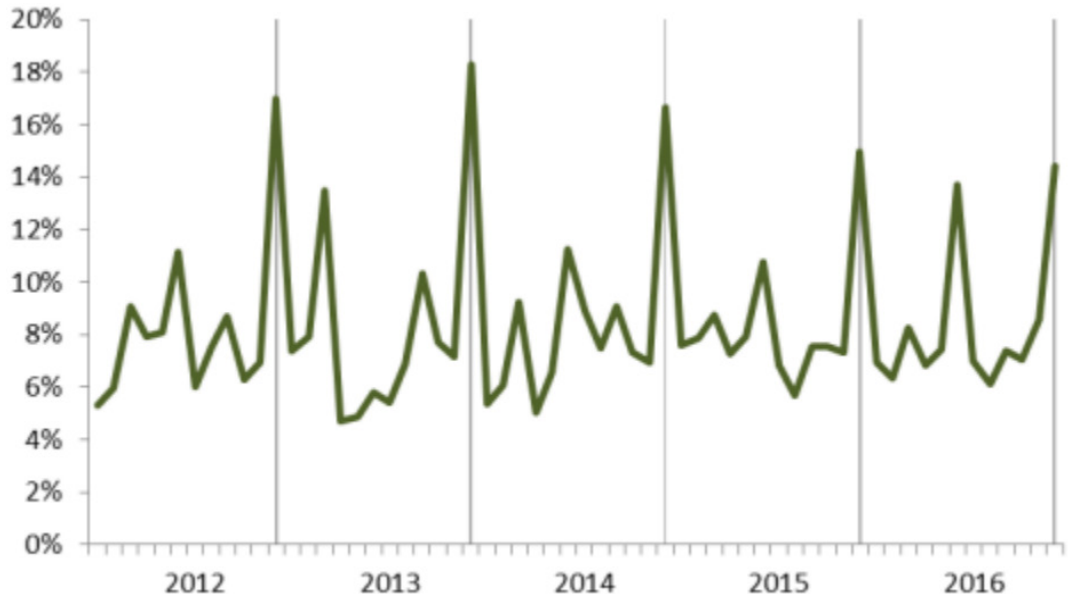

Figure 8. FY2012–FY2016 Monthly Percentage of FY Total, Gray Lines Indicate the Transition of Fiscal Years.
Source: Commission on PPBE Reform (2024, p. 76).

As seen in Figure 8, there is a trend to concentrate the obligations at the end of the FY in O&M accounts. The Commission on PPBE Reform (2024) affirms that year-end funding spikes can cause lower-priority programs to be funded.

On the other hand, the Brazilian budget system uses the PPA and RP to provide temporary flexibility to the budget. However, they do not completely eliminate the risks associated with annual budget approvals. The PPA is a medium-term planning framework, but it does not ensure multi-year funding, as investments outlined in the PPA still require approval through the LOA each year.

The RP allows for some flexibility in accommodating expenses that extend over FYs. Like the United States, Brazil also incorporates the budgetary principles of amount,

purpose, and time in its fiscal management. However, Brazil does not have an equivalent to the U.S. bona fide needs rule. As a result, it is standard practice in Brazil to obligate funds at the end of a FY for anticipated future expenses. This practice results in what could be referred to as a "parallel budget," in which the next FY is burdened by the substantial volume of expenses recorded under RP, leading the government to take contingency measures to manage these obligations. Nonetheless, the RP is more of an accounting mechanism to manage the mismatch between budget and execution timeframes rather than a true multi-year funding instrument.

Regarding tools for ensuring fiscal control over discretionary spending, the United States, for example, uses a mechanism called sequestration. "Whenever Congress enacts budgets that exceed previously established federal spending caps, an automatic, across-the-board spending cut is imposed on broadly defined categories, affecting all departments" (Alves, 2022, p. 37). Meanwhile, Brazil utilizes contingency and cuts when the revenues do not achieve the predicted level. These instruments frequently affect the defense budgets of these two countries.

To sum up, while the United States and Brazil primarily operate with annual budgets, the U.S. budget system suggests greater effectiveness in managing multi-year expenditures through appropriations spanning multiple FYs and various colors of money. Brazil's multi-year mechanisms, such as the PPA and RP, provide some flexibility but do not fully mitigate the risks associated with annual budget approvals.

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IV. EVALUATING BUDGETARY CONSTRAINTS IN DEFENSE: BRAZIL'S NAVAL INVESTMENTS IN PERSPECTIVE

This chapter addresses Brazil's budget and the percentage of Gross Domestic Product (GDP) allocated toward the defense sector. It also discusses how the defense budget is divided into MilPers, O&M, and investment in the United States and Brazil. Moreover, this chapter studies submarine budget requests for both the U.S. Navy and the BN. Besides that, we study how the BN leads with the limitations of the annual cycle budget. Finally, we assess the execution of the PROSUB project from 2020 to 2023 for the impacts caused by the one-year fiscal limitation.

A. BUDGET IN NUMBERS

As shown in Figure 9, Brazil's GDP was $2.13 trillion USD in 2023, placing it among the 10 largest economies in the world (International Monetary Fund, 2023).

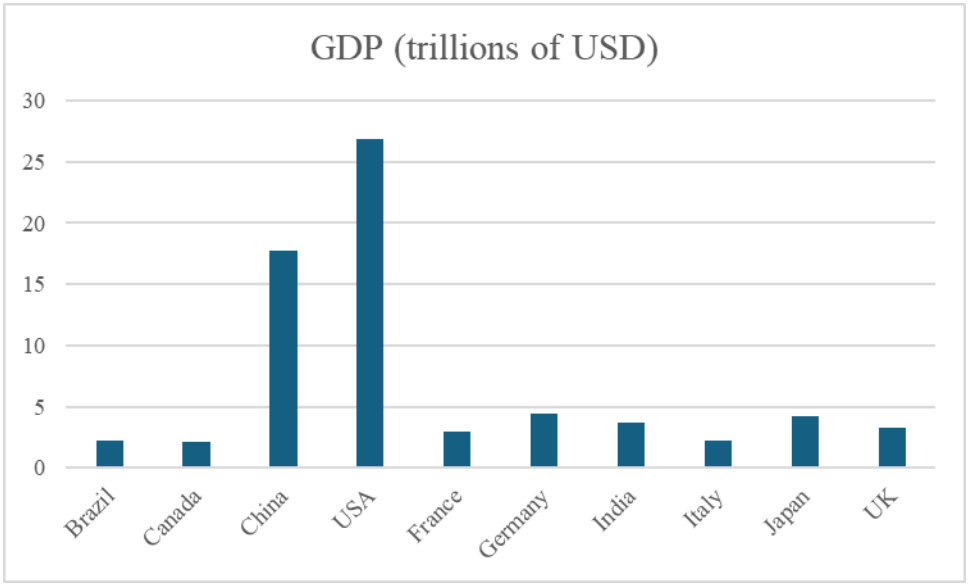

Figure 9. The Top 10 Economies by GDP.
Adapted from International Monetary Fund (2023).

Figure 9 shows a difference of more than 10 times between Brazil's GDP and that of the United States, which is $26.95 trillion USD.

Observing Brazil's budget, in the president's annual budget request to Congress for 2024, mandatory primary expenses represented 92% of primary expenses, while discretionary expenses represented 8%. Primary expenses are costs to maintain and operate public services, excluding financial expenses such as interest payments on debt (Ministério do Planejamento e Orçamento, 2023). The high proportion of mandatory expenses limits the government's flexibility in allocating resources to other areas.

In the United States, in FY2023, approximately 63% of the federal budget was allocated to mandatory expenses, while about 30% was for discretionary expenses (Center on Budget and Policy Priorities, 2022). The remainder was for interest payments on debt. In contrast to the United States, Brazil has a significantly higher proportion of mandatory expenses, leaving less room for discretionary spending.

In 2017, the Brazilian government, seeking budget organization, led Congress to approve Constitutional Amendment No. 95/2016, known as the Spending Cap Law. It establishes that the government can spend up to the previous year's expenditure adjusted for inflation measured by the Extended National Consumer Price Index (IPCA). This law includes both mandatory expenses (such as salaries and pensions) and discretionary expenses (such as general costs, subsidies, and investments; Oliveira, 2021).

Oliveira (2021) reports that critics argue that the rigidity of the Spending Cap Law can limit investments in important areas such as education, science, and technology and can lead to the deterioration of government agencies by restricting public investment.

In the BN, the Spending Cap Law led to a reduction of $1.1 billion USD in discretionary expenses between 2017 and 2024, equivalent to the construction of two Tamandaré-class frigates, as mentioned by Admiral Olsen, the current commander of the Navy (Personalidades em Foco, 2024). Note that the law sets a limit for expenses but not for revenues. So, in the event of economic growth higher than initially anticipated, resulting in an increase in revenue collection, the legally established spending cap must still be maintained. In this case, the collected revenues will constitute the primary surplus, reversing the fiscal deficit situation that Brazil has experienced in recent years.

In this context, it is important to note that public budgeting in Brazil has become mandatory through Constitutional Amendment Nos. 100 and 102/2019. These amendments established that the executive branch has the duty to execute budget programs, "adopting the necessary means and measures to ensure the effective delivery of goods and services to society" (Presidência da República, 2019a, 2019b).

While the mandatory nature of the budget ensures the delivery of goods and services to society, it also decreases flexibility and increases the number of expenditures made at the end of the year, as agencies need to spend their entire allocated budget.

Furthermore, the country's constant economic crises also impose a degree of unpredictability on budget execution. This unpredictability occurs because, with economic crises, budget revenues are not realized according to the initial planning, resulting in the need to make contingencies or cuts to execute the current budget. When there are contingencies, the execution of some resources is blocked until there are sufficient revenues to meet the execution of the budget program. Budget cuts, in turn, prevent budget execution in the considered financial year. These economic uncertainties make planning and implementing budgets challenging, affecting the BN projects even more.

B. DEFENSE BUDGET

This section analyzes Brazil's defense budgeting and procurement approach compared to the United States. By comparing their methods, it is possible to highlight Brazil's limitations and challenges in funding and modernizing its military forces.

To begin, it is fundamental to detail how defense budgets are allocated in Brazil. According to Janes (n.d.), in 2024, 83% of the budget was directed toward MilPers costs, 8% to O&M, 4% to procurement, 0.4% to RDT&E, and 4.6% to other expenses.

This allocation diverges significantly from the United States in the same year. For the United States, 40% of the defense budget is spent on O&M, 21% on MilPers, approximately 20% on procurement, and 15% on RDT&E, with the remaining costs allocated to other expenses.

It is also important to mention that, according to the Stockholm International Peace Research Institute (2022), in terms of GDP, Brazil has spent 1.2% of its GDP on military spending in recent years, while the United States spends about 3.5% of its GDP. The average defense spending around the world is about 2% of GDP.

Facing such fiscal limitations, the BN has employed strategies to manage low budgets, such as making "opportunity purchases." Opportunity purchases are purchases of second-hand vessels from other nations that, for various reasons, wish to dispose of them. To illustrate, in 2018, the BN bought the HMS Ocean, previously the helicopter carrier and the fleet flagship of the British Royal Navy (Robertson, 2018).

Moreover, it is typical for Brazil to acquire equipment and develop technologies in partnership with other countries, as the BID is still technologically developing. This demonstrates Brazil's dependence on foreign technology in military defense systems. To overcome this dependency, the Brazilian government has invested in acquisitions with technology transfer (ToT).

A notable instance of a program with ToT is the PROSUB, which aims to produce four conventional submarines and manufacture the first Brazilian submarine with nuclear propulsion. In addition to the five submarines, PROSUB includes the construction of an industrial infrastructure complex to support the operation of the submarines, which encompasses the shipyards, the naval base, and the metallic structures manufacturing unit (UFEM; Marinha, n.d.). The program began in 2008, and so far, three conventional submarines have been delivered, with the nuclear submarine expected to be completed by 2037.

According to Tribunal de Contas da União (2013), the PROSUB encompasses three governmental actions: 123G, implementation of a shipyard and naval base for the construction and maintenance of conventional and nuclear submarines; 123H, construction of a conventional submarine with nuclear propulsion; and 123I, specific construction of conventional submarines.

The expenses requested for PROSUB in the Annual Budget Law Proposal (PLOA) for FY2024 submitted by the executive branch to Congress are shown in Table 1.

Table 1. Excerpt from PLOA 2024.
Adapted from Ministério do Planejamento e Orçamento (2023).

Action	Total Estimated Cost	Start	End	Projection 2025	Projection 2026	PLOA 2024
123G—Implementation of Shipyard and Naval Base for Construction and Maintenance of Conventional and Nuclear Submarines	$3,278,223,480	2009	2031	$65,915,598	$71,975,222	$63,000,000
123H—Construction of Nuclear Propulsion Submarine	$4,522,038,342	2009	2034	$35,364,241	$38,615,278	$33,800,000
123I—Construction of Conventional Submarines	$3,000,758,780	2010	2026	$210,831,598	$266,046,925	$226,206,034

Table 1 shows that the amount requested for FY2024 for 123G, implementation of shipyard and naval base for construction and maintenance of conventional and nuclear submarines, is $63 million USD; for 123H, construction of nuclear propulsion submarine, is $33.8 million USD; and for 123I, construction of conventional submarines, is $226.2 million USD. After approval by Congress, these amounts should be obligated by the end of the FY, that is, by December 31, 2024. In addition to the expenses for FY2024, the start and end years of the program are also presented, as well as its total estimated cost. For instance, we can see that the construction of conventional submarines began in 2010 and is expected to end in 2026, with a total approximate cost of $3 billion USD. In addition, despite the planned values for 2025 and 2026 in Table 1, they need to appear in the LOA of their respective FYs and be authorized by Congress to permit their appropriations, obligations, and, therefore, expenditures.

In the context of the United States, the budget request is broader and encompasses documents including the P-40 Budget Line Item Justification, P-5c Ship Cost Analysis, Ship Production Schedule, P-8a Analysis of Ship Cost Estimates, P-35 Major Ship Component Fact Sheet, and P-10 Advance Procurement Requirements Analysis, each providing details with regard to what is being acquired, its characteristics, its purpose,

quantity, timeline, rate of production, contractors, type of contracts, and cost analysis to tell Congress and the American public the narrative of the acquisition program.

To illustrate the budget request process in the United States, Figure 10 is the first page of the P-40 document within the budget for constructing the Virginia-class submarine for FY2025 under Shipbuilding and Conversion.

Exhibit P-40, Budget Line Item Justification: PB 2025 Navy											**Date:** March 2024	
Appropriation / Budget Activity / Budget Sub Activity: 1611N: Shipbuilding and Conversion, Navy / BA 02: Other Warships / BSA 1: Other Warships						**P-1 Line Item Number / Title:** 2013 / Virginia Class Submarine						
ID Code (A=Service Ready, B=Not Service Ready): A			**Program Elements for Code B Items:** N/A				**Other Related Program Elements:** 0604558N, 0604580N, 0204281N					
Line Item MDAP/MAIS Code: 516												
Resource Summary	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**To Complete**	**Total**
Procurement Quantity *(Units in Each)*	36	2	2	1	-	1	2	2	2	2	2	51
Gross/Weapon System Cost *($ in Millions)*	103,497.904	7,250.579	9,427.643	5,759.534	0.000	5,759.534	9,068.866	9,505.624	9,773.124	10,341.432	12,167.098	176,791.804
Less PY Advance Procurement *($ in Millions)*	28,400.033	1,938.306	2,297.678	1,871.623	-	1,871.623	2,108.969	2,202.170	2,303.210	2,389.410	3,465.398	46,976.797
Less Cost To Complete *($ in Millions)*	4,162.703	-	-	-	-	-	-	-	-	-	-	4,162.703
Less Economic Order Quantity *($ in Millions)*	5,531.791	778.089	-	272.007	-	272.007	596.592	832.550	832.549	832.550	-	9,676.128
Net Procurement (P-1) *($ in Millions)*	65,403.377	4,534.184	7,129.965	3,615.904	0.000	3,615.904	6,363.305	6,470.904	6,637.365	7,119.472	8,701.700	115,976.176
Plus CY Advance Procurement *($ in Millions)*	31,831.826	2,025.651	1,855.502	2,421.954	-	2,421.954	2,288.954	2,375.448	1,839.613	1,575.177	762.672	46,976.797
Plus Cost To Complete *($ in Millions)*	1,844.685	304.702	168.180	293.004	-	293.004	155.215	412.236	135.750	848.931	-	4,162.703
Plus Economic Order Quantity *($ in Millions)*	6,309.880	-	1,360.037	1,298.349	-	1,298.349	707.862	-	-	-	-	9,676.128
Total Obligation Authority *($ in Millions)*	**105,389.768**	**6,864.537**	**10,513.684**	**7,629.211**	**0.000**	**7,629.211**	**9,515.336**	**9,258.588**	**8,612.728**	**9,543.580**	**9,464.372**	**176,791.804**
(The following Resource Summary rows are for informational purposes only. The corresponding budget requests are documented elsewhere.)												
Plus Outfitting and Post Delivery *($ in Millions)*	1,664.657	99.888	95.434	92.303	-	92.303	76.241	116.151	60.916	162.684	1,880.310	4,248.584
Total *($ in Millions)*	**107,054.425**	**6,964.425**	**10,609.118**	**7,721.514**	**-**	**7,721.514**	**9,591.577**	**9,374.739**	**8,673.644**	**9,706.264**	**11,344.682**	**181,040.388**
Gross/Weapon System Unit Cost *($ in Millions)*	2,874.942	3,625.290	4,713.822	5,759.534	-	5,759.534	4,534.433	4,752.812	4,886.562	5,170.716	6,083.549	3,466.506

Description:

MISSION: To seek out and destroy enemy ships across a wide spectrum of tactical scenarios, working both independently and in concert with a battle group/other ships, providing Joint Commanders with early, accurate knowledge of the battlefield on which power may be projected from sea; covert striking power against targets ashore; the capability to establish covertly an expeditionary force on land; and the maritime strength to destroy enemy naval forces and interdict seaborne commerce.

NOTE: The program is currently executing the fourth Multi-Year Procurement (MYP) (Block V) contract which was awarded on 2 December 2019 and subsequently modified on 22 March 2021 to exercise an option for a tenth SSN. Block V incorporates Acoustic Superiority (AS) modifications on all SSNs, and VIRGINIA Payload Module (VPM) beginning with SSN 803. All Block V SSNs will include modifications to provide enhanced capability and improved performance based upon efforts performed via RDT&E (PE 0604558N/Prj 1947). VPM is an 84-foot hull section with four additional payload tubes, each capable of carrying seven Tomahawk cruise missiles or various other payloads. VPM helps mitigate the loss of undersea strike capability with the retirement of the Service's four guided missile submarines (SSGNs) in the late-2020s. Funding associated with these changes to the baseline are shown in more detail on subsequent pages of these exhibits.

The program is currently planning the fifth MYP (Block VI) contract for FY 2025 - FY 2029 procurements.

FY 2025 funds one VIRGINIA Class Submarine (VCS) with Virginia Payload Module (VPM), Advance Procurement (AP) for future SSNs, as well as $180 million of Submarine Industrial Base (SIB) investment for construction spares to help de-risk schedules (funded in Plans).

The Total Ship estimate for the FY 2025 hull includes an additional shipset of two year advance procurement funded materials, one year advance procurement funded materials, and one year economic order quantity funded materials. This funding will be used to support contractor furnished equipment and government furnished equipment critical spare material that will be consumed on future hulls to ensure critical sub-tier vendors maintain two submarines per year cadence. As a result, the Gross Weapons System Unit Cost (End Cost) is approximately $1 billion higher than a single submarine procurement.

Figure 10. P-40, Budget Line Justification. Source: Department of the Navy (2024b, p. 1, vol. 1–115).

This document offers a broad financial overview, reviewing past years' expenditures and projecting from FY2023 to beyond FY2029, delineating the total funds anticipated to be spent and the number of submarines to be constructed. For instance, in FY2025, the construction of one submarine was requested, with a cost estimate of $5,759,534 USD. However, due to budgeting procedures that include setting aside funds for future costs and advanced procurement, the Total Obligation Authority for FY2025 increased to $7,629,211 USD. This adjustment reflects the total amount that the DOD is authorized to obligate within FY2025, with these funds remaining available for obligation until September 30, 2029.

Comparing the president's budget requests of Brazil and the United States, it is possible to conclude that Brazil's focus is on the short term, with approval only for the next year. Souza (2014) says "the budgetary model adopted in Brazil focuses on the execution of expenses outlined in the Annual Budget Law (LOA), to the detriment of planning, which is consolidated in the Multi-Year Plan (PPA)" (p. 1). According to Souza (2014), the result is a lack of continuous flow of resources, resulting in delays in the readiness of means, the procurement of new equipment, and even impacting the operational activities and maintenance of various military organizations.

C. STRATEGIES TO FACE BUDGET CONSTRAINTS IN THE BRAZILIAN NAVY

This section answers the secondary question, "What are the means implemented by the BN to cope with the annual budget's limitations?"

In 2019, the BN established its Strategic Planning (PEM-2040) to address the need for long-range planning. The plan involves 12 naval objectives (OBNAV) to be pursued from 2020 to 2040 based on the Navy's future vision. These OBNAVs are then translated into naval strategic actions (AEN), which contribute to achieving the force's mission. For example, OBNAV-6, which is the modernization of the naval force, is divided into 12 AENs, with AEN-2 being the execution of the Submarine Program (PROSUB).

The Navy's budgetary system was also updated to synchronize the PEM with the federal government budget. This update aimed to create a relationship matrix that would

allow a clear alignment between strategies and the budget, ensuring a clear and transparent view of how expenditures contribute to achieving the force's objectives.

In parallel, a concept named "aggregators" was introduced. Aggregators are financial management tools that group Navy goals with similar government budget classifications, planning, and execution processes. Among these aggregators, "YANKEE" stands out, representing the Navy's discretionary expenses aligned with the AENs and selected by the Naval High Administration. Due to their strategic nature, these expenses are called Navy Priority Goals (MPMs). An example of an MPM or YANKEE is the development of the SisGAAz.

According to Estado-Maior da Armada (2018), the MPMs are considered highly significant for achieving OBNAV and, therefore, will initially be exempt from resource contingency. Consequently, in the event of government-imposed budget constraints or cuts, the Navy's High Administration will endeavor to safeguard the MPM-related resources.

Furthermore, the Navy created a Decision Support System for Budget Optimization (SAD-ORC) application, which helps Navy authorities make strategic budgeting decisions by employing optimization techniques and a specific multicriteria decision aid (MCDA). Santos et al. (2023) said this approach contributed to an approximate 15% improvement in budget efficiency in 2022.

In addition, from a top-down approach, the Navy frequently monitors agencies' obligations and expenses, ensuring that the funds are used in a timely and appropriate manner. Therefore, this approach motivates agencies to be prepared in terms of planning and bidding so that they can spend their funds as soon as they are received. All resources that are not being used are reallocated to another unit that needs funds.

Moreover, all Navy units conduct a monthly management council to ensure ongoing monitoring. According to Secretaria-Geral da Marinha (2021), the purpose of the management council is to advise the Command of the Organizational Military Unit on economic-financial and managerial administration through planning, programming,

control, and supervision of the use of budgetary and financial resources available to the unit.

At the same time, as Brazil has no bona fide needs rule, units obligate their resources as soon as they receive them. So, the typical culture is to be ready with contracts to spend the funds, thus preventing the funds from being taken away.

Finally, in 2017, to facilitate financial support and avoid the limitations imposed by the spending cap and budgetary restrictions, the BN developed an innovative way to fund the construction of the Tamandaré frigates through the Naval Projects Management Company (EMGEPRON) after intense negotiations with the government's economic sphere (Silveira, 2019).

EMGEPRON is a "state-owned company affiliated with the Ministry of Defense of Brazil through the Navy Command" whose activities "span the broad technological spectrum relevant to the BN's projects" (EMGEPRON, 2019, p. 1). It is important to highlight that the company is not subject to public budget limitations, such as the annual principle. Thus, the Navy obligated to EMGEPRON, through mechanisms that constitute an exception to the spending cap rule, an amount of approximately $1.9 billion USD for constructing the four Tamandaré-class frigates in FYs 2018 and 2019.

Compared with the United States, the model has characteristics similar to multi-year accounts, given that the resources were not limited to one FY and were fully capitalized for the construction of the ships, avoiding the management difficulties provided by the incremental budget.

In simplistic terms, it can be inferred that the model may ensure a perpetual flow of resources for building these naval vessels, thereby contributing to strengthening the BID. However, this model was an exception, for which a lot of political engagement was needed, and, therefore, there is no framework designed for applying this model yet. As the construction of the frigates is ongoing, further analysis is required.

In summary, the BN has taken proactive measures to address the challenges posed by the annual budgetary framework and its implications for long-term strategic planning. The institution of the PEM-2040, the refinement of the Navy's budgetary system, the

introduction of aggregators like YANKEE, and the adoption of the SAD-ORC application have all contributed to aligning strategic actions with the budget and improving budget efficiency. Additionally, the new model developed for constructing the Tamandaré frigates through EMGEPRON has provided a potential solution to the limitations imposed by the spending cap and budgetary restrictions, such as a one-year cycle. However, further study is required to assess the effectiveness and applicability of this model, as the construction of the frigates is ongoing, and a comprehensive framework for the model's implementation has yet to be developed.

D. EVALUATING THE PROSUB PROJECT

This section addresses the secondary research question: "What is the impact of annual budgets on the capital budget of the BN?" Data was obtained from Secretaria do Tesouro Nacional (n.d.), a comprehensive system that records all federal government financial transactions. The analysis spans four years, from 2020 to 2023, focusing on the PROSUB. This timeframe aligns with the PPA 2020–2023.

The PROSUB is part of a strategic partnership between Brazil and France that started on December 23, 2008 and includes a ToT. The primary government actions defined for the program are 123G, implementation of a shipyard and naval base for the construction and maintenance of conventional and nuclear submarines; 123H, construction of one conventional submarine with nuclear propulsion; and 123I, construction of four conventional submarines. To achieve these objectives, nine contracts were formalized.

First, we assess whether the PROSUB's budget has been regular and predictable. As said in Chapter I, budgetary regularity is crucial for defense projects as it ensures their continuity, preventing work stoppages, the extension of timelines, and price increases. Simultaneously, it provides security for defense companies by guaranteeing predictable funding streams and fostering a stable environment for long-term planning and investment. Furthermore, regularity in budget allocation supports the strategic alignment of defense projects with national security objectives, enabling the systematic upgrading of military capabilities and the maintenance of operational readiness.

Analysis shows that the PROSUB's budget has been neither predictable nor regular, reflecting broader trends in the Brazilian defense budget, which has fluctuated from 1.51% of GDP in 2010 to 1.11% in 2023 (Ministério da Defesa, 2024). Although the cumulative funds paid surpassed the originally expected funds in 2023, Marinha (2020) states that the initial schedule underwent revisions in 2014, 2015, 2016, and 2018 due to budget shortfalls and newly identified requirements in the PROSUB program. Consequently, according to the same source, the revised schedule in 2018 extended the contract duration and increased the total project cost. In a similar way, Ministério da Defesa (2022) explains that budgetary constraints have impacted the achievement of the PROSUB goals, causing the renegotiation of the contracts, which directly affected the project's physical-financial schedule, leading to an extension of the completion deadline, incurring penalties and interest, and an increase in the total project cost. Therefore, approximately 27% of the 2021 appropriations for the PROSUB were allocated to the payment of contractual adjustments (Ministério da Defesa, 2022).

Figure 11 illustrates the cumulative initial expected funds (blue line), cumulative actual funds paid (green line), and cumulative revised financial schedule (orange line) for the PROSUB program.

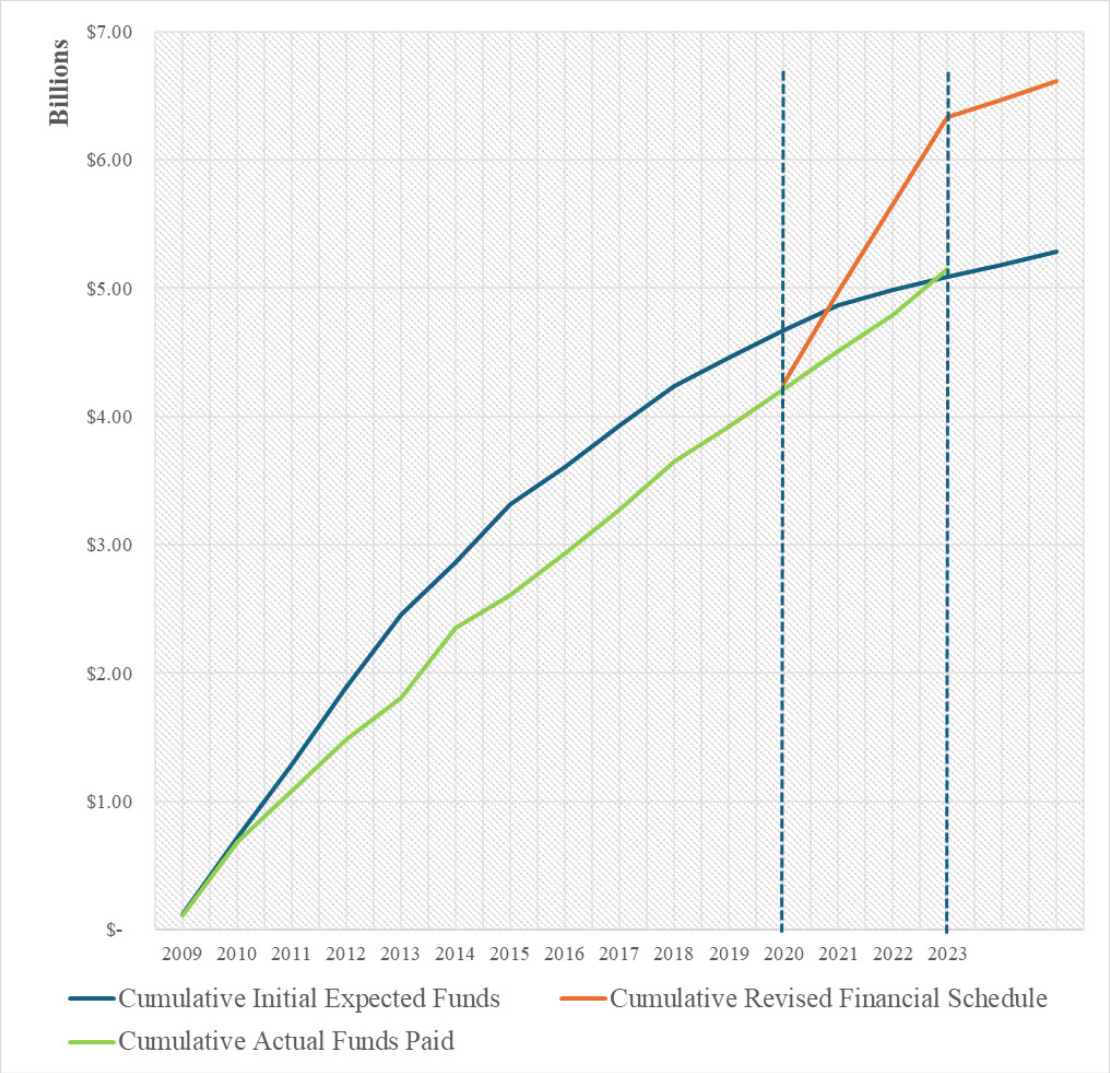

Figure 11. Cumulative Initial Expected Funds, Cumulative Actual Funds Paid, and Cumulative Revised Financial Schedule. Adapted from Marinha (2020, 2024).

Figure 11 also shows that the provided budget from 2020 to 2023 falls short of the new expectations that were set in 2018. Moreover, Marinha (2020) says that the completion of the construction of conventional submarines, initially scheduled for 2022, has been extended to 2024.

In the United States, stability would be maintained, given that approval for defense programs is multi-year and, in most cases, involves full funding. If Brazil adopted the U.S. model, the necessary resources for constructing a submarine, for example, would be

approved at once by Congress, avoiding budgetary instabilities and provisioned in a single instance.

Next, we examine whether the obligation and expenditure rate of funds received in the current FY have been concentrated at the end of the FY. The literature suggests that in annual budget systems, obligations tend to be concentrated in the fourth quarter (Q4) due to the use it or lose it mentality. However, the data for the BN does not support this claim, as seen in Table 2.

Table 2. PROSUB Obligation and Expenditure Rate by Quarter. Adapted from Secretaria do Tesouro Nacional (n.d.).

YEAR	**2020**		**2021**		**2022**		**2023**	
Quarter	Obl	Exp	Obl	Exp	Obl	Exp	Obl	Exp
Q1	25%	8%	**42%**	25%	13%	3%	18%	7%
Q2	33%	18%	34%	16%	**66%**	7%	**80%**	8%
Q3	**35%**	**43%**	20%	**35%**	0%	**39%**	2%	21%
Q4	7%	27%	4%	15%	21%	29%	0%	**63%**
Total	**100%**	**96%**	**100%**	**91%**	**100%**	**78%**	**100%**	**99%**

Table 2 shows that most funds were obligated in the first two quarters except for 2020. On the other hand, the majority of expenditures were made in the second two quarters. This is logical since the obligation (orders) has time to be concluded, delivered, and then paid. Therefore, in this case, there is practically less of a rush at the end of the year since there are fewer funds available. Besides that, 96% of the funds received in 2020 were paid, 91% received in 2021 were paid, 78% received in 2022 were paid, and 99% received in 2023 were paid. Hence, the average of the funds received and paid is 91%, which means that 91% of the services were requested and received in the same year.

Therefore, the approaches mentioned in the previous section used by the BN appear to partially reduce the problems raised by the annual principle, such as the concentration of obligations at the end of the year. To reflect the Navy's approach, we analyze the sum of all obligations and expenditures made by Brazilian agencies in the capital budget, as shown in Table 3.

Table 3. Agencies Obligation and Expenditure Rate by Quarter. Adapted from Secretaria do Tesouro Nacional (n.d.).

YEAR	2020		2021		2022		2023	
Quarter	Obl	Exp	Obl	Exp	Obl	Exp	Obl	Exp
Q1	8%	2%	3%	1%	7%	1%	9%	1%
Q2	32%	8%	20%	5%	38%	7%	23%	5%
Q3	15%	12%	27%	12%	10%	12%	28%	14%
Q4	**45%**	**21%**	**50%**	**17%**	**45%**	**15%**	**40%**	**23%**
Total	**100%**	**43%**	**100%**	**35%**	**100%**	**35%**	**100%**	**43%**

Unlike the Navy, other Brazilian agencies showed the highest obligation and expenditure rates in the last quarter of the FY. This suggests that the BN's strategies mentioned in the previous section may help mitigate the effects of the annual budget cycle. However, based on Figure 11, which shows that the PROSUB program has been underfunded, an additional reason for the Navy's early obligations could be that the BN is trying to catch up on the program's progress due to insufficient funding in previous years. Both the Navy's strategies and the need to compensate for underfunding could have contributed to the observed pattern of early obligations.

Lastly, the percentage of canceled RP over the budget authority is examined, as shown in Figure 12. It is important to note that, in Brazil, if RP is canceled for reasons such as the need to replace a contractor failing to fulfill the contract or facing bankruptcy, the budget authority to use the funds dies.

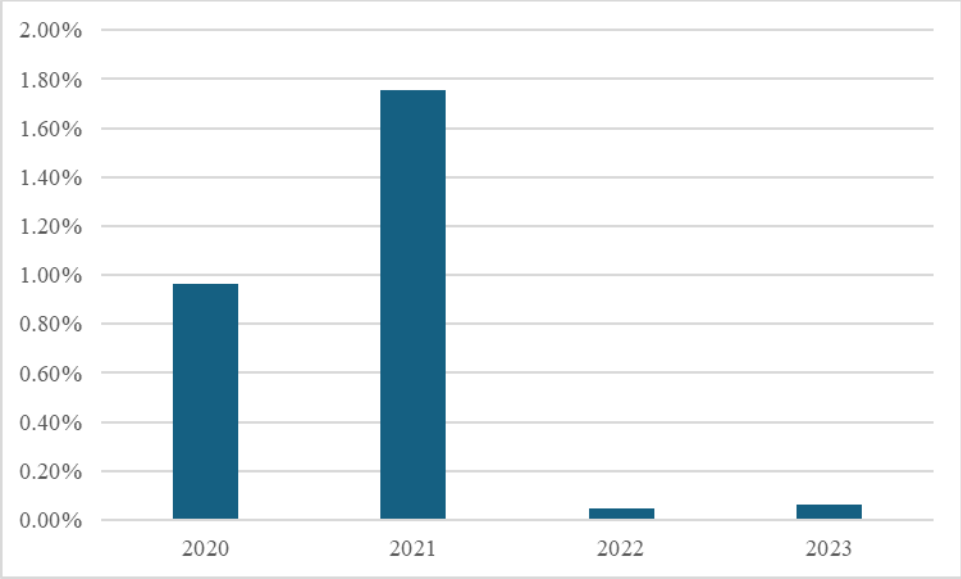

Figure 12. Canceled RP.
Adapted from Secretaria do Tesouro Nacional (n.d.).

Figure 12 shows that 2021 experienced the worst percentage of unused funds, at 1.75%, corresponding to the non-utilization of $4.86 million USD authorized by Congress. The average throughout the period was 0.7%. Thus, the Navy's already limited budget is further impacted by the inefficiencies of the current budgetary system.

To sum up, by analyzing this information about the PROSUB's budget, it is possible to realize that the annual budget affects the funds' predictability, impacting the planned activities. To match the funds authorized with the plan, the BN must redo the program plan yearly, which is very time-consuming. Therefore, combined with economic uncertainties and budget cuts, the annual budget system constrains PROSUB's progress. At the same time, measures implemented by the BN have minimized the side effects of the annual budget, reducing the number of obligations made in a rush at the end of the FY.

V. ANALYSIS AND FINDINGS

This section analyzes which budget system's annual, biennial, or multi-year appropriations would best enhance the efficiency and effectiveness of BN investments' progress, answering the primary question of this research.

The analysis reveals that Brazil's annual budget treats operating expenses and capital expenses equally when considering the time frame to obligate funds, restricting the execution of multi-year projects. Moving to a biennial budget is too risky and is not the optimal solution. Therefore, the multi-year appropriations in an annual budget process would be the best approach for Brazil to ensure the smooth progress of long-term defense projects while supporting the growth of the BID.

A. ANNUAL, BIENNIAL, OR MULTI-YEAR APPROPRIATIONS

Analyzing the current budget system in Brazil reveals that operating expenses and capital expenses are treated similarly when considering the time available to make obligations due to the annual principle. Hence, there is no difference between funding to build a nuclear submarine and buying food; the time to obligate the funds (a one-year cycle) is the same.

In addition, capital budgeting is generally covered incrementally, not upfront, as in the United States, which means that if the BN is constructing one submarine, it will receive the total amount spread over several years, and the amount available each year will depend on the Brazilian Congress's authorization. In other words, the multi-year projects must be present in the PPA as well as in the LOA of each year to permit the continuity of the construction. As a result, managing funds from different FYs to build one submarine is necessary, making it more complicated and more complex than if the total cost needed to construct were provided upfront, which is the standard procedure for capital expenses in the U.S. DOD, as explained in Chapter III.

To illustrate, suppose that the total cost of building one submarine is $4 billion USD, and this construction will happen from 2020 to 2023, with a scheduled spending of $1 billion USD per year. In this case, the 2020–2023 PPA needs to contain the submarine

program, demonstrating that it starts in 2020 and finishes in 2023; the planned amount is $1 billion USD yearly; and the total cost is $4 billion USD. Besides that, the $1 billion USD must be authorized by Congress in the 2020, 2021, 2022, and 2023 LOAs.

However, continuing with this example, if the amount authorized by Congress is less than $1 billion USD annually, it could result in an amendment to the submarine contract, an extension of the schedule, and price increases in the submarine program.

Further, in this scenario, if any issues arise with the contract, there will be almost no time to fix them, and the funds authorized will be lost. For example, suppose that the company contracted to build the submarine does not meet its obligations; this will result in a second bidding process to contract another company, which is very time consuming and probably will not be finished by the end of FY2020. Therefore, the budget authority given by Congress to build the submarine will be lost, resulting in a delay in the project.

Moreover, if the total cost ($4 billion USD) of the submarine is provided in FY2020, supposing that investments were fully funded upfront in Brazil, the program would be executed during the required four years using the RP instrument to finish the program after the end of the FY. Although the RP instrument provides some flexibility by allowing the carry-over of funds obligated within the FY, this instrument does not eliminate the issues raised by the annual budget cycle. Furthermore, the overuse of RP in all kinds of expenses results in an uncontrolled second budget, usually called a parallel budget, for the next year, limiting the expenditures already planned in the year prior. As stated by Liernet and Ljungman (2009), in developing countries such as Brazil, the use of this instrument should be limited only to certain kinds of expenditures, such as investments.

Comparing the budget requests of the United States and Brazil, it becomes apparent that Brazil's investment PB is limited, focused on the next FY, and lacks transparency since it is not well detailed. In the United States, it is possible to visualize that the PB has plenty of information for each program, containing specific details such as what is being acquired, its characteristics, its purpose, quantity, timeline, rate of production, contractors, type of contracts, cost analysis, projections for many years, and amounts approved for five years.

In addition, as demonstrated in the PROSUB case study, the uncertainty associated with year-to-year funding impacts project timelines and increases costs. Regarding costs, as shown in Chapter IV, approximately 27% of PROSUB funds were allocated to the payment of contractual adjustments in 2021. This allocation of funds to contractual adjustments emphasizes the financial impact of project delays and uncertainties caused by the annual budget system. These additional costs could have been mitigated or avoided with a more stable and predictable funding mechanism, such as multi-year appropriations, which would allow for better long-term planning and execution of complex defense projects. Albeit, it is important to note that even full-funding in a multi-year appropriation carries a certain level of risk if the initial cost estimate is too low. In such cases, additional funds may still be required to cover any cost overruns. Nevertheless, multi-year appropriations generally provide a more stable and predictable funding environment compared to the annual budget system, enabling improved project management and cost control in complex defense projects.

The annual budget system impacts the progress of long-term projects in Brazil, and it is not the best option for executing defense projects.

Moving to a biennial budget is not a suitable choice either. From the U.S. states' experiences using this budget, the drawbacks outweigh the benefits. The two-year time frame can raise issues such as less control and monitoring from Congress and other agencies, planning too far in advance, reducing flexibility to respond to unexpected changes, and increasing the potential for outdated priorities. As shown in Chapter II, currently most U.S. states use annual over biennial budgeting, and recently, several states have shifted away from biennial budgeting due to the challenges presented by this system. On the whole, moving to a biennial budget is too risky due to the overall payoff, and so far, it is not the optimal solution for Brazil's case.

Multi-year appropriations in an annual budget process are less risky since they do not require switching all accounts to multi-year, as in the case of biennial budgets. Moreover, the multi-year system can fit the needs of long defense projects with a timeline that spans several years. Also, the multi-year alternative avoids the problem of using funds in a rush at the end of the year due to the expiration of the obligation period, resulting in

more reasonable expenses. Furthermore, combined with the fully funded upfront costs, multi-year appropriations ensure more predictability and stability for defense projects' progress, preventing project halts, timeline extensions, and price increases.

As a result, the multi-year appropriations system prevents a situation like Brazil's, where the armed forces buy without knowing whether they can pay, undermining the project's progress and the government's efficiency in fostering the nation's growth. One example that highlights the budget instability challenges in the PROSUB is that employees were fired in 2024 due to the contingency of program funds, according to Vasconcelos (2024).

B. ALLOCATION OF DEFENSE FUNDING

Chapter IV reveals an important finding in the allocation of defense funds between Brazil and the United States. The analysis demonstrates a stark contrast, highlighting that Brazil's defense allocates more than 80% of the budget to MilPers and only 4% to procurement, while the U.S. defense directs about 21% to MilPers and 20% to procurement. While at first glance, this distribution may suggest imbalances in Brazil's budget allocation, such a straightforward comparison overlooks critical contextual factors.

A review of Brazil's defense budget reveals that the allocation towards personnel initially might seem large. However, this perspective is somewhat limited and superficial, failing to account for the broader and unique roles that the Brazilian armed forces fulfill, roles often managed by separate entities in other countries. For example, the BN is not only engaged in traditional defense activities but also undertakes maritime protection, navigation safety, search and rescue operations, and supports diplomatic initiatives—all integral components of national security under the defense budget.

Furthermore, in 2019, Brazil has implemented significant reforms to reduce personnel costs by mandating a 10% reduction in military personnel by 2029 and reducing the categories of dependents eligible for military benefits from eight to two. Now, only spouses or stable partners, children or stepchildren under the age of 21, and disabled dependents who receive military pensions qualify. These strategic changes are intended to

better allocate resources within the defense budget, shifting focus from personnel costs to enhancing operational capabilities.

Moreover, comparing defense budgets as a percentage of GDP, the Unites States dedicates about 3.5% of its GDP to defense, whereas Brazil allocates merely 1.2%. This significant funding disparity underlines that Brazil's defense sector might be underfunded given the extensive responsibilities and operational scope it covers. Increasing Brazil's defense spending is crucial to provide the necessary resources not only for the modernization and expansion of military capabilities but also for maintaining the current operational state.

Finally, a higher budget allocation to Brazil's defense would allow for a more balanced distribution of funds, reducing the proportion spent on personnel by enabling more investment in procurement, maintenance, and other critical areas. This financial support is essential to ensure that Brazil can effectively meet its diverse defense obligations.

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VI. CONCLUSION AND RECOMMENDATIONS

By comparing Brazil's budgeting approach with that of the United States and studying the impact of the annual budgeting system on the PROSUB program, this study has identified several issues and potential areas for reform. The next sections summarize the main results of the thesis, provide recommendations for improving Brazil's defense budgeting process, and suggest areas for further studies.

A. SUMMARY

Given Brazil's massive maritime area and long coastline, the sea is understood to be a vital asset for the nation's growth and supremacy. To ensure the necessary capabilities to defend this asset called the Blue Amazon, Brazil established its strategic defense priorities in the END, underlining goals to be achieved, such as the development of four conventional submarines and one nuclear submarine through the PROSUB program.

The END established as one of its targets a stable and constant flow of financial resources for the execution of defense projects and the development of the national defense industry. Nevertheless, as observed in this thesis, Brazil has not yet achieved this goal.

As this thesis details, Brazil's annual budgeting system, characterized by the annual cycle, poses significant challenges to the efficient execution of long-term defense projects like PROSUB. The need for annual legislative approval, combined with the prohibition on carrying over unobligated funds to subsequent fiscal years, creates funding uncertainties, inefficiencies in spending, project delays, and cost increases.

Compared to Brazil's incremental funding approach, the U.S. budgeting system, while still largely operating on an annual basis, incorporates multi-year appropriations that provide greater flexibility and stability for defense investments. Full funding of major acquisitions upfront in the United States better aligns resources with project timelines.

The case study of PROSUB highlighted how budgetary instability and shortfalls relative to planned funding levels have undermined the submarine program, necessitating contract renegotiations, schedule extensions, and increased total costs. This situation

demonstrates the risks the annual budgeting system poses to the BN's ability to efficiently deliver on strategic investment priorities.

While Brazil has some multi-year planning instruments like the PPA and accounting mechanisms like RP to mitigate annual cycle challenges, these instruments do not fully eliminate risks associated with annual budget approval. The BN has implemented additional strategies like strategic resource prioritization and intensive budget monitoring to further cope with annual limitations. However, the root structural issue remains.

With defense budgets already significantly constrained, enhancing the efficiency and effectiveness of each dollar spent takes on heightened importance. In conclusion, it is recommended that Brazil explore transitioning to multi-year appropriations, at least for a long-term defense program, to test whether this budgeting system will enhance efficiency and effectiveness in funding the project execution without harming the nation's economy. While still maintaining annual oversight, providing the BN with the authority to obligate funds across the full project life cycle would significantly enhance stability and efficiency.

At the same time, swiftly moving to full funding instead of incremental funding for capital investments would ensure that the projects are funded upfront, avoiding the uncertainty of receiving funding in the next FY.

In parallel to the adoption of multi-year appropriations, it is also recommended that Brazil progressively increase its defense spending to reach the global average of 2% of GDP. Considering the current global scenario where conflicts between nations are becoming more frequent, and given the strategic importance of the Blue Amazon for Brazil's economic growth and national security, this increase would provide more resources for the modernization and readiness of the armed forces, strengthening Brazil's ability to protect its sovereignty and national interests.

Furthermore, implementing a bona fide needs rule and providing more explicit guidance on target obligation and expenditure rates across the fiscal year could reduce the inefficient year-end surges and the problem of a parallel budget in the next FY.

Additionally, the president's budget request in Brazil (PLOA) should be more detailed to provide transparency. When looking at the PLOA, it is unclear to the taxpayers

what is being planned, procured, and acquired. The budget request should include more information about each program, such as the items being acquired, their characteristics, purpose, quantity, timeline, rate of production, contractors, type of contracts, cost analysis, and multi-year projections, similar to the approach adopted by the U.S. DOD in its budget request. This level of detail would give taxpayers a clearer understanding of how their money is spent and enhance public trust in defense budgeting.

All these modifications would require a collaborative approach involving both legislative and executive branches to develop a new budget framework to ensure the stability and predictability of defense funding. Such a framework would facilitate more informed decision-making and alignment of the defense budget with national security needs.

B. AREAS FOR FURTHER STUDY

It was possible to identify important areas that require further analysis. First, the funding model used for the Tamandaré-class frigate program, capitalizing the necessary resources upfront in EMGEPRON, a state-owned company not subject to annual limitations, shows promise as an alternative pathway. A deeper study in this area could create a new and unique framework for defense investments in Brazil.

Secondly, this thesis could be expanded to include an analysis of mechanisms used by other countries to ensure stable and continuous resource allocation to multi-year defense projects.

Lastly, in Brazil, the Army, Navy, and Air Force each use a different acquisition process. In the United States, acquisitions among the forces is a standard procedure developed by the DOD. Hence, a study to analyze the benefits of a standard process for the three Brazilian forces could identify ways to generate more interoperability between them and result in economies of scale in large purchases.

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