Future of the Brazilian Defense Industry – Market Attractiveness, Competitive Landscape and Forecasts to 2021

Report Code: DF0373MR

Publishing Date: August 2016

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. Introduction

1.1. What is this Report About?

This report offers insights into the market opportunities and entry strategies adopted by foreign OEMs (original equipment manufacturers) to gain a market share in the Brazilian defense industry. In particular, it offers in-depth analysis of the following:

- **Market opportunity and attractiveness:** detailed analysis of the current industry size and growth expectations during 2017–2021, including highlights of the key growth stimulators. It also benchmarks the industry against key global markets and provides detailed understanding of emerging opportunities in specific areas.
- **Procurement dynamics:** trend analysis of imports and exports, together with the implications and impact this will have on the Brazilian defense industry.
- **Industry structure:** Five Forces analysis to identify various power centers in the industry and how these are expected to develop in the future.
- **Market entry strategy:** analysis of possible ways to enter the market coupled with detailed descriptions of how existing companies have entered the market, including: key contracts, alliances, and strategic initiatives.
- **Competitive landscape and strategic insights:** analysis of the competitive landscape of the defense industry in Brazil, providing an overview of key defense companies (both domestic and foreign), together with insights such as: key alliances, strategic initiatives, and a brief financial analysis.
- **Business environment and country risk:** a range of drivers at country level, assessing business environment and country risk. It covers historical and forecast values for a range of indicators, evaluating business confidence, economic performance, infrastructure quality and availability, labor force, demographics, and political and social risk.

1.2. Definitions

For the purposes of this report, the following timeframes apply:

- **Historic Period:**2012–2016
- **Forecast Period:**2017–2021

The following are definitions of military expenditure:

- **Revenue expenditure** includes: troop training, institutional education, construction, and maintenance of various undertakings. It also covers the salaries, allowances, pensions, transportation, food, insurance, welfare benefits, and miscellaneous expenditures, pertaining to all unit allowances for training, contingency, and other grants for officers, non–commissioned officers, enlisted men, and contracted civilians.
- **Capital expenditure (CAPEX)** covers research and development (R&D), and the procurement, maintenance, transportation, and storage of weaponry and other equipment. It also includes expenditure on aircraft and aero engines, heavy and medium vehicles, naval equipment, and expenditure on the purchase of land, construction plants, and machinery.

The following are definitions of defense categories:

- **Military hardware** refers to the broad range of machinery, systems, equipment, and weapons used by defense forces.
- **Air defense systems** are defined as all measures designed to nullify or reduce the effectiveness of hostile air action. They include: ground and air-based weapon systems, associated sensor systems, command and control arrangements, and passive measures. This may be to protect naval, ground and air forces wherever they are positioned, but does not include missile defense systems.
- **Missile defense systems** are systems, weapons, or technologies involved in the detection, tracking, interception, and destruction of attacking missiles.
- **Naval defense systems** are used to protect sea lanes and ferry troops, or attack other navies, ports, or shore installations. They include surface ships, amphibious ships, submarines, and seaborne aviation.
- **Homeland security (HLS)** involves the protection of a country's civilians and critical infrastructure from natural or man-made disaster. Its margins extend to border and maritime patrol, customs checks in ports and airports, search and rescue operations, disaster recovery, and combating terrorism and cyber-attacks.

The following are miscellaneous definitions:

- **Indirect offsets** involve both barter and counter trade deals, investment in the buying country, or the transfer of technology unrelated to the weapons being sold.
- **Direct offsets** is defined as an arrangement wherein the purchaser receives work or technology directly related to the weapons sale, typically by producing the weapon system or its components under license.
- **Multipliers** are additional credits assigned over and above the market value provided to offsets for a technology, product or service being offered.
- **Command, control and communications and intelligence system (C3I)** refers to an information system employed by a military's top command to direct its forces. This system provides the military with information on various parameters associated with executing a strategy during a military exercise. The parameters include reconnaissance and surveillance, troop positions, inventory levels, and weather conditions. The communication system enables the transfer of images and videos captured by surveillance systems, and data and voice between the command and control center. In addition, the system aids in joint operations between the army, navy and air force.
- **Maintenance, repair and overhaul (MRO)** involves the servicing of a defense system with the objective of restoring it to a state where it can perform its intended function. It could be routine maintenance, replacement of faulty spare parts, or checking the entire system to ensure smooth functioning.
- **Airborne early warning and control systems (AEW&C)** are airborne radar systems used by the military to detect the movement of aircraft in its airspace. Used at high altitudes, they are used in both defensive and offensive air operations and have the ability to help distinguish between civilian and military aircraft.

1.3. Summary Methodology

SDI's dedicated research and analysis teams consist of experienced professionals with a background in industry research and consulting in the defense sector. The following research methodology is followed for all databases and reports:

Secondary Research

The research process begins with exhaustive secondary research to source reliable qualitative and quantitative information related to the defense market. The secondary research sources that are typically referred to include, but are not limited to:

- Industry associations
- National government documents and statistical databases
- Company websites, annual reports, financial reports, broker reports, investor presentations
- Industry trade journals and other literature
- Internal and external proprietary databases
- News articles, press releases, and webcasts specific to the companies operating in the market

Primary Research

SDI conducts hundreds of primary interviews a year with industry participants and commentators in order to validate its data and analysis. A typical research interview fulfills the following functions:

- Provides first-hand information on market size, market trends, growth trends, competitive landscape, and future outlook
- Helps to validate and strengthen secondary research findings
- Further develops the analysis team's expertise and market understanding
- Primary research involves e-mail interactions, telephone interviews, and face-to-face interviews for each market category, division, and sub-division across geographies

The participants who typically take part in such a process include, but are not limited to:

- Industry participants: CEOs, VPs, business development managers, market intelligence managers, and national sales managers
- External experts: investment bankers, valuation experts, research analysts, and key opinion leaders specializing in defense markets

Conventions

- Currency conversions are performed on the basis of average annual conversion rate format calculations
- All the values in tables, with the exception of compounded annual growth rate (CAGR) and compounded annual rate of change (CARC), are displayed to one decimal place; therefore, due to this rounding method, growth rates may appear inconsistent with absolute values

- The forecast values are projected on the basis of nominal values; the inflation was not taken into account

1.4. SDI Terrorism Index

The SDI Terrorism Index classifies countries across the world into one of the following categories, based on the risk of terrorism:

- Worst affected
- Highly affected
- Moderately affected
- Some risk
- Low risk

It takes into account the total number of terrorist incidents, the total number of people affected by these attacks, and the presence of foreign terrorist organizations in a country. Based on these parameters, the terrorism index is developed using a weighted average scorecard.

1.5. About Strategic Defence Intelligence

This report is one of a series that is available to subscribers of our premium research platform — Strategic Defence Intelligence. Strategic Defence Intelligence provides a stream of continuously updated customer and competitor intelligence as well as detailed research reports providing an unrivalled source of global information on the latest developments in the defense industry.

Strategic Defence Intelligence's unique monitoring platform tracks global defense activity for over 2,500 companies and 65 product categories in real-time in a highly structured manner - giving a comprehensive and easily-searchable picture of all defense industry activity. The site features: daily updated analysis, comment and news, company and customer profiles, defense spending, tenders and contracts, and product and technology intelligence. It also offers a research and analysis database giving you access to industry and competitor reports to inform your business and market planning, as well as fully customizable tools, including instant personalized report generation, and custom alerts.

2. Executive Summary

Brazil's defense expenditure is expected to register a CAGR of 4.08% over the forecast period

Brazilian military expenditure, which stands at US$19.3 billion in 2016, registered a CAGR of -13.31% during the historic period. It is however, expected to grow at a CAGR of 4.08% during the forecast period, to reach US$20.5 billion by 2021. The budget for 2016 is an allotted budget, whereas the budget mentioned up to 2015 is an actual executed expenditure of Brazil. There is a huge difference between the planned budget and the executed budget in 2015. The Brazilian Government reduced its budget and focused on implementing transaction tax on the people to overcome the recession. The country's defense expenditure will largely be driven by the Brazilian MoD's increasing efforts to replace its aging military systems and equipment, military procurements that are largely focused on the protection of its substantial resources from illegal mining, deforestation, and drug trafficking. In addition, the Brazilian Ministry of Defense aims to decrease its dependence on foreign OEMs by boosting its indigenous defense industry, by equipping the country with latest technological developments. As a percentage of GDP, the country's defense budget is expected to average 1.14% over the forecast period.

The capital expenditure allocation, which stood at an average of 10.7% during the historic period, is projected to decrease at an average of 6.2% during the forecast period. This decline is due to budgetary pressures, which compelled the country to reduce its defense procurement plans. Furthermore, Brazil is expected to allocate as much as an average of 93.8% of its defense budget towards revenue expenditure, of which almost 50% will be used to pay pension allowances to its retired military personnel.

Brazilian homeland security expenditure stands at US$3.89 billion in 2016, and is estimated to reach US$4.82 billion in 2021, registering a growth rate of 3.97%. With major international sporting events such as the 2016 Olympics, the country is spending heavily on border security and homeland infrastructure. Brazil has increased its expenditure on security and surveillance systems, radars, and biometric systems. Furthermore, the government is increasing efforts to control organized crimes such as drug trafficking, border crossing, and cyber security.

Low allocation for defense capital expenditure and delay in the closure of defense deals are the major challenges of Brazilian Defense Industry

In order to promote Brazil's domestic defense industry, the majority of its arms import deals include technology transfer obligations. However, a number of defense firms are either reluctant to share proprietary information or are prohibited by their country's policy on the transfer of technology. This requirement has been a key deterrent for foreign OEMs entering the Brazilian industry. Foreign suppliers also face project delays in the approval of defense deals, as the Brazilian Ministry of Defense takes a considerable amount of time to evaluate offset agreements. This further leads to cost overruns by foreign manufacturers, leading to low profitability and constant revisions of offset agreements by bidders attempting to win contracts.

Modernization of defense systems expect to drive arms imports

Brazil relies on imports and has allocated significant funds for the procurement of fighters under the fourth-generation FX-2 program, in order to modernize its aging fleet of aircraft. During the historic period, the country's defense imports were the highest in 2012. Aircraft and armored vehicles dominated imports during this period, with Germany and the US being the main suppliers. In order to protect its oil rich reserves in the Amazon basin, Brazil is spending heavily on naval vessel procurements during the review and forecast period. Brazil has contracted the French defense company DCNS in 2009, to supply four diesel-electric-powered submarines,

based on the Scorpene model. The construction of these submarines was commissioned in 2014 and is expected to complete by 2022.

The Brazilian defense industry is still in its early development stage, and defense exports are limited to a few neighboring countries and less developed nations such as Argentina, Chile, Columbia, and the Czech Republic. During the 1980s, Brazil's exports were higher than its imports, which were supported by the demand for high-quality and low-cost defense systems in developing countries. However, intense competition from the foreign OEMs of developed countries resulted in the loss of business and eventual closure of several Brazilian defense firms.

3. Market Attractiveness and Emerging Opportunities

The country's defense budget stood at US$19.3 billion in 2016, registering a CAGR of -13.31% during the historic period. The budget for 2016 is an allotted budget, whereas the budget mentioned up to 2015 is an actual executed expenditure of Brazil. There is a huge difference between the planned budget and the executed budget in 2015. The Brazilian government reduced its budget and focused on implementing transaction tax on the people to overcome the recession. Although the actual budget increased in terms of local currency from 2012 to 2014, it showed a downward trend in dollar value owing to variations in the exchange rate. The forecast period is expected to witness a modest increase in defense spending, at a CAGR of 4.08%, to value US$20.5 billion in 2021. The country's defense budget is mainly driven by continuous modernization in the defense sector, expanding its domestic defense capabilities by concentrating on initiating joint ventures, strategic partnerships and collaborations, and undertaking various weaponry procurement projects. Recently, the government planned to establish a specialized organization in order to procure military systems and technologies related to innovation, research, and development which are a part of Brazil's strategic plan 2016-2019. In addition, capital expenditure is expected to increase at a CAGR of 7.45% over the forecast period, mainly due to the procurement of multi-role aircraft, multi-mission helicopters, naval vessels, aircraft carriers, transport helicopters, modernizing its armored vehicles, and the FX-2 program. For instance, the Brazilian Government signed a deal with Saab (Sweden) which values US$4.7 billion. According to the deal, Saab will deliver Gripe NG multi-role aircraft to Brazil. In addition, border monitoring program- SISFRON (Sistema Integrado de Monitoramento de Fronteiras) and SISGAAZ (Sistema de Gerenciamento da Amazônia Azul) is to be implemented during the forecast period.

Additionally, the country is increasing its homeland security (HLS) expenditure in order to counter organized crime and increasing Islamic and white right-wing extremism, which pose challenges to internal security.

.

3.1. Defense Market Size Historical and Forecast

3.1.1. Brazilian defense budget is expected to grow at an estimated CAGR of 4.08% during 2017–2021

In terms of local currency, the Brazilian defense budget is expected to reach R$67.2 billion by 2021

The Brazilian defense budget stood at R$63.1 billion in 2016 and registered a CAGR of -1.24% during 2012–2016. However, the defense expenditure is forecast to grow slightly at a CAGR of 4.08%, to value R$67.2 billion in 2021.

In terms of US dollars, Brazilian defense expenditure is expected to value US$95.7 billion cumulatively during 2017–2021

Brazilian defense expenditure is valued at US$19.3 billion in 2016, and registered a CAGR of -13.31% during the historic period. The decrease of military budget in 2015 is due to the weak financial position of the country. At present, Brazil is facing recession and is expected to recover in the near future, which can further increase its budget towards the defense industry. The decrease in budget during the historic period is also primarily due to the decline in the exchange rate. However, an increase in the defense budget is primarily due to the country's modernization of its outdated defense systems, and simultaneous focus on the development of its domestic defense capabilities to reduce dependency on foreign suppliers, and financing towards military hardware procurement programs. Brazilian defense expenditure is projected to grow at a CAGR of 4.08% to value US$20.5 billion by 2021.

The following table shows the Brazilian defense expenditure during 2012-2021:

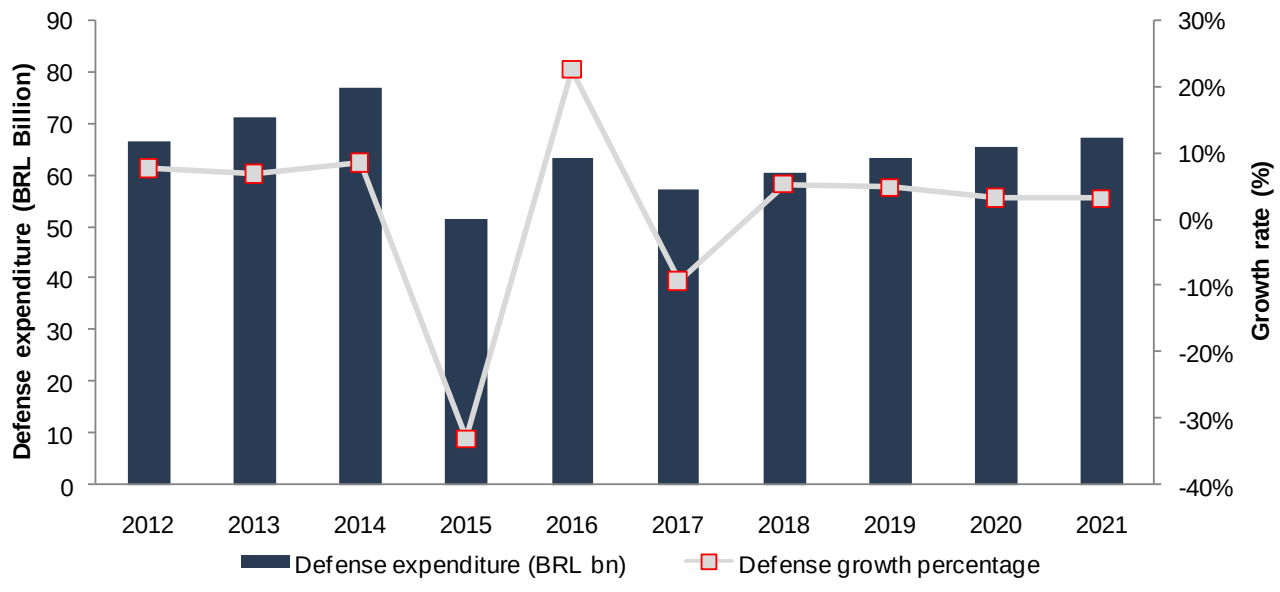
Table 1: Brazilian Defense Expenditure (R$ billion& US$ billion), 2012–2021

Year	Defense expenditure (R$ bn)	Growth Rate (%)	Defense expenditure (US$ bn)	Growth Rate (%)
2012	66.4	7.6%	34.2	-7.7%
2013	70.9	6.8%	33.0	-3.3%
2014	76.9	8.5%	32.8	-0.6%
2015	51.6	-32.9%	15.8	-52.0%
2016	63.1	22.4%	19.3	22.4%
2017	57.3	-9.3%	17.5	-9.3%
2018	60.3	5.2%	18.4	5.2%
2019	63.1	4.8%	19.3	4.8%
2020	65.2	3.2%	19.9	3.2%
2021	67.2	3.1%	20.5	3.1%
2012–2016	***CAGR (%) R$***	***-1.24%***	***CAGR (%) US$***	***-13.31%***
2017–2021	***CAGR (%) R$***	***4.08%***	***CAGR (%) US$***	***4.08%***

Source: Ministry of Defense, Brazil and SDI analysis ©SDI

The following chart shows the Brazilian defense expenditure in local currency over the period 2012-2021:

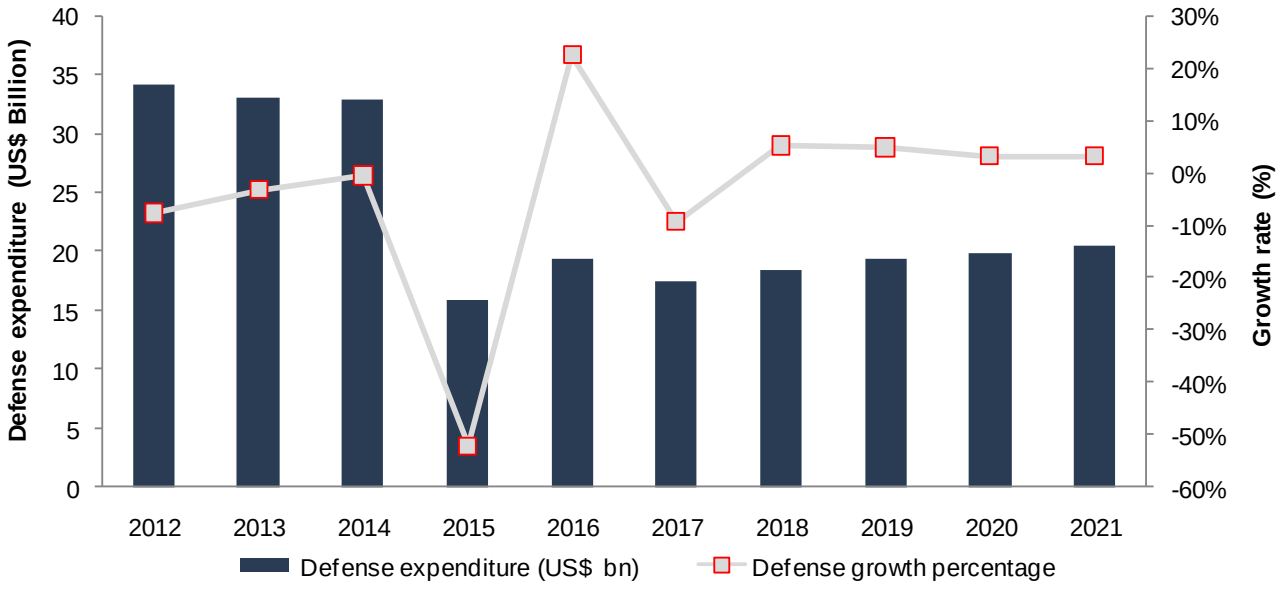
Figure 1: Brazilian Defense Expenditure (R$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

The following chart shows the Brazilian defense expenditure in US Dollars over the period 2012-2021:

Figure 2: Brazilian Defense Expenditure (US$ Billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.1.2. Development of indigenous defense capabilities, modernization of defense systems, and large defense procurement projects are expected to drive the Brazilian defense expenditure

Development of indigenous defense capabilities: Brazil possess a substantial indigenous military production sector among other Latin American nations, and plans to reduce its dependency on foreign OEMs by expanding its domestic defense capabilities; therefore, the country has been concentrating on initiating joint ventures, strategic partnerships, and collaborations to acquire foreign technology that both complements and supports the research and development of its indigenous weaponry. For instance, in 2016, Brazil established a special organization for the procurement of advanced technologies and also develops research and development. The country also offers a wide variety of products, such as the KC-390 military transport aircraft and EMB 314 Super Tucano. In addition, Brazil signed a contract with Israel Aerospace Industries (IAI) for a large scale air refueling project, in which domestic subcontractors will also be participating. Moreover, a new law was passed in 2012, aimed at reducing the dependency on foreign military imports by forming a new segment for a "strategic defense company", which requires at least 60% of the shares to be owned by Brazilians. The law exempts the strategic defense company from Brazil's tax on industrial goods, and liberates them from obligations to contribute to unemployment insurance and social security programs. The new addition of this law states that the 26 companies which have been given tax benefits will ease the production chain up to 18%, which makes them more competitive in domestic defense industry. Such developments will help Brazil to boost its indigenous defense industry by equipping the country with the latest technological developments and improve its product offering during the forecast period.

Modernization of defense systems: At present, the country is facing spending cuts in the defense budgets which in turn results in the reduction of spending on modernization programs. But it is expected that the country recovers from the recession and spending will increase in the near future. The Brazilian MoD is increasing efforts to replace its aging military systems and equipment acquired during the Soviet era. The country is expanding its naval fleet to increase regional maritime security by procuring Amazonas Class Ocean Patrol Vessels from the UK and France. The country is aiming to modernize Brazilian Navy through the Submarine Development program (PROSUB). According to this program, the navy designs and builds four conventional submarines powered by nuclear propulsion. The Brazilian Marine Corps negotiated a contract with BAE Systems to provide and modernize 23 amphibious assault vehicles, which are expected to be delivered in 2017. And also, Helibras and Sagem signed an agreement to modernize flight controls of panther helicopters of Brazil. Furthermore, in an agreement signed with France in 2008, Brazil jointly manufacturing four Scorpene attack submarines, anticipated to enter service in 2017, along with a nuclear-powered submarine to be commissioned in 2023. Additionally in 2013, the Brazilian Air Force chose Saab’s Gripen over other prospects, which included Dassault’s Rafale jet and Boeing’s F/A 18 Super Hornet, under a US$4.5 billion contract to provide 36 fighter jets by 2020.The country’s defense ministry is also currently in the process of strengthening its military ties with Russia, having initiated a US$1 billion planned procurement of anti-aircraft missile batteries. Its military modernization programs include the production of 2,044 Guarani armored vehicles, Gripen next generation (NG) multi-role combat aircraft, Pantsir-S1 round-based air defense system, the KC-390 tanker aircraft development program, nuclear submarine program, ballistic missiles, and an aircraft carrier, along with training, maintenance, and the education of military forces. Brazil hosted the 2014 FIFA World Cup and will also host the 2016 Olympic Games, and so will spend a considerable amount on the acquisition of weapons, particularly until 2016. Brazil’s capital expenditure registered a CAGR of 0.98% during the historic period and is further expected to grow, at a CAGR of 6.09%, to reach a cumulative total of US$18.5 billion during by 2020. Such major projects are set to

fuel strong growth in the industry during the forecast period, as the government procures a large amount of military hardware.

Large defense procurement projects: The country's growing need to protect its borders, the Amazon rainforest, and substantial offshore oil discoveries will drive the defense budget over the forecast period, due to the large defense projects the country is expected to undertake. These projects include the procurement of fourth-generation fighter (F-X2) and the Brazilian defense industry's most ambitious project-Embraer's plan to build a nuclear powered fast tract submarine. The Brazilian Navy is also in the process of modernization, as outlined in its long term modernization plan released in 2004, which is expected to be completed by 2019. Major programs included in this plan are the procurement of five 1,800-ton ocean patrol vessels, five 6,000-ton frigates, single support vessels, and a surveillance system for Atlantic territorial waters. Major programs of the Brazilian Army include the procurement of armored vehicles, weapons, radars, night vision goggles, and UAVs. Additionally, the government has also invested US$1.2 billion in the space program for the construction of a launch center, launch vehicles, and satellites. The Brazilian government is expected to invest a significant amount of finance towards military hardware procurement programs, driving expenditure over the forecast period.

3.1.3. Defense budget as a percentage of GDP will remain at an average of 1.14% over the forecast period

The Brazilian defense budget as a percentage of GDP decreased from 1.39% in 2012 to 1.26% in 2016, and is further anticipated to remain same at 1.12% in the years 2017 and 2021. The decrease in the defense expenditure as a percentage of GDP is primarily due to the country's focus on stabilizing and recovering the economy from the fiscal deficit crisis.

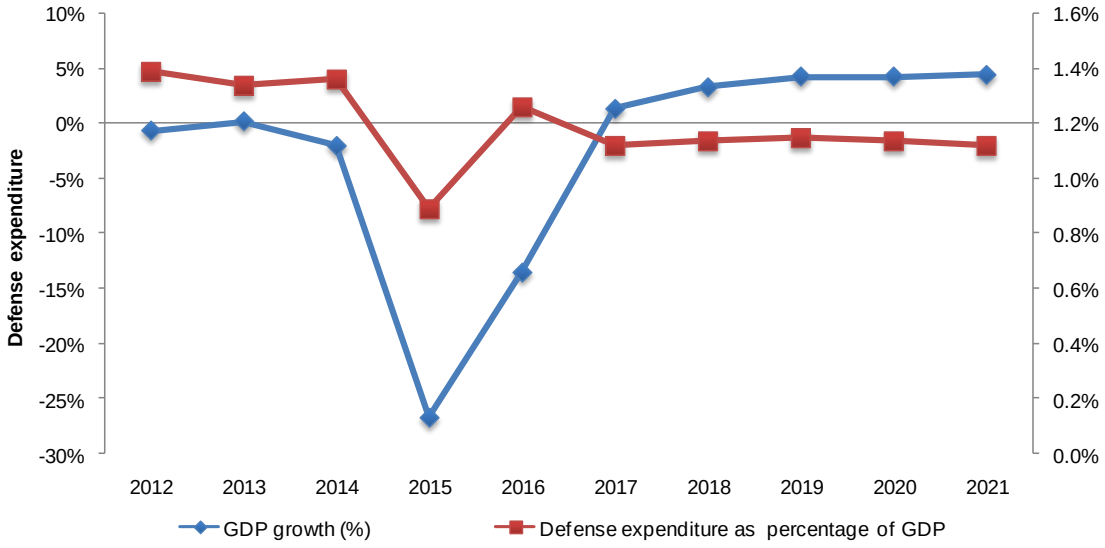
The following table shows Brazilian GDP growth and defense expenditure as a percentage of GDP between 2012 and 2021:

Table 2: Brazilian GDP Growth and Defense Expenditure as Percentage of GDP Growth, 2012–2021

Year	GDP growth (%)	Defense expenditure as percentage of GDP
2012	-0.61%	1.39%
2013	0.21%	1.34%
2014	-1.93%	1.36%
2015	-26.67%	0.89%
2016	-13.42%	1.26%
2017	1.41%	1.12%
2018	3.36%	1.14%
2019	4.27%	1.15%
2020	4.29%	1.14%
2021	4.53%	1.12%
Source: Ministry of Defense, Brazil and SDI analysis		© SDI

The following figure shows the GDP growth and defense expenditure as a percentage of GDP between 2012 and 2021:

Figure 3: Brazilian GDP Growth and Defense Expenditure as Percentage of GDP Growth,2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.2. Analysis of Defense Budget Allocation

3.2.1. Share of capital expenditure is expected to decrease during the forecast period

The Brazilian MoD allocated an average of 11.4% of capital expenditure during the historic period, which is expected to decrease marginally over the forecast period. The major procurements of the country include multi-role aircraft, multi-mission helicopters, naval vessels, aircraft carriers, transport helicopters, and modernizing its armored vehicles, FX-2 program. In addition, border monitoring program- SISFRON (Sistema Integrado de Monitoramento de Fronteiras) and SISGAAZ (Sistema de Gerenciamento da Amazônia Azul),is to be implemented during the forecast period. The Brazilian MoD allocated an average of 88.6% of revenue expenditure during the historic period which is expected to increase marginally over the forecast period. This decline in the share of capital expenditure is mainly due to the budget cuts which results in low budget allocation to the procurement programs.

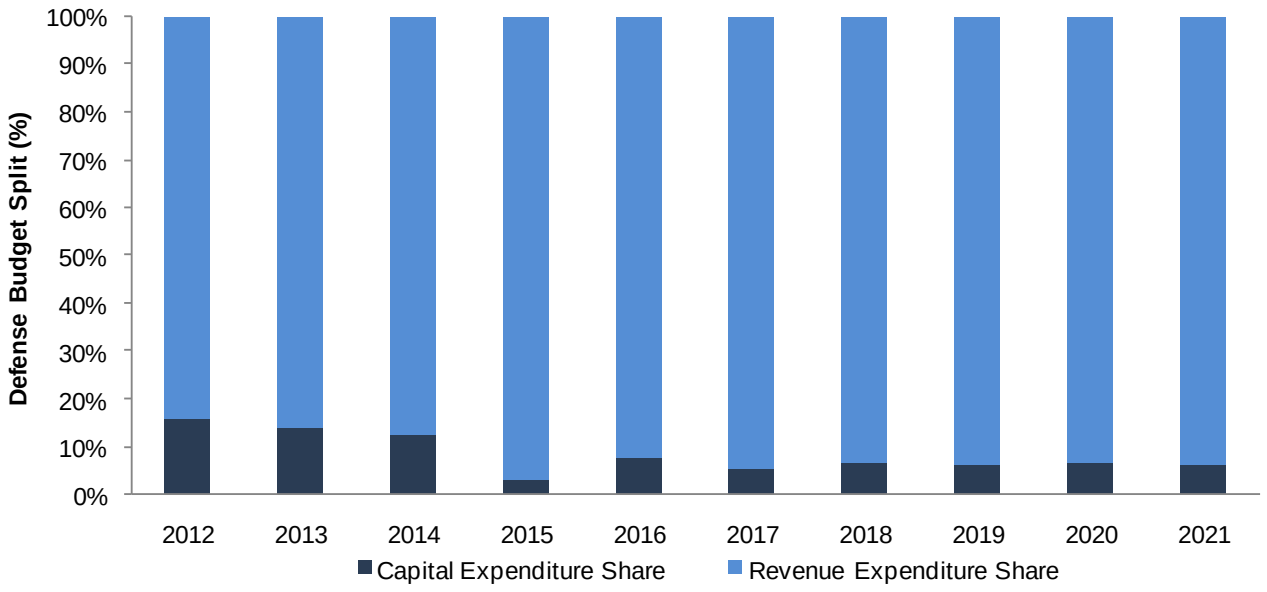
The following table displays the Brazilian defense budget share of capital and revenue expenditure during 2012-2021:

Table 3: Brazilian Defense Budget Split Between Capital and Revenue Expenditure (%), 2012–2021

Year	Capital Expenditure Share	Revenue Expenditure Share
2012	16.1%	83.9%
2013	14.0%	86.0%
2014	12.6%	87.4%
2015	3.1%	96.9%
2016	7.9%	92.1%
2017	5.5%	94.5%
2018	6.7%	93.3%
2019	6.1%	93.9%
2020	6.4%	93.6%
2021	6.2%	93.8%

Source: Ministry of Defense, Brazil and SDI analysis© **SDI**

Figure 4: Brazilian Defense Budget Split Between Capital and Revenue Expenditure (%),2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.2.2. Capital expenditure is anticipated to record a CAGR of 7.45% during the forecast period

In terms of local currency, the Brazilian capital expenditure is projected to reach R$4.18 billion by 2021

In terms of local currency, the budget allocation for capital expenditure increased from R$10.6 billion in 2012 to R$4.9 billion in 2016, and registered a CAGR of -17.41%. However, during the forecast period, the country is expected to register a CAGR of 7.45%, to value R$4.18 billion in 2021.

In terms of US dollars, the Brazilian capital expenditure is expected to value US$5.9 billion cumulatively during 2017–2021

The Brazilian defense capital expenditure values US$5.5 billion in 2016 and recorded a CAGR of -27.5% during the historic period. The decline is due to the budgetary pressures, which compelled the country to reduce its defense procurement plans. However, Brazil's capital expenditure is expected to grow slightly at an estimated CAGR of 7.45% over the forecast period, to value US$1.3 billion by 2021.The cumulative capital expenditure over the forecast period is expected to be US$5.9 billion.

The following table shows the Brazil's capital expenditure during 2012–2021:

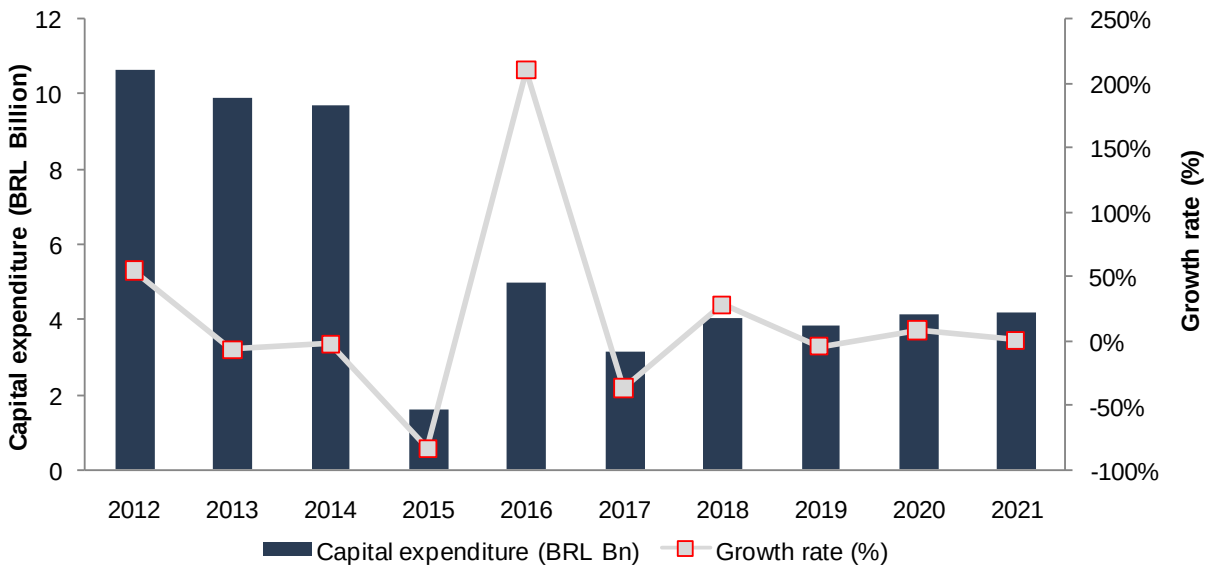
Table 4: Brazilian Defense Capital Expenditure (R$ billion & US$ billion), 2012–2021

Year	Capital expenditure (R$ bn)	Growth Rate (%)	Capital expenditure (US$ bn)	Growth Rate (%)
2012	10.67	54.6%	5.49	32.5%
2013	9.92	-7.0%	4.63	-15.8%
2014	9.70	-2.3%	4.14	-10.4%
2015	1.60	-83.5%	0.49	-88.2%
2016	4.96	210.2%	1.52	210.2%
2017	3.14	-36.8%	0.96	-36.8%
2018	4.02	28.1%	1.23	28.1%
2019	3.84	-4.5%	1.17	-4.5%
2020	4.15	8.3%	1.27	8.3%
2021	4.18	0.7%	1.28	0.7%
2012–2016	***CAGR (%) R$***	***-17.41%***	***CAGR (%) US$***	***-27.50%***
2017–2021	***CAGR (%) R$***	***7.45%***	***CAGR (%) US$***	***7.45%***

Source: Ministry of Defense, Brazil and SDI analysis ©SDI

The following chart shows the Brazil's capital expenditure in local currency during 2012–2021:

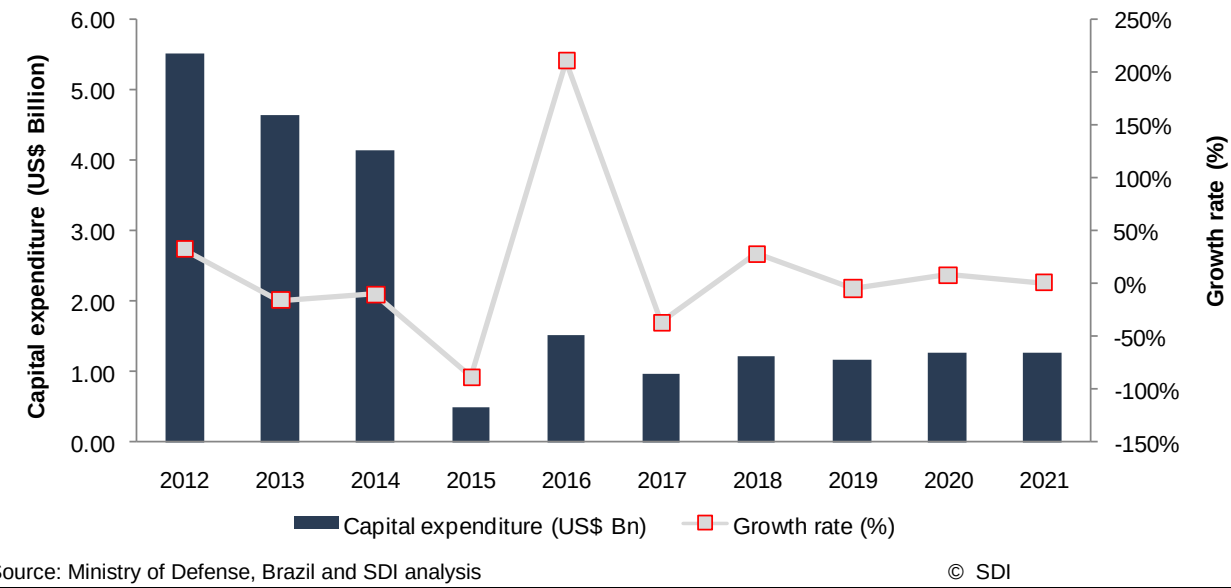
Figure 5: Brazilian Defense Capital Expenditure (R$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

The following chart shows the Brazil's capital expenditure in US dollars during 2012–2021:

Figure 6: Brazilian Defense Capital Expenditure (US$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.2.3. The army accounted for the largest percentage share of the overall Brazilian defense budget

Historically, the country allocated the major portion of its defense budget to its army. The country's MoD assigned an average of 45.9% of its total defense budget to the army during the historic period, which is estimated to increase and register an average of 46.7%over the forecast period. The Brazilian MoD groups force account, commission secretariat for marine resources, ordnance industry, and Osorio foundation and among others under the other expenditure category, which accounts for an average of 3.66% of the total defense budget during 2012–2016, and is projected to increase slightly at an average of 3.94% over the forecast period.

The table below displays the military expenditure allocation of army, navy, air force and other category during 2012−2021:

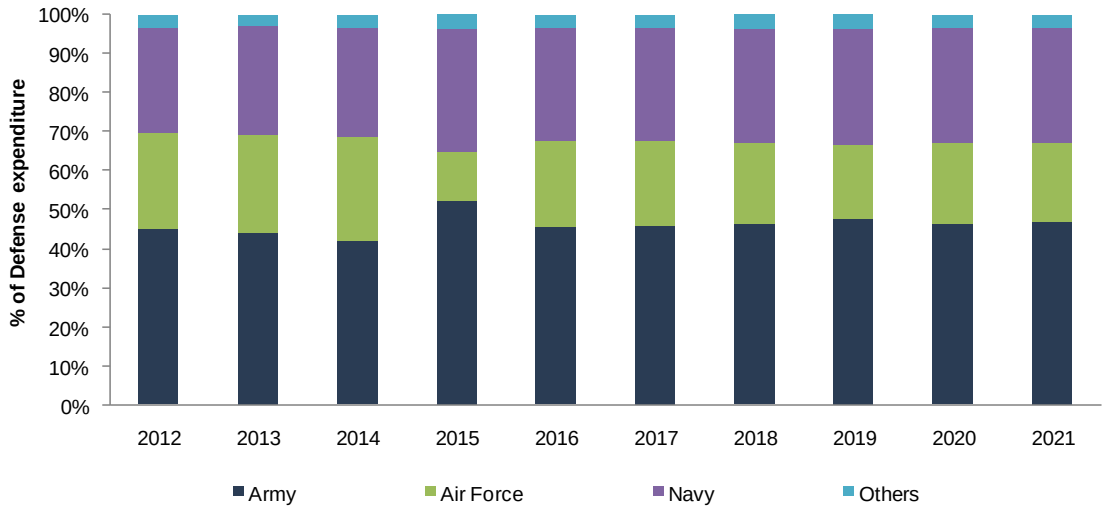
Table 5: Brazilian Defense Budget Split between Army, Navy, Air Force and other category, 2012–2021

Year	Army Expenditure Share	Air Force Expenditure Share	Navy Expenditure Share	Other Category
2012	45.1%	24.5%	27.2%	3.1%
2013	44.0%	25.1%	28.0%	3.0%
2014	42.1%	26.6%	28.0%	3.3%
2015	52.4%	12.3%	31.6%	3.8%
2016	45.7%	22.0%	28.9%	3.4%
2017	46.0%	21.5%	29.1%	3.4%
2018	46.6%	20.6%	29.4%	3.5%
2019	47.7%	19.1%	29.7%	3.5%
2020	46.5%	20.8%	29.3%	3.4%
2021	46.7%	20.5%	29.4%	3.4%

Source: Ministry of Defense, Brazil and SDI analysis © SDI

The chart below displays the military expenditure allocation of army, navy, air force, and common services during 2012-2021

Figure 7: Brazilian Defense budget Split Between Army, Navy, Air Force and Other category, 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.2.4. Army defense expenditure is estimated to reach US$9.6 billion in 2021

In terms of local currency, the Army expenditure is expected to reach R$31.37 billion by 2021

In terms of local currency, defense budget expenditure for the army witnessed a decreasing trend between 2012 and 2016, and registered a CAGR of -0.94%. However, it is expected to increase over the forecast period, to value R$31.37billion in 2021 from R$26.36 in 2017, at a CAGR of 4.45%

In terms of US dollars, army expenditure is forecast to value US$44.68 billion cumulatively during 2017–2021

Brazil's expenditure on its army values US$8.82 billion in 2016, and registered a CAGR of -13.05% during the historic period. However, this is expected to increase at a CAGR of 4.45%, to value US$9.59 billion in 2021. The country is expected to cumulatively allocate US$44.68 billion for its army over the forecast period. BAE Systems will provide 16 upgraded M109 howitzers in 2016 and 2018 to the Brazilian Army. The government is also planning to modernize its army by the consolidation of armored training center in Santa Maria. Also, the Brazilian Army is expected to receive several armored fighting vehicles from the US. In order to control fire arms smuggling and drug trafficking, the Brazilian Army created an Integrated Border Monitoring System (SISFRON), with an estimated investment of BRL12 billion (US$3.6 billion). Under this program, the army plans to procure surveillance equipment, antennas, and among others in the forecast period.

The following table shows the army expenditure allocation of Brazil during 2012-2021:

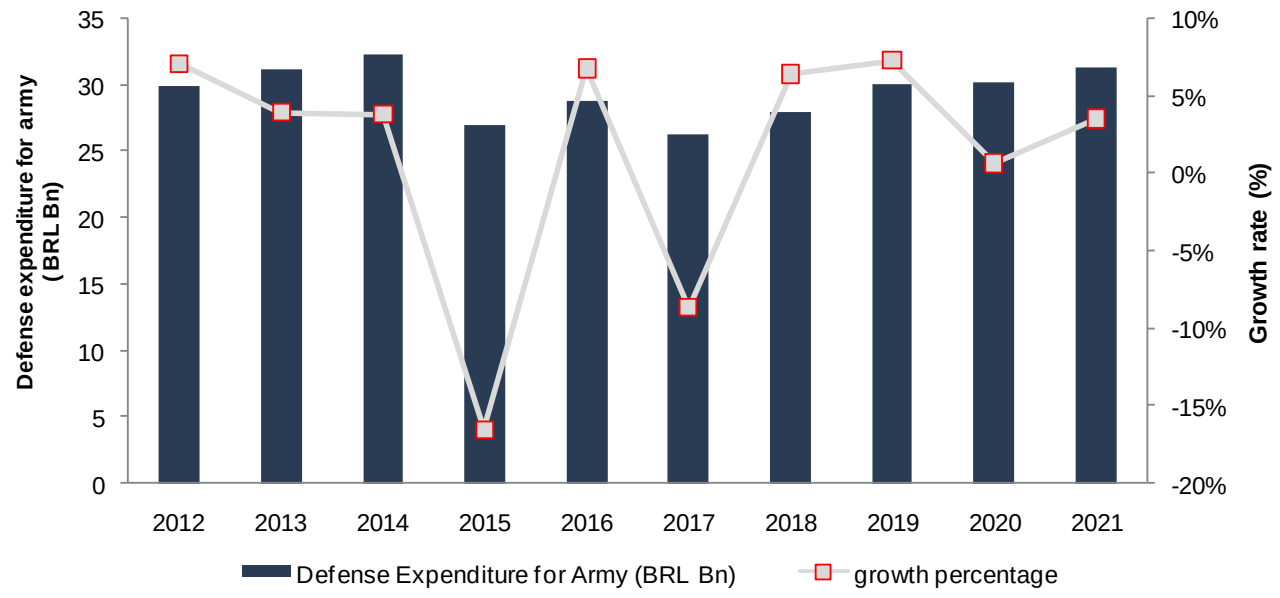
Table 6: Brazilian Defense Expenditure for Army (R$ billion & US$ billion), 2012–2021

Year	Army Expenditure (R$ bn)	Growth Rate (%)	Army Expenditure (US$ bn)	Growth Rate (%)
2012	30.0	7.1%	15.4	-8.2%
2013	31.2	4.0%	14.5	-5.8%
2014	32.4	3.9%	13.8	-4.8%
2015	27.0	-16.5%	8.3	-40.3%
2016	28.9	6.8%	8.8	6.8%
2017	26.4	-8.7%	8.1	-8.7%
2018	28.1	6.4%	8.6	6.4%
2019	30.1	7.3%	9.2	7.3%
2020	30.3	0.7%	9.3	0.7%
2021	31.4	3.5%	9.6	3.5%
2012–2016	***CAGR (%) R$***	***-0.94***	***CAGR (%) US$***	***-13.05%***
2017–2021	***CAGR (%) R$***	***4.45%***	***CAGR (%) US$***	***4.45%***

Source: Ministry of Defense, Brazil and SDI analysis ©SDI

The following chart shows the army expenditure allocation of Brazil in local currency during 2012-2021:

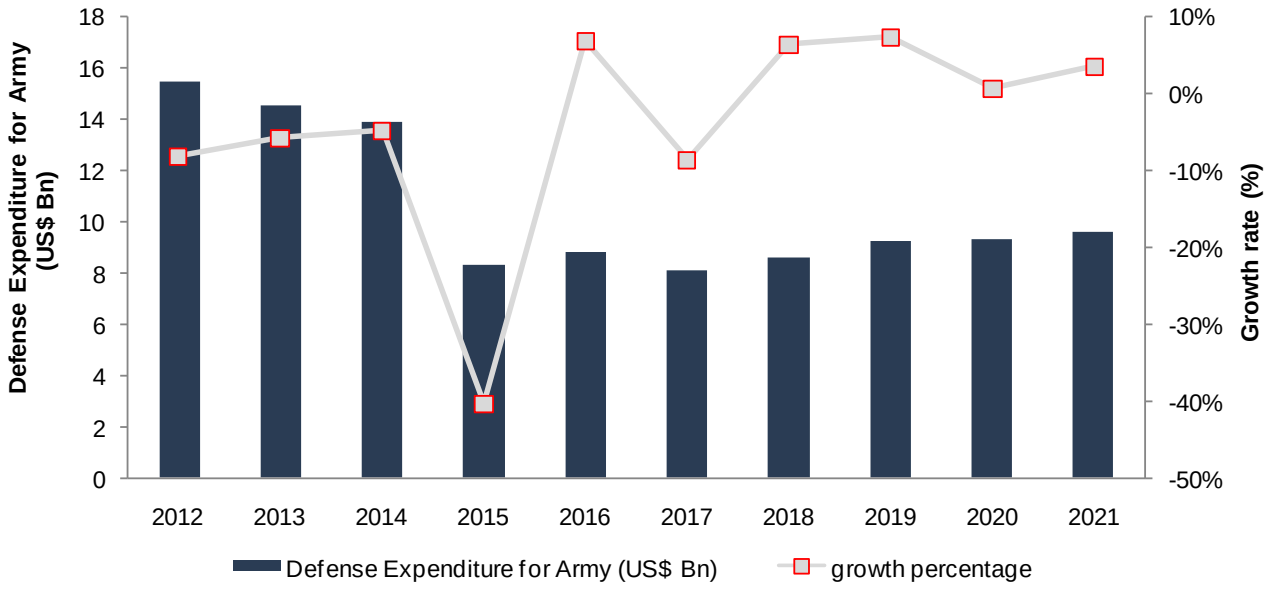
Figure 8: Brazilian Army Expenditure (R$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis © SDI

The following chart shows the army expenditure allocation of Brazil in US dollars during 2012-2021:

Figure 9: Brazilian Defense Expenditure for Army (US$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.2.5. Air force defense expenditure is expected to grow at a CAGR of 2.85% during 2017–2021

In terms of local currency, the air force expenditure is anticipated to reach R$13.7 billion by 2021

Air Force expenditure in terms of local currency registered a CAGR of 2.85% between 2012 and 2016, to stand at R$13.89 billion in 2016. It is projected that air force expenditure will register a CAGR of 2.85% to value R$13.76billion in 2021.

In terms of US dollars, air force expenditure is estimated to value US$19.58 billion cumulatively during 2017–2021

The country's expenditure on its air force values US$4.25 billion in 2016, and recorded a CAGR -15.57% during the historic period. However, during the forecast period, the country is expected to register a CAGR of 2.85% to value US$4.21 billion by 2021. For instance, in 2015, SAAB and the Brazilian MoD signed a contract for the acquisition of external stores for Gripen NG, worth US$245 million. The increase in air force defense expenditure is primarily due to the procurement of multi-role aircraft, multi-mission helicopters, and among others. In 2014, the Brazilian Air Force signed a purchase agreement of 28 aircraft over a 12 year span. The cumulative air force expenditure is estimated to value US$19.58 billion during the forecast period.

The table below shows the air force expenditure allocation of Brazil during 2012-2021:

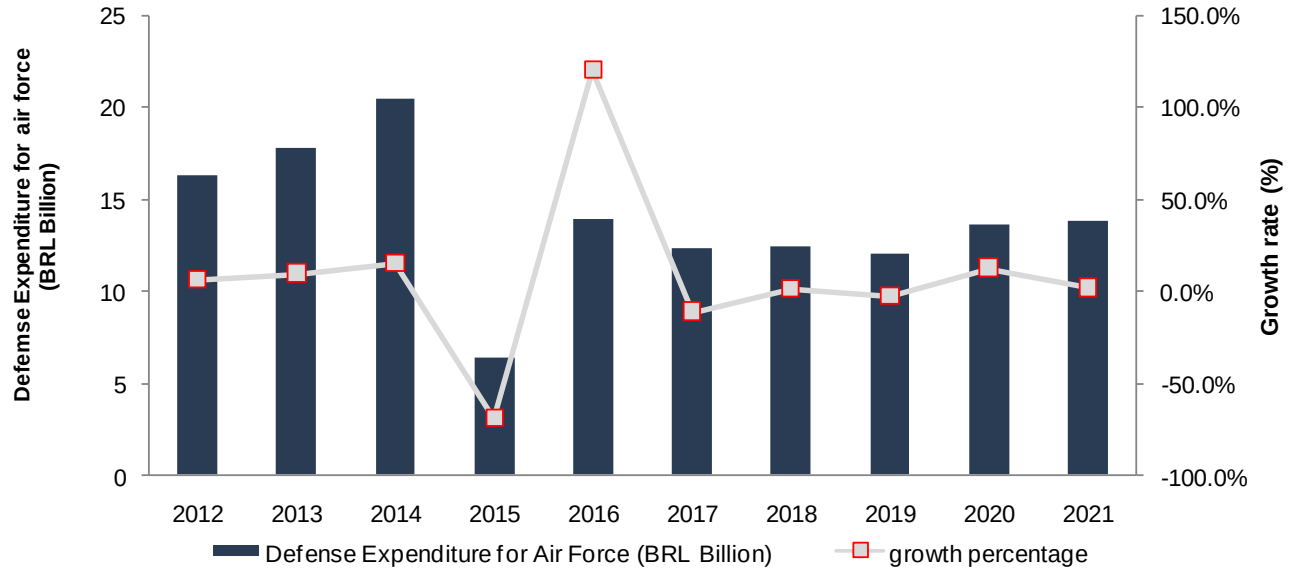
Table 7: Brazilian Defense Expenditure for Air Force (R$ billion & US$ billion), 2012–2021

Year	Air Force Expenditure (R$ bn)	Growth Rate (%)	Air Force Expenditure (US$ bn)	Growth Rate (%)
2012	16.23	5.7%	8.36	-9.4%
2013	17.76	9.4%	8.28	-0.9%
2014	20.45	15.1%	8.74	5.5%
2015	6.32	-69.1%	1.93	-77.9%
2016	13.89	119.7%	4.25	119.7%
2017	12.30	-11.5%	3.76	-11.5%
2018	12.40	0.9%	3.79	0.9%
2019	12.05	-2.9%	3.68	-2.9%
2020	13.55	12.4%	4.14	12.4%
2021	13.76	1.6%	4.21	1.6%
2012–2016	***CAGR (%) R$***	***-3.82%***	***CAGR (%) US$***	***-15.57%***
2017–2021	***CAGR (%) R$***	***2.85%***	***CAGR (%) US$***	***2.85%***

Source: Ministry of Defense, Brazil and SDI analysis ©SDI

The chart below shows the air force expenditure allocation of Brazil in local currency during 2012-2021

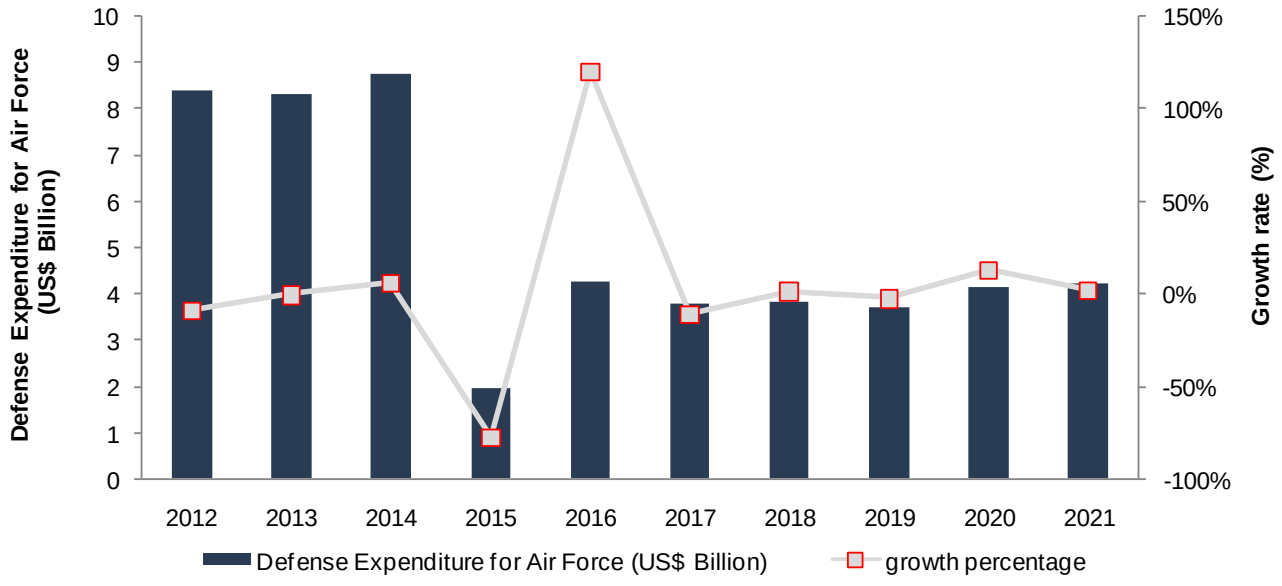
Figure 10: Brazilian Defense Expenditure for Air Force (R$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis © SDI

The chart below shows the air force expenditure allocation of Brazil in US dollars during 2012-2021

Figure 11: Brazilian Defense Expenditure for Air Force (US$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.2.6. Naval expenditure is estimated to register a CAGR of 4.33% over the forecast period

In terms of local currency, navy expenditure is anticipated to reach R$19.74 billion by 2021

Naval expenditure in terms of local currency registered a CAGR of 0.22% between 2012 and 2016, to stand at R$18.25billion in 2016. It is projected that naval expenditure will register a CAGR of 4.33% to value R$19.74billion in 2021.

In terms of US dollars, navy expenditure is estimated to value US$28.12 billion cumulatively during 2017–2021

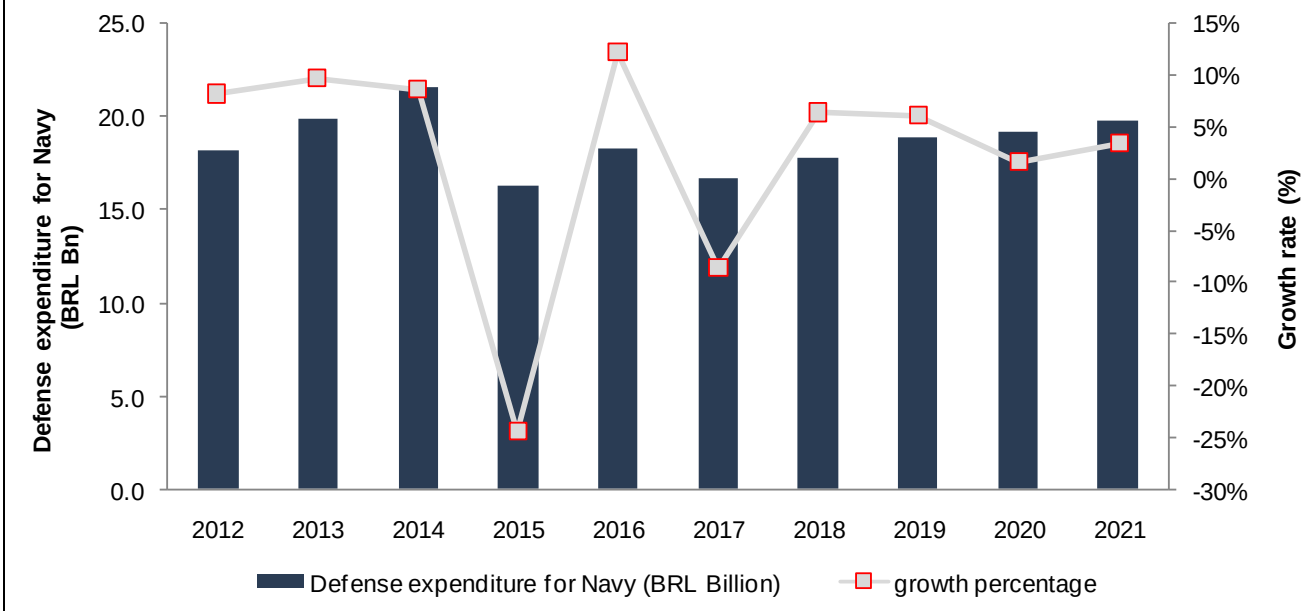
The Brazilian MoD allocated an average of US$7.66 billion to its naval forces during the historic period, and registered a CAGR of -12.03% during 2012–2016. However, the budget is projected to increase at an estimated CAGR of 4.33% to value US$6.03 billion by 2021. The Brazilian government introduced a submarine development program named PROSUB, which aims to design and build four submarines with nuclear propulsion. And also, the navy plans to build a nuclear submarine under the Navy Nuclear Program (PNM). The increase in naval expenditure is also due to the procurement of submarines, frigates, patrol vessels, and among others.

The table below shows the navy expenditure during 2012-2021:

Table 8: Brazilian Defense Expenditure for Navy (R$ billion & US$ billion), 2012–2021				
Year	Navy Expenditure (R$ bn)	Growth Rate (%)	Navy Expenditure (US$ bn)	Growth Rate (%)
2012	18.09	8.1%	9.31	-7.4%
2013	19.82	9.6%	9.24	-0.8%
2014	21.52	8.6%	9.20	-0.4%
2015	16.28	-24.4%	4.98	-45.9%
2016	18.25	12.1%	5.58	12.1%
2017	16.67	-8.7%	5.09	-8.7%
2018	17.71	6.3%	5.41	6.3%
2019	18.78	6.0%	5.74	6.0%
2020	19.09	1.6%	5.83	1.6%
2021	19.74	3.4%	6.03	3.4%
2012–2016	***CAGR (%) R$***	***0.22%***	***CAGR (%) US$***	***-12.03%***
2017–2021	***CAGR (%) R$***	***4.33%***	***CAGR (%) US$***	***4.33%***
Source: Ministry of Defense, Brazil and SDI analysis		©SDI		

The chart below shows the navy expenditure in local currency during 2012-2021:

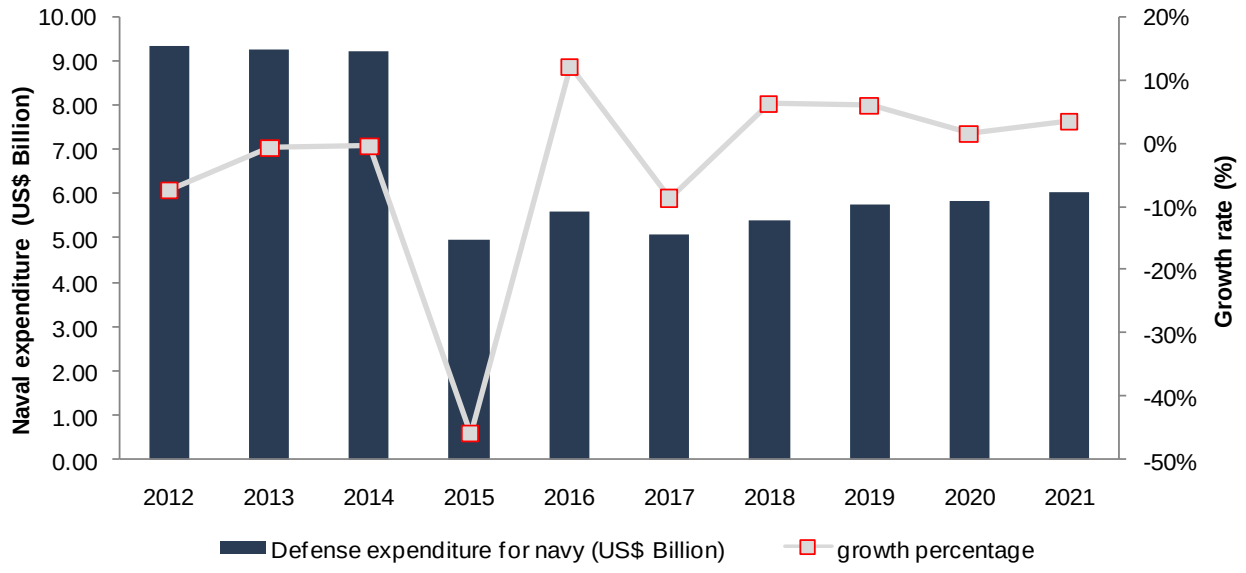
Figure 12: Brazilian Defense Expenditure for Navy (R$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis © SDI

The chart below shows the navy expenditure in US dollars during 2012-2021:

Figure 13: Brazilian Defense Expenditure for Navy (US$ Billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.2.7. Other category allocation is expected to increase over the forecast period

In terms of local currency, the other category expenditure is anticipated to reach R$2.31 billion by 2021

Other category expenditure in terms of local currency registered a CAGR of 0.68% between 2012 and 2016, to stand at R$2.15 billion in 2016. It is projected that other category expenditure will register a CAGR of 4.63% to value R$2.31 billion in 2021.

In terms of US dollars, the other category expenditure is estimated to value US$3.29 billion cumulatively during 2017–2021

The other category services of the Brazilian MoD include force account, commission secretariat for marine resources, ordnance industry, and Osorio foundation and among others. During the historic period, the other category budget was valued at US$1.08 billion in 2012 and decreased to US$0.66 billion in 2016 at a CAGR of -11.62%. However, during the forecast period, this value is expected to increase further at a CAGR of 4.63%, to reach US$0.71 billion in 2021. The gradual increase in expenditure of other category can be attributed to the number of training programs that are to be executed over the forecast period.

The table below shows the other category expenditure over the period 2012-2021:

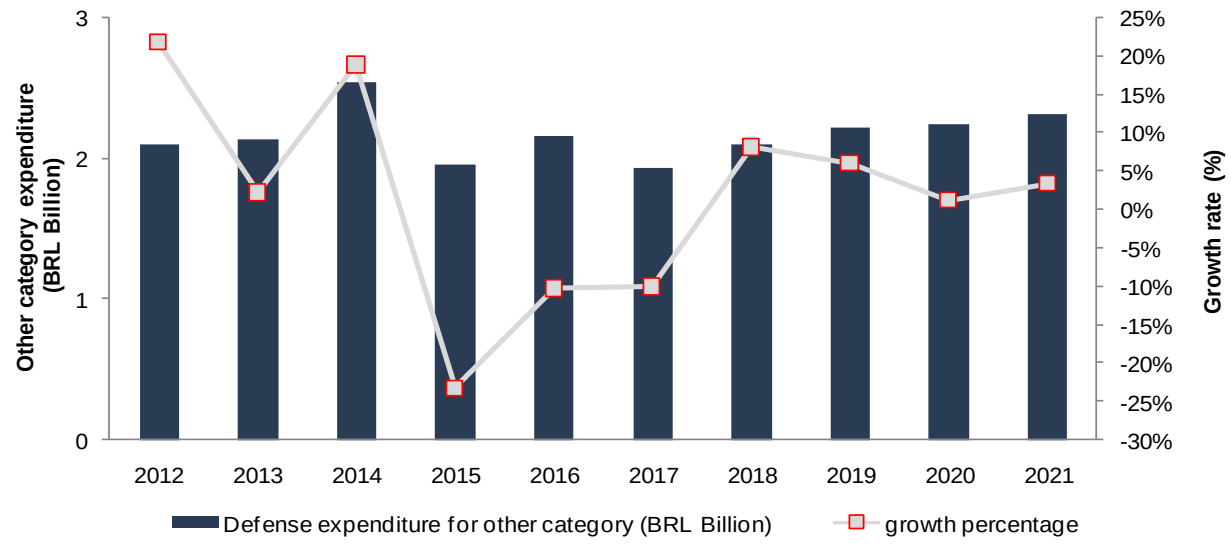
Table 9: Brazilian Other Category Expenditure (R$ billion& US$ billion), 2012–2021

Year	Other Category expenditure (R$ bn)	Growth Rate (%)	Other Category expenditure (US$ bn)	Growth Rate (%)
2012	2.09	21.8%	1.08	4.4%
2013	2.13	2.2%	0.99	-7.5%
2014	2.54	18.9%	1.08	9.0%
2015	1.95	-23.3%	0.59	-45.1%
2016	2.15	-10.3%	0.66	10.3%
2017	1.93	-10.1%	0.59	-10.1%
2018	2.09	8.1%	0.64	8.1%
2019	2.21	6.0%	0.68	6.0%
2020	2.24	1.2%	0.68	1.2%
2021	2.31	3.4%	0.71	3.4%
2012–2016	***CAGR (%) R$***	***0.68%***	***CAGR (%) US$***	***-11.62%***
2017–2021	***CAGR (%) R$***	***4.63%***	***CAGR (%) US$***	***4.63%***

Source: Ministry of Defense, Brazil and SDI analysis ©SDI

The chart below shows the other category expenditure in local currency over the period 2012-2021:

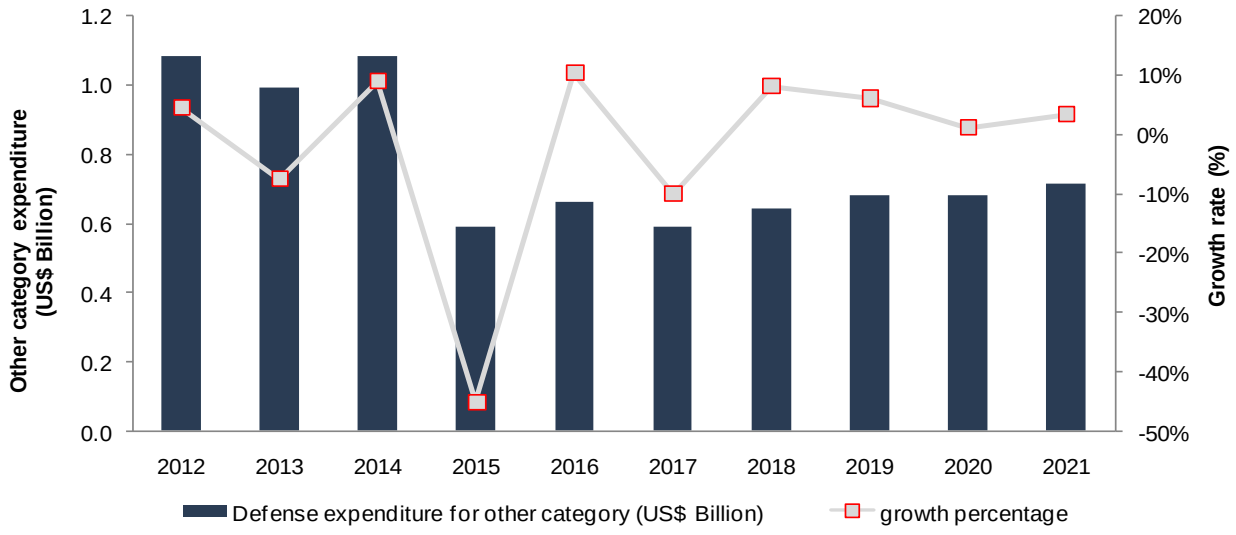
Figure 14: Brazilian Defense Expenditure for other category (R$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis © SDI

The chart below shows the other category expenditure of Brazil in US dollars during 2012-2021:

Figure 15: Brazilian Defense Expenditure for other category (US$ Billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis © SDI

3.2.8. The Brazilian Per-capita defense expenditure to increase during the forecast period

The Brazilian per-capita defense expenditure decreased from US$171.5 in 2012 to US$93.6 in 2016, and recorded a CAGR of -14.04% during the historic period. The country's population is expected to increase at a CAGR of 0.69% over the forecast period, and overall defense expenditure is estimated to grow at a CAGR of 4.08%. As a result, per capita defense expenditure is estimated to register a CAGR of 3.37%, to reach US$96.2 by 2021, from US$84.3 in 2017.

The following table shows the Brazilian per capita defense spending during 2012-2021:

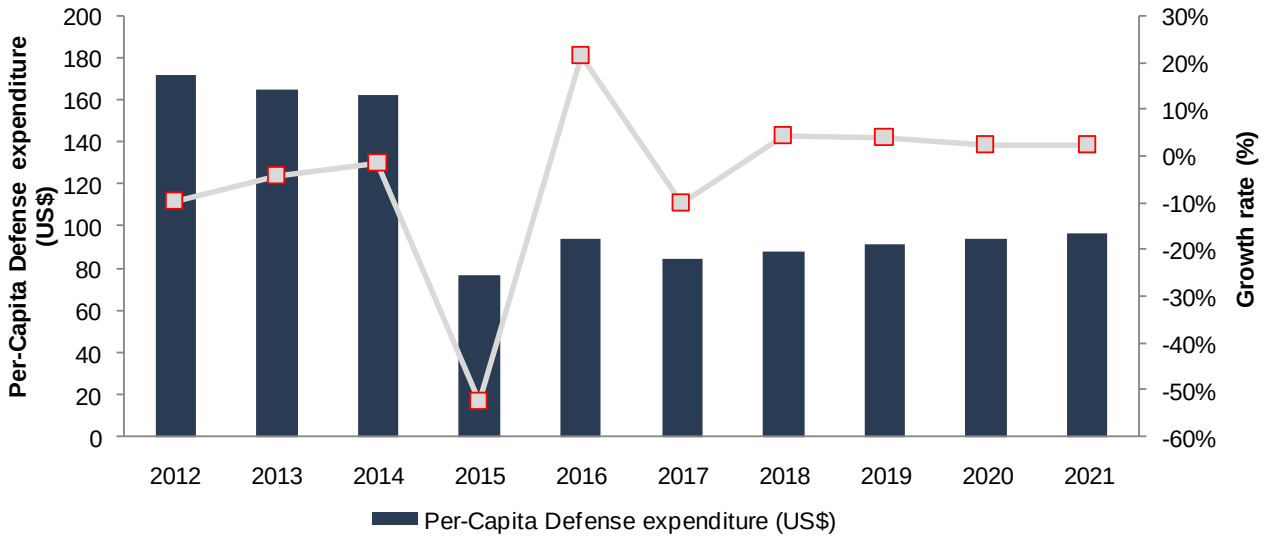
Table 10: Brazilian Per Capita Defense Expenditure (US$), 2012–2021

Year	Per capita defense expenditure (US$)	Growth rate (%)
2012	171.5	-9.7%
2013	164.4	-4.2%
2014	162.0	-1.4%
2015	77.1	-52.4%
2016	93.6	21.5%
2017	84.3	-10.0%
2018	88.0	4.5%
2019	91.6	4.1%
2020	93.9	2.5%
2021	96.2	2.4%

Source: MoD, Brazil and SDI analysis © SDI

The following chart shows the Brazilian per capita defense spending during 2012-2021:

Figure 16: Brazilian Per Capita Defense Expenditure (US$), 2012–2021



Source: MoD, Brazil and SDI analysis

3.3. Homeland Security Market Size and Forecast

3.3.1. Homeland Security market in Brazil is expected to grow at a CAGR of 3.97% during the forecast period

In terms of local currency, Homeland security expenditure is expected to reach R$15.78 billion by 2021

In terms of local currency, the homeland security budget values R$12.73 billion in 2016 and registered a CAGR of 2.29% during the historic period. Moreover, it is projected to value R$15.78 billion by 2021, registering a CAGR of 3.97% during 2017–2021.

In terms of US dollars, Homeland security expenditure is forecast to value US$22.35 billion cumulatively during 2017–2021

The Brazilian MoD allocated US$3.89 billion in 2016, registering a CAGR of -10.21% during the historic period. Furthermore, the homeland security expenditure is expected to increase at a CAGR of 3.97% during the forecast period to value US$4.82 billion in 2021. The Brazilian government is expected to cumulatively spend US$22.35 billion on its homeland security (HLS) market over the forecast period, which will be directed towards border protection, security spending for world sporting events, and protection against illegal immigration and drug trafficking.

The table below shows the Brazilian homeland security expenditure during 2012-2021:

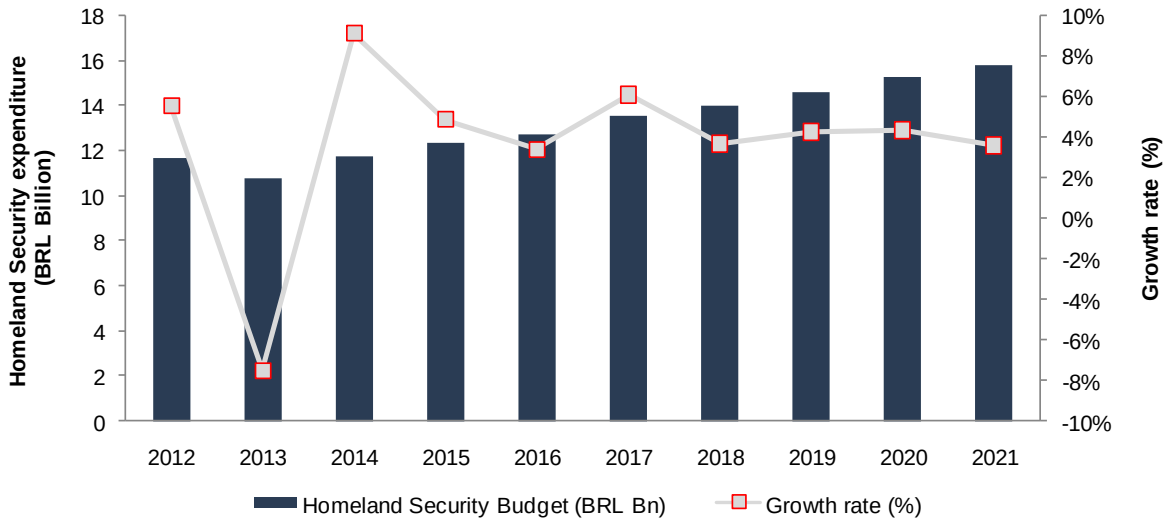
Table 11: Brazilian Homeland Security Expenditure (R$ billion& US$ billion), 2012–2021

Year	Defense expenditure (R$ bn)	Growth Rate (%)	Defense expenditure (US$ bn)	Growth Rate (%)
2012	11.63	5.54%	5.99	-9.55%
2013	10.76	-7.48%	5.02	-16.23%
2014	11.74	9.11%	5.02	0.02%
2015	12.31	4.86%	3.76	-25.00%
2016	12.73	3.41%	3.89	3.41%
2017	13.51	6.09%	4.13	6.09%
2018	14.00	3.67%	4.28	3.67%
2019	14.60	4.27%	4.46	4.27%
2020	15.23	4.35%	4.66	4.35%
2021	15.78	3.59%	4.82	3.59%
2012–2016	***CAGR (%) R$***	***2.29%***	***CAGR (%) US$***	***-10.21%***
2017–2021	***CAGR (%) R$***	***3.97%***	***CAGR (%) US$***	***3.97%***

Source: Ministry of Defense, Brazil and SDI analysis ©SDI

The chart below shows the homeland security expenditure of Brazilian local currency during 2012-2021:

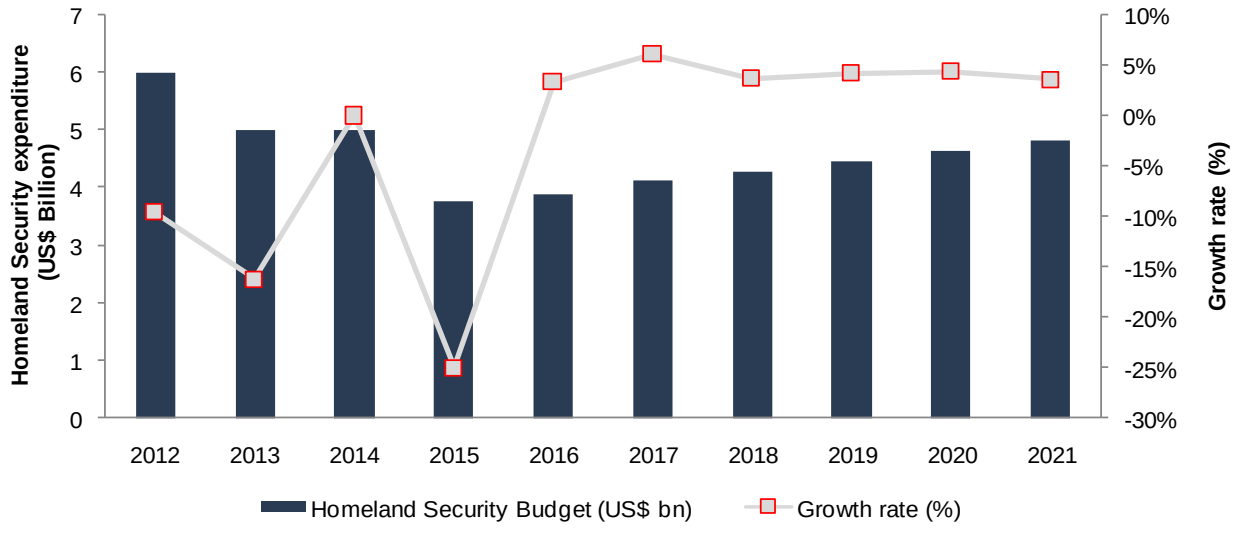
Figure 17: Brazilian Homeland Security Expenditure (R$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis © **SDI**

The chart below shows the homeland security expenditure of Brazil in US dollars during 2012-2021:

Figure 18: Brazilian Homeland Security Expenditure (US$ billion), 2012–2021



Source: Ministry of Defense, Brazil and SDI analysis

3.3.2. Brazilian sporting events will be the key factor driving homeland security

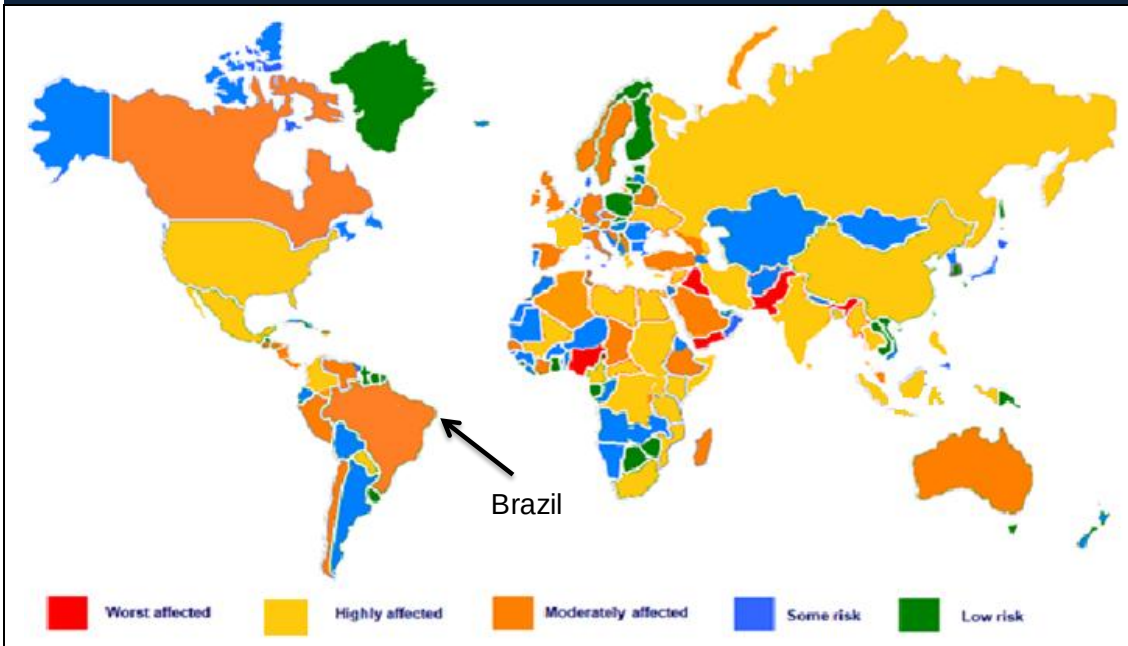
Brazil's ambitious international sporting events are anticipated to boost the country's spending on homeland security during the forecast period. Due to the Summer Olympics in 2016, Brazilian homeland security recruited a large number of security personnel, in order to enhance internal security during these events. Significant investment in command and control centers, training, and security equipment such as mobile police stations, boats, cameras, anti-bomb systems, video-walls, radio communications, media intelligence monitoring, video-monitoring, and cyber security software drives the homeland security market in the near future. The country established SESGE (Secretariat for the Security of Big Events) in 2011 to combine law enforcement agencies and develop a trained and technologically equipped security force to be responsible for security services at major events. Additionally, the government deploys 3,000 and 5,000 soldiers in each of the 12 host cities during the 2016 Rio Olympics. Technologically advanced equipment will be employed by these forces and the Brazilian police department, including multi-use robots, robocop glasses, and others. Brazil is also coordinating with Israeli companies that are seeking opportunities, and is also forming partnerships with domestic manufacturers to provide UAVs and ground control stations. During the forecast period, the country will potentially acquire defense systems such as biometric facial recognition, luggage inspection, explosives detection and identification, perimeter defense, and security planning and management in preparation for this major international event.

3.3.3. Brazil falls under "moderately affected" category in the terrorism index

The Brazil falls under the 'moderately affected' category in the SDI Terrorism Index. Despite its vast geography, the country has low threat to homeland security from terrorist organizations and has not experienced any terrorist attacks. Through the utilization of extensive radar systems, the country's Amazon Protection System actively monitors and protects the region from drug trafficking, illegal mining, and deforestation.

The following figure shows the heat map based on the SDI Terrorism Index, which displays the threat level faced by countries across the world:

Figure 19: SDI Terrorism Heat Map, 2016



Source: SDI Terrorism Index

3.3.4. Brazil faces very low threats from terrorist organizations

According to the SDI Research Terrorism Index, Iraq, Pakistan, Afghanistan, India, and Yemen are the worst affected countries by terrorism in the world. Brazil ranked seventy four in the overall terror prone countries ranking, with the terrorism score of 2.2.

The following table shows the terrorism score and the respective country along with its rank:

Table 12: SDI Terrorism Index, 2016

Rank	Country	Index Score
1	Iraq	10.0
2	Afghanistan	9.2
3	Nigeria	9.2
4	Pakistan	9.1
5	Syria	8.1
6	India	7.7
7	Yemen	7.6
8	Somalia	7.6
9	Libya	7.3

Table 12: SDI Terrorism Index, 2016		
Rank	**Country**	**Index Score**
10	Thailand	7.3
11	Philippines	7.3
12	Ukraine	7.2
13	Egypt	6.8
14	Central African Republic	6.7
15	South Sudan	6.7
16	Sudan	6.7
17	Colombia	6.7
18	Kenya	6.7
19	Democratic Republic of the Congo	6.5
20	Cameroon	6.5
21	Lebanon	6.4
22	China	6.3
23	Russia	6.2
24	Israel	6.0
25	Bangladesh	5.9
26	Mali	5.9
27	Turkey	5.7
28	UK	5.6
29	Greece	5.0
30	Uganda	4.9
31	Bahrain	4.9
32	Nepal	4.8
33	Indonesia	4.8
34	Algeria	4.8
35	US	4.6
36	France	4.6
37	Mozambique	4.4
38	South Africa	4.2
39	Iran	4.2
40	Paraguay	4.1
41	Myanmar	4.1
42	Sri Lanka	4.1
43	Saudi Arabia	4.0
44	Mexico	4.0
45	Tanzania	4.0
46	Chile	4.0
47	Tunisia	3.7
48	Ireland	3.7
49	Malaysia	3.6

Table 12: SDI Terrorism Index, 2016		
Rank	**Country**	**Index Score**
50	Ethiopia	3.5
74	Brazil	2.2

Index score classification: >8 - Worst affected, between 7 and 4 - Highly affected, between 3.9 and 2.0 - Moderately affected, between 1.9 and 0.1 - Some risk, and <0.1 - Low risk

Source: SDI Terrorism Index

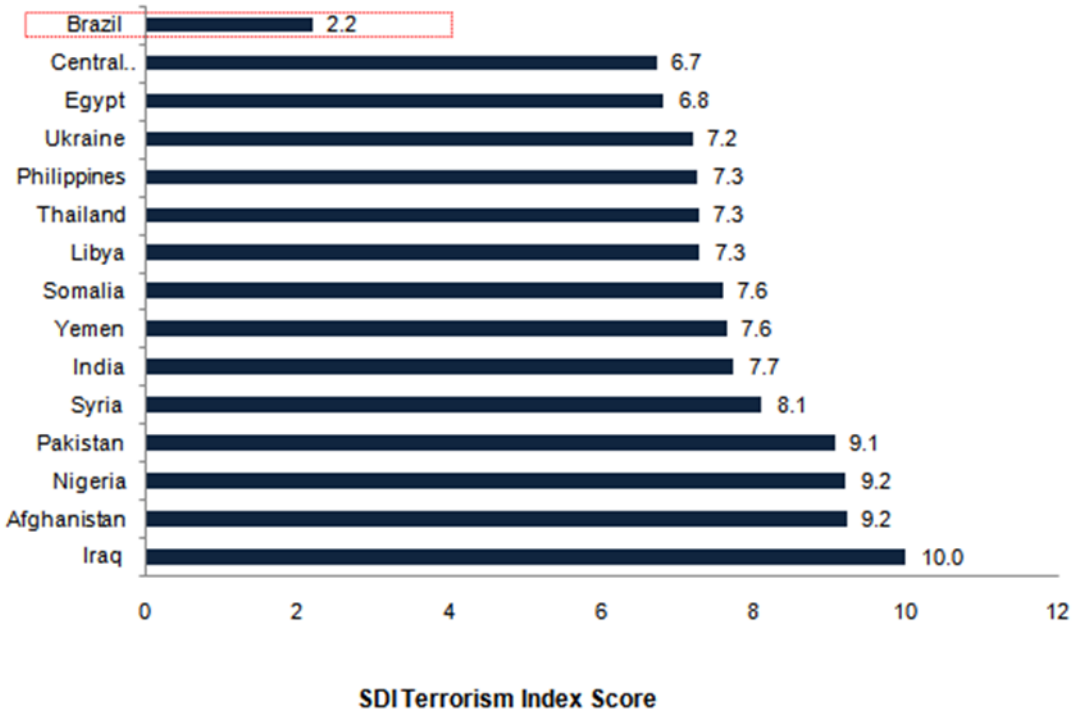
3.3.5. Brazil has a terrorism index score of 2.2

The terrorism index is calculated on the basis of the following factors:

- The number of terror attacks that the country has faced
- The total number of people victimized
- The number of foreign terrorist organizations operating in the country

The following is the SDI terrorism index score which displays the threat level faced by countries across the globe:

Figure 20: SDI Terrorism Index, 2016



Index score classification: >8 - Worst affected, between 7 and 4 - Highly affected, between 3.9 and 2.0 - Moderately affected, between 1.9 and 0.1 - Some risk, and <0.1 - Low risk

Source: SDI Terrorism Index

3.4. Benchmarking with Key Global Markets

3.4.1. Brazil ranks among major Global Defense Markets

With a defense budget of US$19.3 billion in 2016, Brazil is expected to remain among the top spenders in the world. Compared to Latin American countries, Brazil's defense budget is higher than Mexico, Venezuela, Argentina, and Chile. Despite the economic slowdown, the country's presence in the global defense market will continue to increase significantly over the forecast period. However, the US and China are expected to be the largest defense spenders over the forecast period. Brazilian military spending is expected to register a CAGR of 4.08%over the forecast period to value US$20.5 billion in 2021.

The figure below benchmarks the growth of the Brazilian defense budget with other key markets:

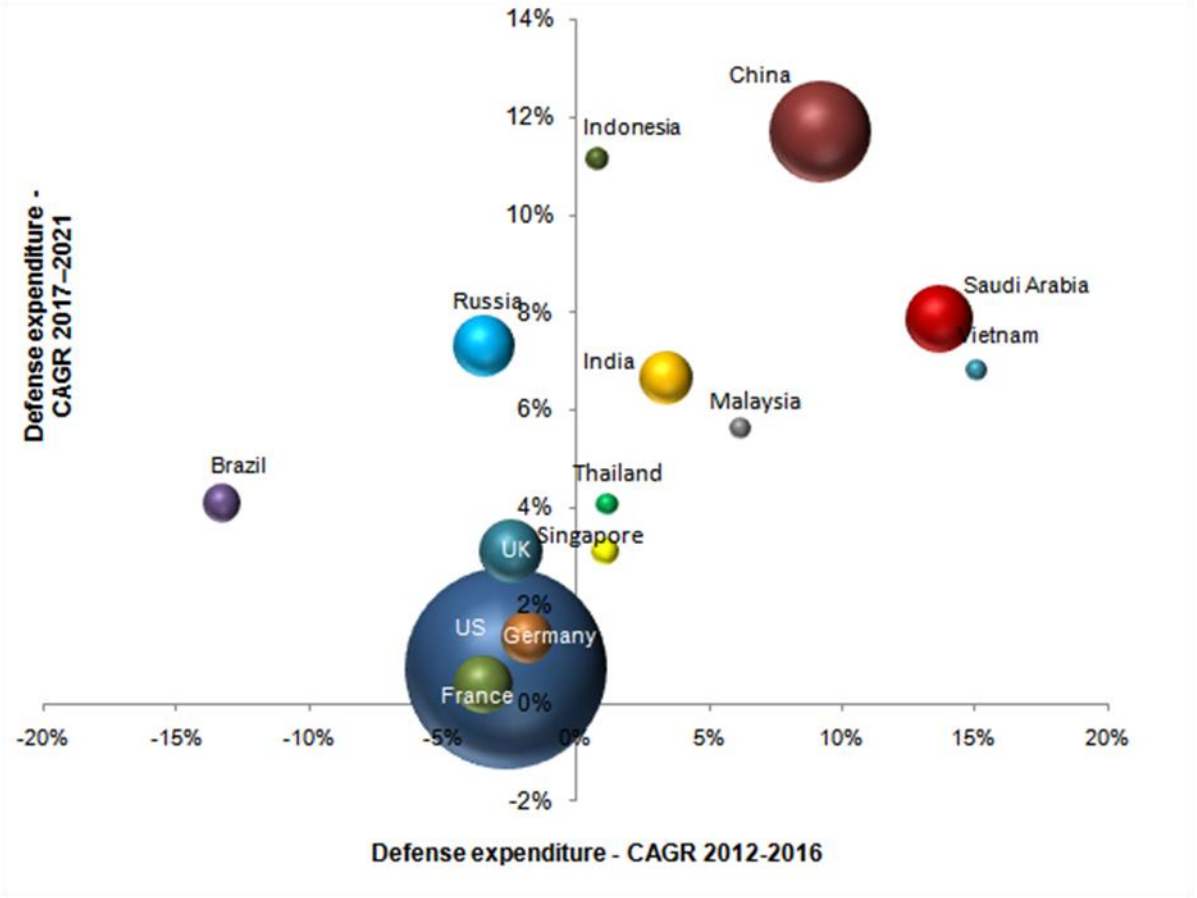
Table 13:Benchmarking with Key Markets – 2012–2016 vs. 2017–2021

Country	CAGR 2012–2016	CAGR 2017–2021	Budget in 2016(US$ Billions)
US	-2.63%	0.71%	580
China	9.23%	11.69%	146
Saudi Arabia	13.68%	7.83%	63
UK	-2.42%	3.09%	54
Russia	-3.46%	7.28%	52
France	-3.48%	0.38%	47
India	3.41%	6.65%	39
Germany	-1.82%	1.34%	38
Brazil	-13.31%	4.08%	19
Singapore	1.10%	3.10%	10
Malaysia	6.20%	5.60%	6
Vietnam	15.10%	6.80%	6
Thailand	1.19%	4.06%	6

Source: SDI analysis © SDI

The figure below benchmarks the growth of the Brazilian defense budget with key global markets:

Figure 21: Benchmarking with Key Markets, 2012–2016 vs. 2017–2021



Note: Bubble size represents 2016 defense expenditure (US$ billions)

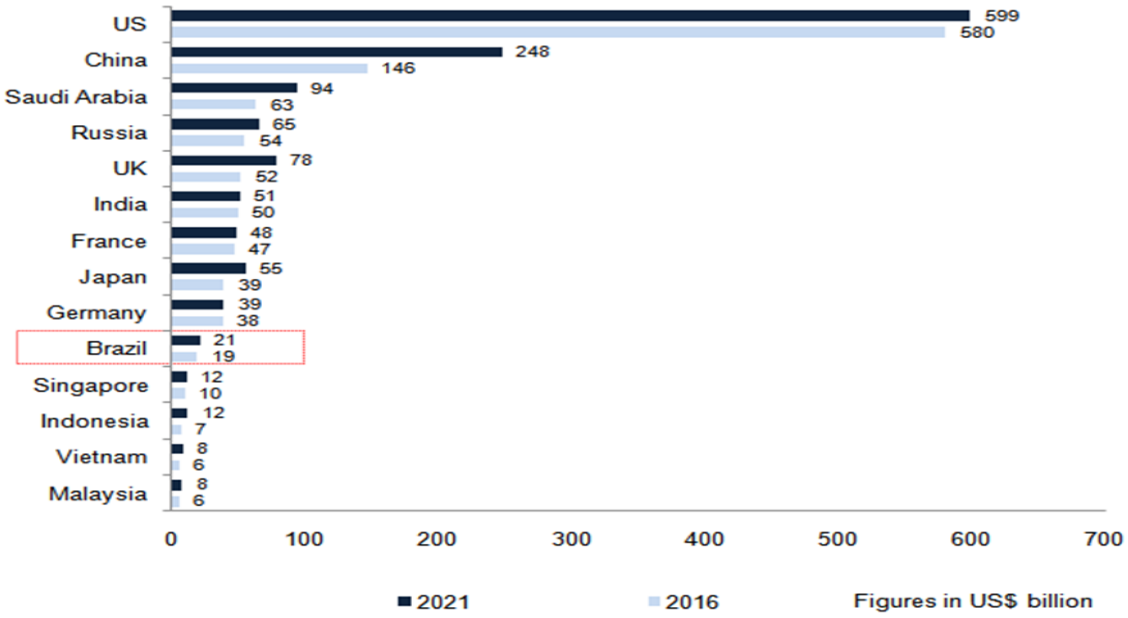
Source: SDI analysis

3.4.2. Brazils expected to remain among top defense spending countries in the world

While the US and China dominate the global defense industry, with defense budgets of US$580 billion and US$146billion, respectively in 2016, Brazil maintains a significant presence in the international arms market. The Brazilian defense budget is expected to grow at a CAGR of 4.08% from 2017–2021 and is expected to value US$21 billion by 2021.

The following figure shows the top defense-spending countries in 2016 and those expected in 2021:

Figure 22: Defense Expenditure of the World's Largest Military Spenders (US$ billion),2016 and 2021



Note: Figures are rounded off to zero decimal places

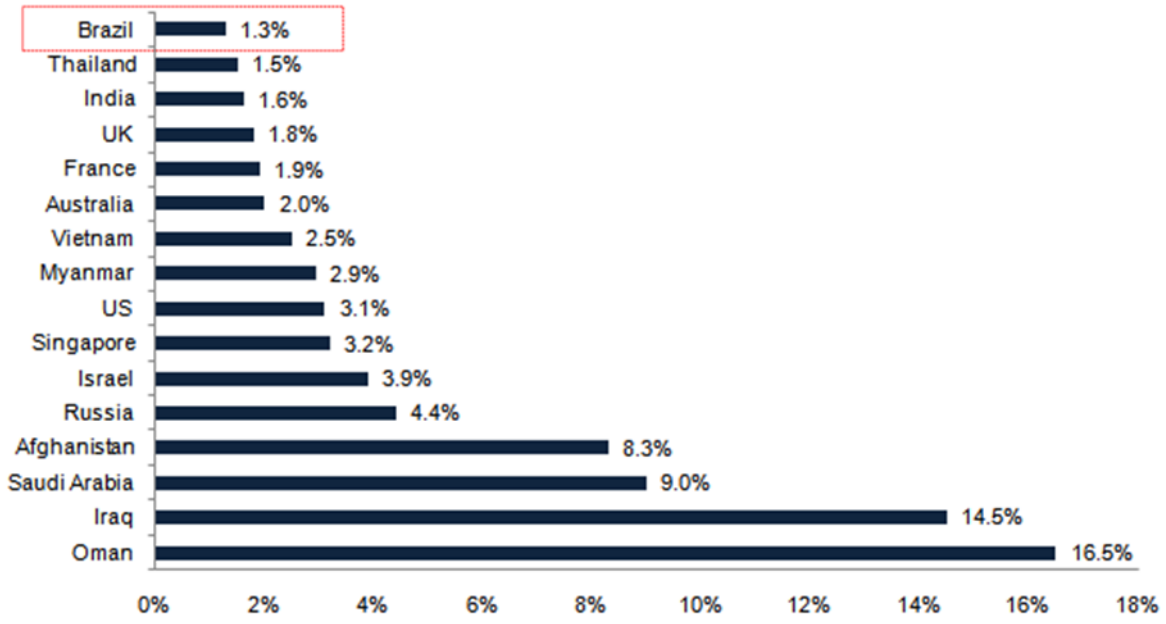
Source: SDI analysis

3.4.3. Brazil is expected to spend an average of 1.14% of its GDP on defense over the forecast period

As a percentage of GDP, Brazilian defense expenditure stood at 1.3% during 2016. While this is a smaller percentage than the US, India, Russia, and China, it is however higher than the other regional spenders such as the Mexico, Chile, and Argentina. During 2017-2021, Brazilian defense expenditure as a percentage of GDP is expected to hover around 1.14% on average.

The chart shows the Brazilian defense expenditure as a percentage of GDP compared with leading defense spending nations:

Figure 23: Defense Expenditure as a Percentage of GDP of Largest Military Spenders (%), 2016



Source: SDI analysis

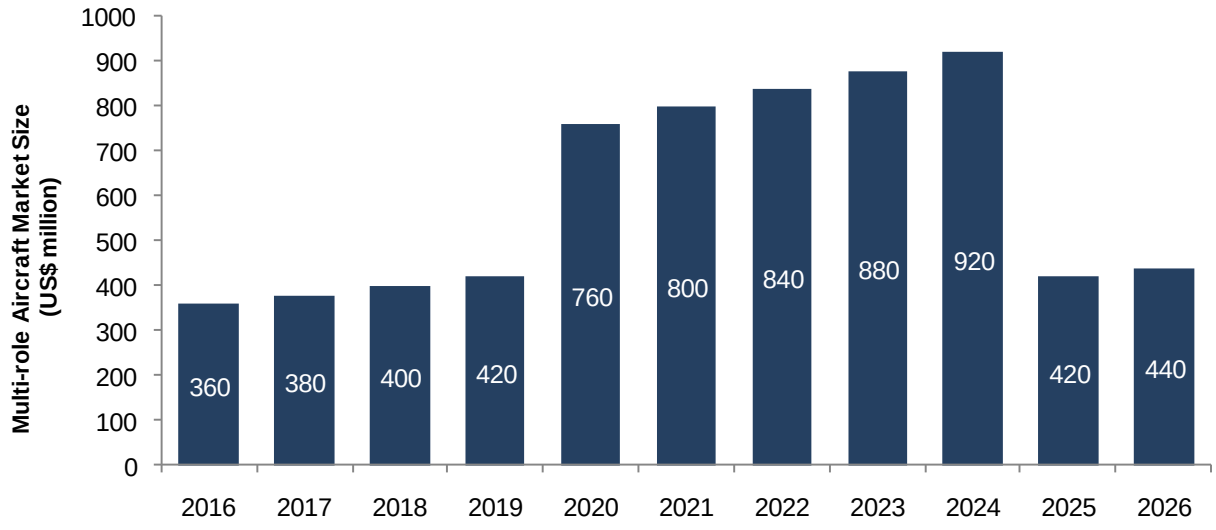
3.5. Market Opportunities: Key Trends and Drivers

3.5.1. Multi-role aircraft

The Brazilian government is primarily expected to spend on the procurement of multi-role aircraft. The key factors driving military aircraft procurement in the region are the need to maintain a well-equipped army to protect the Amazon rainforests, police drug trafficking in the region, and the need to protect the country's natural resources. Moreover, an escalating arms race in the region, which has seen countries such as Venezuela, Chile, Colombia, and Peru investing heavily in modernizing their armed forces, has propelled Brazil to contribute to the growth of the military aircraft market. Under the FX-2 program, in December 2013, the Brazilian Air Force contracted SAAB to supply 36 Gripen NG fighter jets, worth US$4.5 billion, to replace its aging fleet of Mirage 2000's until2023.Furthermore, the Brazilian Air Force (FAB) has a contract with Embraer to provide logistical support to its fleet of 92 A-29 Super Tucano, under a US$126 million deal anticipated to be complete in 2018. Brazil is planning to develop its advanced military aircraft manufacturing industry with the technology transfers involved in this deal.

The chart below shows multi-role aircraft market size in Brazil (US$ Million) during 2016 -2026:

Figure 24: Multi-role Aircraft Market Size (US$ Million), 2016–2026



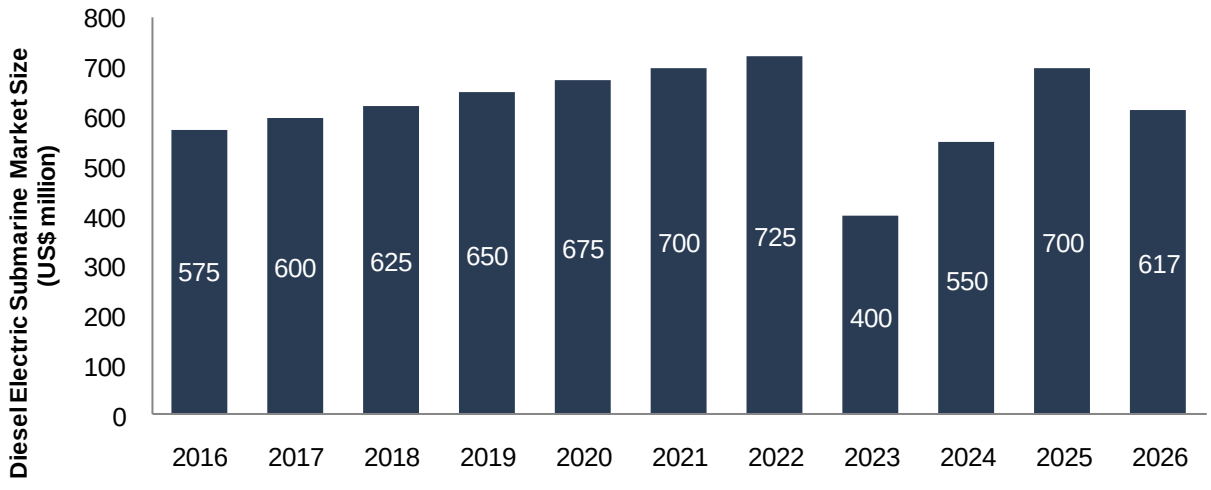
Source: SDI analysis

3.5.2. Diesel Electric Submarine

Despite its recent budget cuts, the Brazilian government is planning to build four diesel electric submarines to guard the country's 7,491km coastline and secure its offshore oil reserves. Brazil is spending extensively on the design and manufacture of conventional and nuclear submarines, with assistance from France. The main aim to build submarines in Brazil is to increase the domestic industry which in turn creates employment in the country. In 2009, Brazil and France signed an agreement to build four Scorpene design diesel-electric submarines (SSK) under a US$9.9 billion program, and France is additionally to provide assistance in developing and fielding the non-nuclear parts of the nuclear fast attack submarine (SSN).The new shipbuilding facility set up will manufacture its first diesel submarine by 2015, and its first nuclear submarine to be commissioned in 2023 and enter service in 2025. The Brazilian manufacturer, Odebrecht, will partner with French shipbuilder DCNS under a joint venture to manufacture at the facility located at Rio de Janeiro. The contract also includes technology transfer, which is pivotal to Brazil's capabilities of manufacturing a nuclear submarine. The first submarine Riachuelo will be commissioned in 2015 and the remaining three are to follow throughout the decade. The total market for submarines in Brazil is estimated at US$575 million in 2016, which is expected to increase at a CAGR of 0.7% during the forecast period, to reach US$617 million in 2026.

The chart below shows the diesel electric submarine market size in Brazil (US$ million) during 2016 -2026:

Figure 25: Diesel Electric Submarine Market Size (US$ Million), 2016 –2026



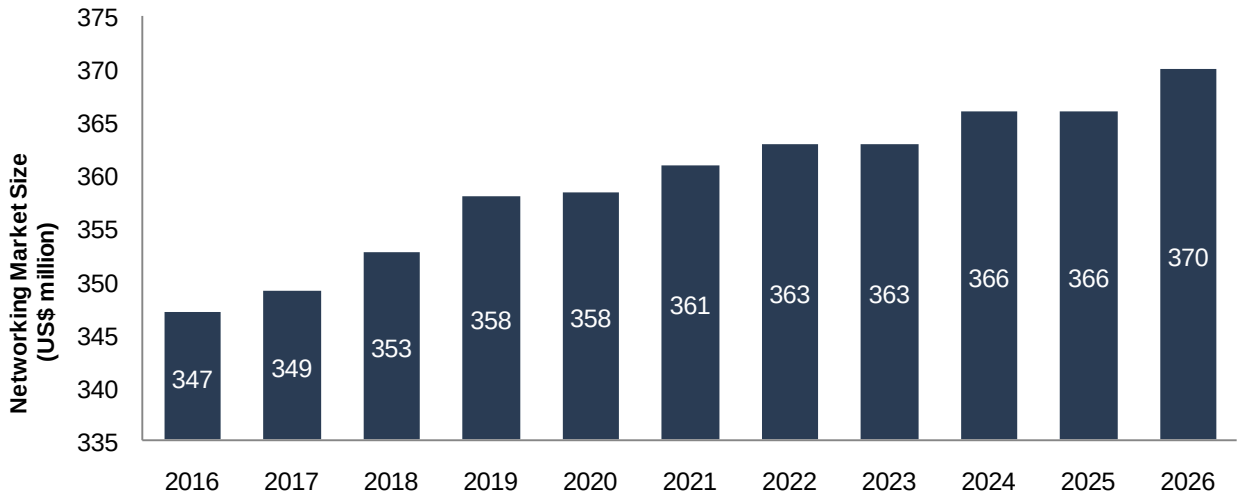
Source: SDI analysis

3.5.3. Military IT –Networking

Brazil is the highest spender on military IT, data and computing in the region, followed by Venezuela, Chile, Mexico, and Peru. Brazil represents the largest defense market in the Latin American region as a consequence of undertaking defense modernization programs and surveillance projects such as System for the surveillance of the Frontier (SISFRON) and a system for surveillance of Blue Amazon called SISGAAZ. The majority of expenditure is anticipated to be directed towards the COBRA (Combatente Brasileiro) and SISFRON program. These programs are designed to expand the capacity in the areas of communication, lethal capability, protection, survivability, mobility, and observation. The country has also undertaken military modernization programs and is expected to allocate a substantial portion of its budget to the procurement of computer hardware and software, and networking products to upgrade or retrofit its existing equipment. Moreover, the country has been increasing its defense budget at a robust pace as it aims to develop a self-sufficient domestic defense industry and replace its fleet of aging defense systems. The Brazilian government currently faces a pressing need to address various security challenges in the Amazon, ranging from drug and human trafficking to a spillover of guerilla activity in neighboring countries. In an effort to combat these threats, the MoD is expected to spend significantly on military IT networking.

The chart below shows the military IT−networking market size in Brazil (US$ million) during 2016-2026:

Figure 26: Military IT-Networking Market Size (US$ Million), 2016 –2026



Source: SDI analysis

4. Defense Procurement Market Dynamics

Brazil relies on imports and has allocated significant funds for the procurement of fighters under the fourth-generation FX-2 program in order to modernize its aging fleet of aircraft. During 2011–2015, Germany, the US, France, and Israel are the major suppliers of its arms imports to Brazil. The country primarily imports aircraft, armored vehicles, ships, and sensors. Brazil's defense industry is still in its development stage, and defense exports are limited to a few neighboring countries and less developed nations such as Angola, Ecuador, Bolivia, Mozambique, among others. The country primarily exports aircraft, artillery, and missiles. However, defense exports registered an increasing trend during 2011–2015.

Please note, the following figures in this section are based on Trend Indicator Values (TIV) expressed in US$ million at constant (1990) prices. Although figures are expressed in US$, TIVs do not represent the financial value of goods transferred. Rather, TIVs are an indication of the volume of arms transferred.

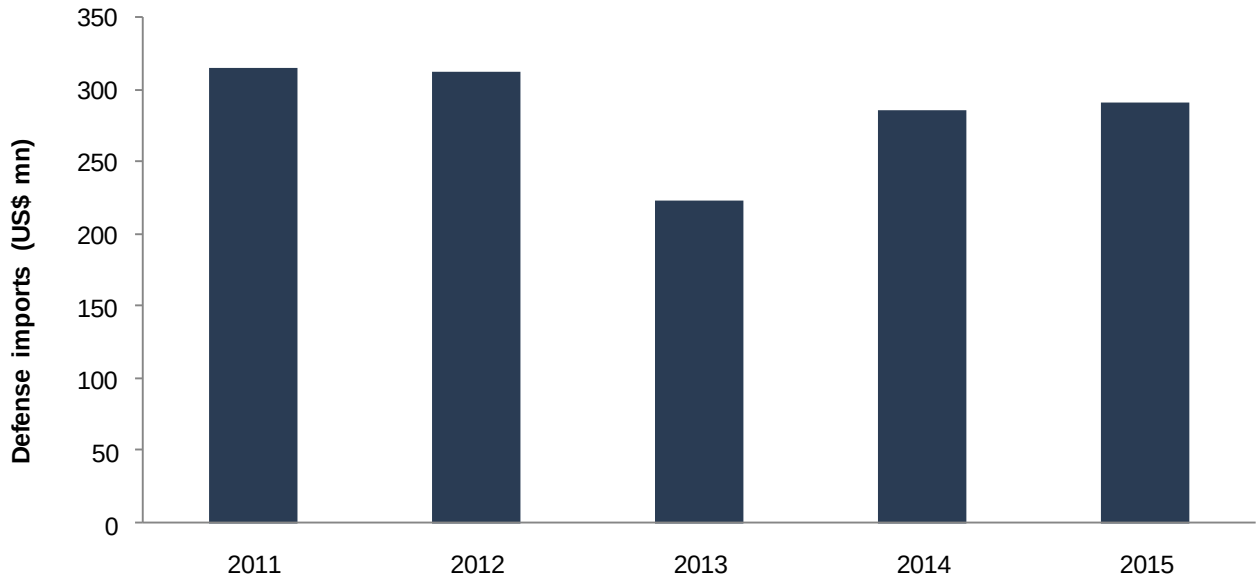
4.1. Import Market Dynamics

4.1.1. Modernization of defense systems expect to drive arms imports

Brazil relies on imports and has allocated significant funds for the procurement of fighters under the fourth-generation FX-2 program, in order to modernize its aging fleet of aircraft. During the historic period, the country's defense imports were the highest in 2012. Aircraft and armored vehicles dominated imports during this period, with Germany and the US being the main suppliers. In order to protect its oil rich reserves in the Amazon basin, Brazil is spending heavily on naval vessel procurements during the review and forecast period. Brazil has contracted the French defense company DCNS, to supply four diesel-electric-powered submarines, based on the Scorpene model. Throughout the historic period, Brazil also procured missile systems, which included anti-ship, anti-submarine, and beyond visual range missiles, from Israel, the US, and Spain. The country is also expected to spend significantly on the import of UAVs, patrol vessels, frigate, missiles, satellite communication terminals, long range radars, and armored vehicles, which will increase the overall imports in the country during the forecast period.

The figure below shows the volume of Brazilian arms imports during 2011–2015:

Figure 27: Brazilian Defense Import Trend (US$ Million), 2011–2015 (TIV values*)



Source: SIPRI and SDI analysis

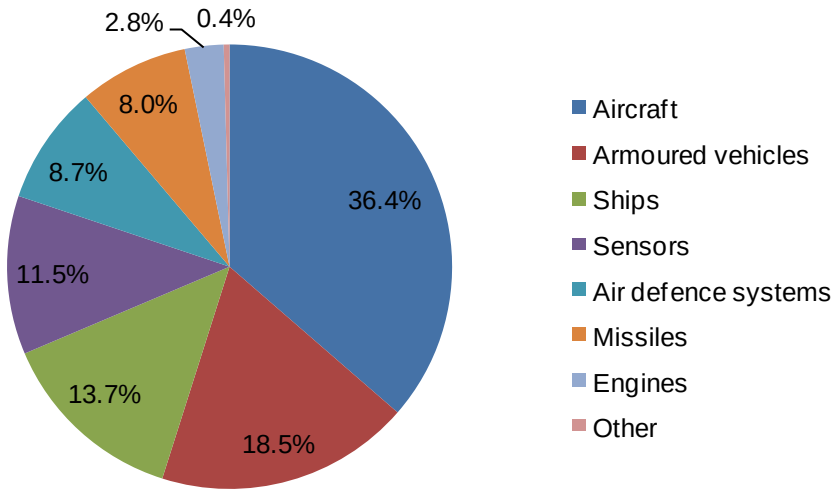
**Please note, the following figures are based on trend indicator values (TIV) expressed in US$ million at constant (1990) prices. Although figures are expressed in US dollars, TIVs do not represent the financial value of goods transferred. Instead, TIVs are an indication of the volume of arms transferred.*

4.1.2. Aircraft and Armored Vehicles accounted for a total share55% in the Brazilian defense imports

Aircraft and armored vehicles accounted for the majority of Brazil's defense imports during 2011–2015, with a share of 55%. Ships, missiles, sensors, engines, and air defense systems are the other major weapon categories in which the country imported equipment from foreign companies, cumulatively accounting for 36.6%. The share of aircraft and armored vehicles were highest due to the ongoing FX-2 acquisition program of the Brazilian Air Force and the procurement of VBTP-MR Guarani 6x6 amphibious armored vehicles. The Brazilian Army is also in plans to procure additional 2,044 units by 2030. Furthermore, the ongoing procurement plans of the Brazilian Navy, consisting of various naval vessels and surface combatants, including patrol vessels, amphibious landing vessels, and submarines, are expected to increase the share of naval vessels in the import category. Additionally, in October 2013, Brazil contracted Russia to supply Pantsir-S1 air defense systems, which will safeguard military facilities against a wide range of low-flying targets. During the forecast period, percentage shares for sensors, armored vehicles, and missiles are expected to grow further, as a result of the various procurement programs initiated by the MoD.

The figure below shows the source of the Brazilian Defense imports by country for 2011–2015:

Figure 28: Brazilian Defense Imports by Category (%), 2011–2015



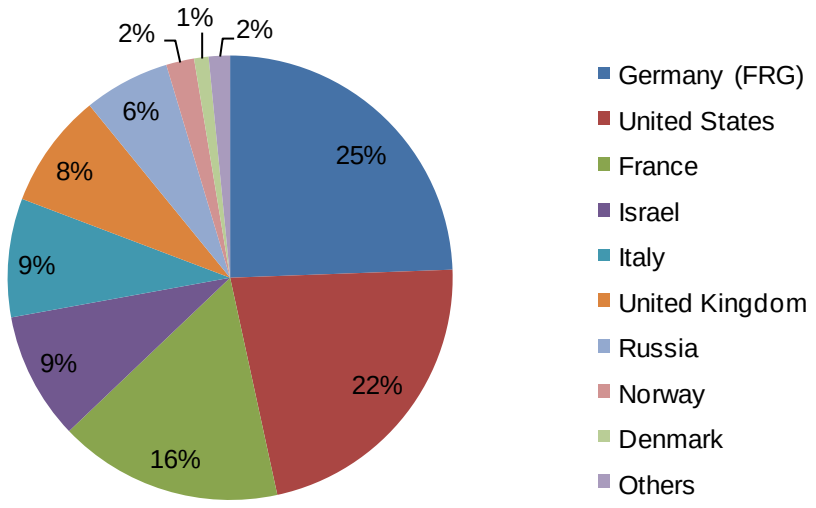
Source: SIPRI and SDI analysis

4.1.3. Germany, the US, and France are the major suppliers for Brazil

Brazil imports the majority of its defense procurements from Germany and the US, cumulatively accounting for 47% of its total defense imports during 2011–2015. Other significant suppliers to the country were France, the UK, and Israel. Over the last ten years, Brazil relied on its arms imports to acquire defense technologies through licensed production, co-production, and joint ventures. In an attempt to reduce the country's dependence on foreign arms, the Brazilian government has provided funding for a number of domestic defense projects. The region's leading aircraft manufacturer, Embraer, has been instrumental in the implementation of a significant number of foreign technology acquisitions. Embraer has developed because of its co-production activities with the Italian company Earache, which manufactures a variety of fighter jet components. The Brazilian defense ministry, in order to modernize its aging aircraft fleet, allocated significant funds for procurement under the fourth-generation FX-2 program fighters. In December 2013, a contract worth US$4 billion was signed with Saab to procure 36 Gripen fighter aircraft. Furthermore, during the forecast period, the development of domestically manufactured air transport and refueling aircraft KC-390 is expected to generate demand for the import of engines and navigation systems from foreign manufacturers. The Brazilian Air Force (FAB) has contracted with International Aero Engines (IAE) to supply V2500-E5 engine power plants for the KC-390 transport aircraft.

The figure below shows the Brazilian defense imports by category for 2011–2015:

Figure 29: Brazilian Defense Imports by Country (%), 2011–2015



Source: SIPRI and SDI analysis

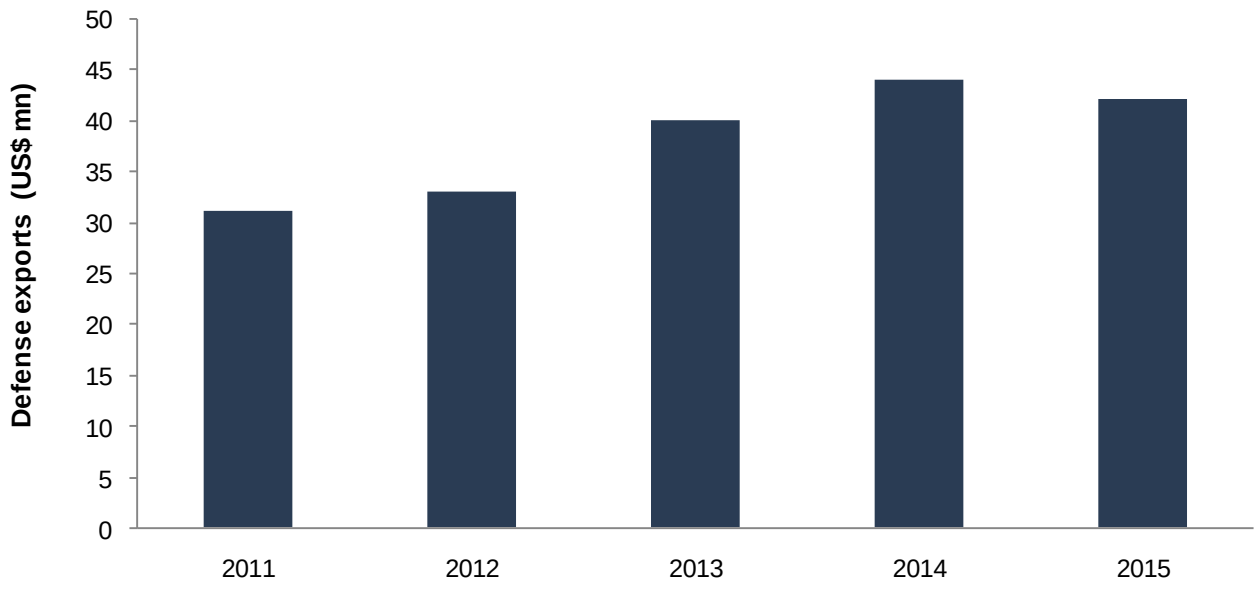
4.2. Export Market Dynamics

4.2.1. Development of domestic defense capability is expected to fuel exports in Brazil's emerging military industry

Brazil's defense industry is still in its early development stage, and defense exports are limited to a few neighboring countries and less developed nations such as Argentina, Chile, Columbia, and the Czech Republic. During the 1980s, Brazil's exports were higher than its imports, which were supported by the demand for high-quality and low-cost defense systems in developing countries. However, intense competition from foreign OEMs of developed countries resulted in the loss of business and eventual closure of several Brazilian defense firms. During the historic period, Indonesia and Angola were the major recipients of Brazilian defense systems, with a cumulative share of 63%. Over 2011–2015, aircraft sales accounted for the majority of Brazil's defense exports, contributing almost 72% to the country's total defense exports. In order to further promote arms exports, the Brazilian government has announced plans to increase loans to defense firms. The country is expected to concentrate on the African, Middle Eastern, and East Asian defense markets, and plans to construct customized defense systems at a low cost.

The figure below shows the volume of Brazil defense exports during 2011–2015:

Figure 30: Brazilian Defense Export Trend (US$ Million), 2011–2015 (TIV values)



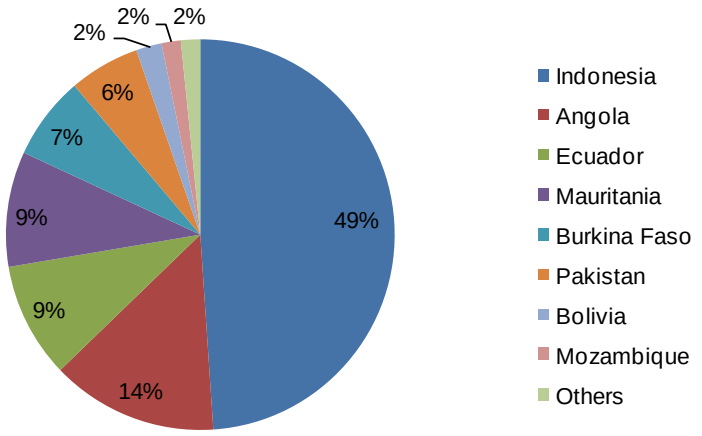
Source: SIPRI and SDI analysis

4.2.2. Indonesia and Angola are the major prospects for the Brazilian defense exports

During 2011–2015, Indonesia and Angola emerged as the largest consumers of Brazil's defense equipment, with shares of 49% and 14% respectively. One of the major aircraft manufacturers, Embraer, is currently developing the 19-ton KC390 military transport aircraft, which will compete with Lockheed Martin's C130 and Kawasaki's XC-2. The construction of this aircraft will rely on multinational technology and components. France, Sweden, and Portugal have each expressed an interest in procuring the KC390, which is anticipated to increase Brazilian exports. During 2011-2015, the company exported 92 aircraft which includes EMB-314 super tucanos to Indonesia for air-to-air interception, surveillance, and counter-insurgency, thus making Indonesia the largest recipient of Brazilian defense products during that period. In 2008, Brazil signed a US$1.2 billion contract with Eurocopter to acquire French aviation technology in order to expand Brazilian aviation exports. Eurocopter's Brazilian subsidiary, Helibras, will act as the manufacturing hub for the sale of Eurocopter helicopters in Latin America. During the forecast period, the export of early warning systems is expected to increase, with India, Mexico, and Greece purchasing the EMB 145 airborne early warning and control (AEW&C) system, in order to carry out aerial surveillance, mission coordination, and border surveillance.

The figure below shows the volume of the Brazilian Defense exports by country during 2011–2015:

Figure 31: Brazilian Defense Exports by Country (%), 2011–2015



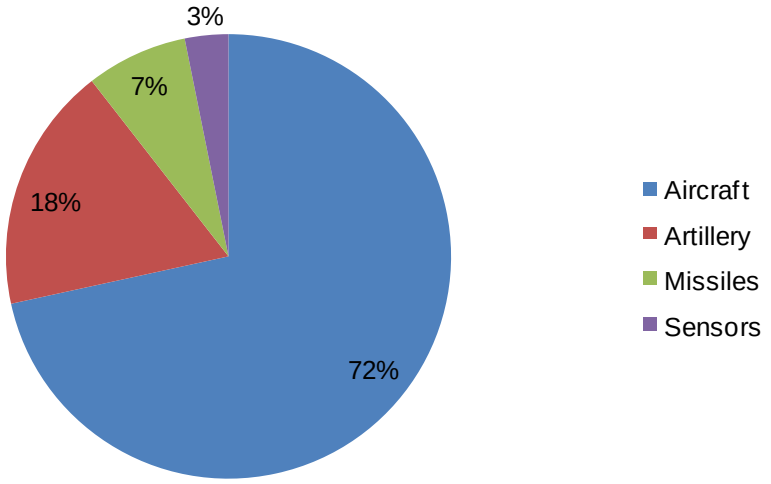
Source: SIPRI and SDI analysis

4.2.3. Aircraft accounted for the majority of Brazilian defense exports during 2011–2015

During 2011–2015, aircraft were the main exported product, accounting for72% of defense exports. This large percentage of aircraft can be attributed to the multiple deals of Embraer with foreign countries such as Indonesia, Angola, Ecuador, and Chile.

The figure below shows the volume of Brazilian defense exports by category during 2011–2015:

Figure 32:Brazilian Defense Exports by Category (%), 2011–2015



Source: SIPRI and SDI analysis

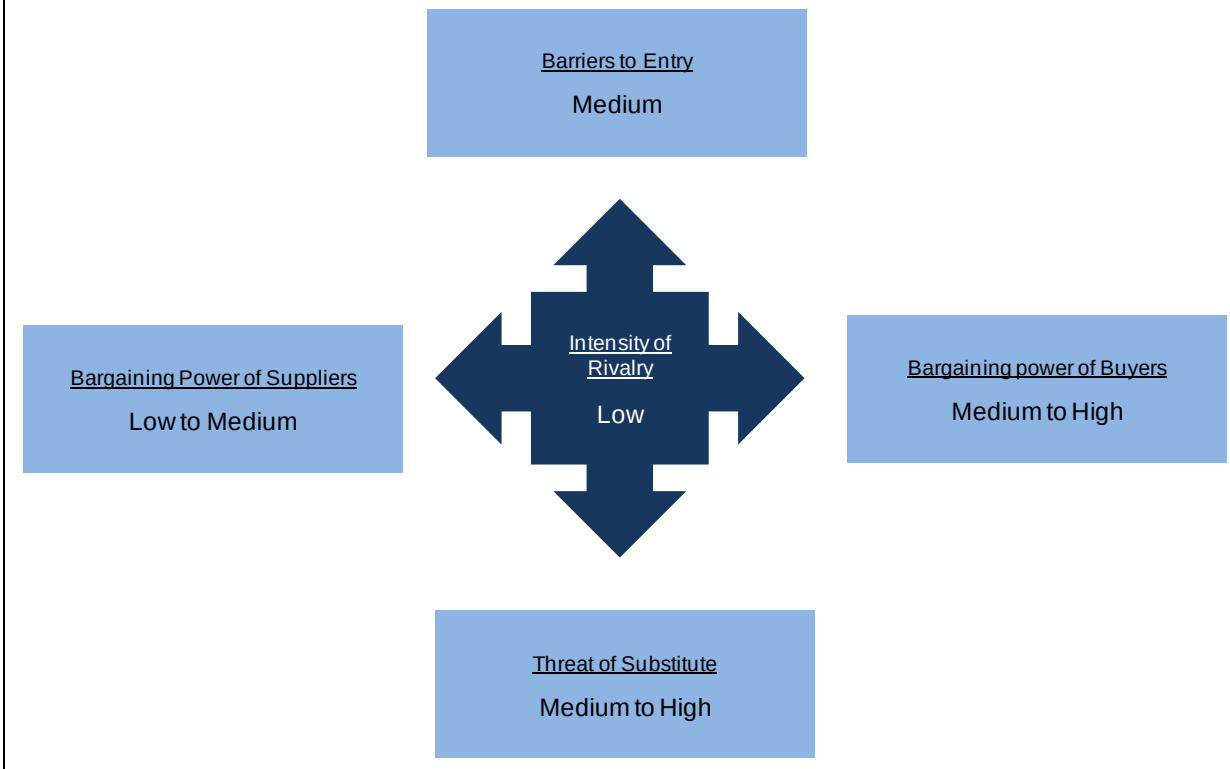
5. Industry Dynamics

5.1. Five Forces Analysis

Procurements for the Brazilian defense industry are undertaken by individual defense services. According to Porter's five forces analysis, the Brazilian defense industry's bargaining power is high for advanced systems purchases, as a result of the technology transfer requirements, and medium for purchases involving components for aircraft and submarine manufacturing. The bargaining power of suppliers of high-end systems is low due to the country's extensive technology transfer offset requirements. The entry barrier for the industry is medium. Due to the country's offset requirements and delays in the approval of deals, the entry barriers are relatively high; however, the entry barriers are lowered by the country's availability of inexpensive labor and raw materials. The intensity of rivalry is low among the domestic firms, as each company caters to different defense demands, while rivalry is medium among foreign OEMs, as several firms compete to supply high-end defense systems. The threat of substitution is high, as foreign OEMs offer similar systems, differentiated only by price and the technology transfer offered.

The following sections provide a Porter's Five Forces analysis of the Brazilian defense industry.

Figure 33: Industry Dynamics – Porter's Five Forces Analysis



Source: SDI analysis

5.1.1. Bargaining power of supplier: low to medium

The bargaining power of suppliers for high-end defense equipment, which includes fighter jets and submarines, is low due to the country's constant demand for technology transfers and the large number of bidders, which offers competition for defense deals. The bargaining power of suppliers of medium- and low-end defense equipment is medium, as procurements are often for niche products, such as armored personnel vehicles, which regularly involves the purchase of components that are available at more established prices.

5.1.2. Bargaining power of buyer: medium to high

All defense procurements are acquired by the Ministry of Defense through the individual defense division. The bargaining power of the buyer for high-end defense equipment is high due to the country's stringent offset rules involving technology transfer. The bargaining power of the buyer for medium- and low-end defense equipment is medium, as Brazil is dependent on foreign suppliers for components and technology.

5.1.3. Barrier to entry: medium

The barrier to entry for defense firms in the country is governed by two factors. Firstly, Brazil's stringent offset obligations act as a deterrent for foreign OEMs who plan to enter the country's defense market, as companies are often required to transfer technology or assemble the defense system in Brazil. Secondly, the availability of low-cost labor and raw materials encourages foreign OEMs to use Brazil as a hub for the manufacture and export of defense systems to other Latin American countries.

5.1.4. Intensity of rivalry: low

There is no rivalry between domestic and foreign suppliers as domestic manufacturers are still at an initial stage and differ largely in terms of manufacturing capability to compete with foreign suppliers. However, the intensity of rivalry among foreign suppliers is medium due to the presence of a large number of companies offering similar products. Additionally, with the country's defense budget forecast to increase at a CAGR of 4.34% during the forecast period, the growing numbers of domestic entrants are anticipated to increase their market share by competing strongly with foreign players.

5.1.5. Threat of substitution: medium to high

The threat of product substitution ranges from medium to high in the Brazilian defense industry, due to a number of factors. Firstly, the threat of substitution within an individual product category is high, with a range of products available. While switching to another product, the country is driven by various factors such as features and cost. For example, in the purchase of the FX-2 program, the ministry has various options such as Boeing's twin-engine F/A-18 Super Hornet, Lockheed Martin's F-16 fighter, Dassault's Rafale, and Saab's Gripen. Secondly, the anticipated growth in the defense budget is set to increase the threat of substitution, with the armed forces opting for more sophisticated military hardware and software equipment.

6. Market Entry Strategy

6.1. Market Regulation

6.1.1. International and domestic defense procurement deals are primarily decided by competitive bidding

All defense procurement and acquisitions made by the MoD and associated bodies follow a competitive bidding process. The MoD decides which company to procure equipment from, depending on whether the equipment complies with the ministry's requirements, which company offers the lowest price, and which company offers the most technology transfer. The rule applies for both domestic and foreign suppliers, without any preferential treatment for domestic suppliers. Recently, in 2016, the Brazilian Army established a new organization in order to consolidate decisions for different procurements and to procure military equipment to support strategic projects (PEE).

6.1.2. Stringent offsets requirements for all defense procurements

The Military of Defense procurement program in Brazil is governed by the Brazilian National Defense Strategy, and focuses on driving industrial participation through decentralized offset management. As previously mentioned, offset management aims to obtain the maximum possible technology transfer through defense deals in order to boost local production. The Brazilian Air Force, which manages offsets associated with its procurements, has previously executed agreements worth US$4 billion, and has a further 18 deals under negotiation. The strategic offset obligations are overseen by Estado-Mayor ad Aeronautical (EMAER), while the resulting technology is monitored by the Secretariat of Economy and Finances (SEFA). Other procurements are managed by the Ministry of Defense. The government planning to raise the offset threshold to US$70 million from US$5 million and also the offset credit banking and swaps are to be introduced which allows accrued offset credits and will be administered by the Joint Committee for Defence Industry.

The following table provides an overview of the country's offset guidelines:

Table 14: Brazil – Offset Guidelines and Agreements

Key Characteristics of Offsets	Offset Guidelines
Program objectives	Applies to defense and aerospace industries
Offset threshold	US$5 million
Offset type	Accepts both direct and indirect, with the direct offsets being the preferred type
Offset percentage	100% of the contract value.
Multipliers	Defense procurements: decided on a case-by-case basis Air force procurements: set at 1 to 4
Penalties	Defense procurements: decided by the federal government Air force procurements: are credit-increase-based settlements and/or liquidated damages
Eligibility	Transfer of technology, investments, co-production, licensed production, marketing support, training, and other forms of countertrade Air force procurements: decided on a mandatory MoU (memorandum of understanding) for all air force procurements
Performance period	Contract period

Table 14: Brazil – Offset Guidelines and Agreements	
Waiver	Air force procurements: obligations are waived when supplied by a single source, government-to-government international agreements (except under competitive environments).Five percent of the obligation is bank guaranteed
Source: SDI analysis	© SDI

6.2. Market Entry Route

6.2.1. Foreign OEMs follow direct offset route to enter defense market

Foreign OEMs are entering the Brazilian defense market through the transfer of technology for the development of domestic companies' defense systems. These foreign companies enter into industrial cooperation agreements, which enable domestic defense firms to manufacture and assemble the defense products. The country encourages foreign OEMs to follow this route, and technology transfers often become the deciding criteria for future deals involving the firm.

The SAAB AB signed a deal with the Brazilian government to deliver Gripen NG multi-role aircraft and Sweden committed to transfer technology that is needed by Brazil to manufacture its military jets. The European Aeronautic Defense & Space Company's, (EADS) Eurocopter, utilized this technology transfer route in order to become a subsidiary of the Brazilian company Hegiras. Hegiras has emerged as the market leader of attack helicopters in Latin America, and acts as a hub for Eurocopter's Latin American productions.

France has agreed to provide extensive technological assistance in submarine construction, and the development of naval bases, to become the supplier of the FX-2 program, factors that have given it an advantage over competitors such as the Swedish company Saab and the US-based company Boeing.

6.2.2. Collaborations provide market entry opportunities

In recent years, there have been a growing number of collaborations between international companies and the Brazilian government. The Brazilian government encourages technology-sharing agreements and R&D activities jointly, which will enhance the domestic defense manufacturing capabilities while maintaining diplomatic relations with other countries. Examples of these strategic collaborations include the co-operation in cyber security between Argentina and Brazil, as Latin American countries are subjected to spying by US intelligence agencies. Another is the joint venture set up by DCNS and its Brazilian partner Odebrecht, to design and manufacture four Scorpene type submarines and a nuclear powered submarine under a technology transfer agreement.

6.3. Key Challenges

6.3.1. Low allocation for defense capital expenditure and delay in the closure of defense deals are the major challenges of Brazilian Defense Industry

The major challenge for defense suppliers is the time taken by the Brazilian Ministry of Defense to approve defense deals. As defense procurements occur through competitive bidding, competing companies must undergo technical compliance checks, after which the ministry enters a lengthy negotiation process with bidders, designed to secure the maximum technology transfer at the lowest price. The armed forces are in charge of conducting trials on shortlisted equipment and forwarding their recommendations to the Ministry of Defense (MoD), who perform the final financial negotiations with the concerned seller. As such, the confirmation process is further delayed by long negotiation periods and competing offers given by various defense firms. Examples include the delay in selecting a supplier for the fourth-generation fighter jets and the delayed purchase of armored personnel carriers from the Italian branch of Invesco Ltd.

Brazil only allocates around 6-7% of its total defense expenditure to arms procurement. The country currently allocates 60-70% of its defense budget towards providing pensions for retired military personnel, and a significant amount is spent on the administration of its defense forces. Although domestic advancements by Brazilian defense firms are fueling the component procurement market, the deal value for these components is often small. This means the Brazilian defense industry appears to be a less attractive investment opportunity for foreign OEMs.

6.3.2. Complying with Brazil's requirement for extensive technology transfer

Brazil has a strict offset obligation for defense deals, equivalent to 100% of the contract value. This has proved to be a challenge for foreign OEMs, whose governments have a policy of limited technology transfer, including the US-based company Boeing. Moreover, Brazil's offset policy requires that defense contracts use domestic companies for the manufacture and assembly of defense systems. A number of foreign OEMs have agreed to such offset requirements due to the availability of inexpensive labor and raw materials in the country. However, a significant portion of these companies are reluctant to share proprietary information with Brazil, and often fail to supply defense systems to the country as a consequence. These rigorous requirements by Brazil often delay the approval of defense deals.

7. Competitive landscape and Strategic Insights

7.1. Competitive landscape Overview

Brazil's defense policy has led the country to improve its domestic defense capabilities and reduce its reliance on arms supplied by foreign OEMs. The country has an established aircraft manufacturing industry that caters to the air force's needs, with the exception of high-end fighter jets. The country has a policy of acquiring technology from foreign OEMs, to manufacture it indigenously. The domestic firms enter into joint ventures with foreign OEMs to procure technology, which is driving Brazil's arms exports.

7.2. Key Public Sector Companies

7.2.1. Embraer: overview

Empresa Brasileira de Aeronautica SA (Embraer) was founded as a government initiative in 1969 and was later privatized in 1994. Embraer is one of the world's largest aircraft manufacturers, with a specific focus on commercial, defense, and executive aircraft. The company's defense aviation division focuses on intelligence, surveillance, and reconnaissance (ISR) systems, cargo, combat, training, and transport.

The company's major stakeholders include Previ, CiaBozano, Thornburg investment management, and the Oppenheimer fund. Embraer's subsidiaries are Indústria Aeronáutica Neiva, Embraer Aircraft Maintenance Services Inc. (EAMS), and Indústria Aeronáutica de Portugal SA (OGMA). The company employs more than 16,800 people, and during 1991–2001, it was Brazil's largest defense exporter. Embraer has offices, industrial operations, and customer service facilities in Brazil, China, France, Portugal, Singapore, and the US.

7.2.2. Embraer: products and services

- EMB 145 AEW&C
- EMB 145 MULTI INTEL advanced remote sensing/ airborne ground surveillance and intelligence
- EMB 145 MP maritime patrol and anti-submarine warfare
- KC-390 medium-lift military transport
- Super Tucano

7.2.3. Embraer: recent announcements and strategic initiatives

July 2016: The company's KC-390 multi-mission aircraft completed its first international mission.

July 2016: Embraer launched its Phenom 100 business jet at AirVenture Fly-In and Convention.

October 2014: The company rolled out the first prototype of the KC-390 military transport from the production hangar at the industrial plant of Gavião Peixoto, Brazil

July 2014: The company participated in the 49th Farnborough International Airshow, displaying its entire range of products.

April 2014: The company took part in the 14th Defence Services Asia exhibition in Kuala Lampur, and displayed its products and capabilities.

September 2013: The company delivered its first modernized A-1 (A-1M) fighter jet to the Brazilian Air Force (FAB) at its industrial plant in Gavião Peixoto, in outstate São Paulo.

September 2013: The company signed a contract to acquire the remaining 50% of Atech Negóciosem Tecnologia S.A. shares, as part of its acquisition strategy.

April 2013: The company began to promote and sell the KC-390 military transport jet on the market.

April 2013: Embraer announced the delivery of its E190 aircraft to Norway's Fly nonstop. It is configured with 100 Elite seats in a single class configuration.

March 2013: Embraer Defense & Security has successfully completed the critical design review (CDR) of the Brazilian Air Force's KC-390 military transport aircraft development program

March 2013: Embraer delivered its first batch of F-5EM fighter to the Brazilian Air Force.

February 2013: The company announced the delivery of advanced training A-29 Super Tucano turboprops to the National Air Force of Angola

June 2012: The company announced that it has delivered the first two Embraer 190 model type jets to the Ukrainian Aviation Group Alliance (UAG) and will deliver three more e-jets by the end 2012.

June 2012: The company announced the first flight of its modernized A-1M model light attack jet.

October 2011: The Super Tucano light attack and advanced training turboprop received its airworthiness certificate issue by the US Federal Aviation Administration (FAA),

October 2011: Embraer defense and security strengthens its partnership with the Brazilian industry for the KC-390 program by selecting Brazilian company AEL Sistemas, to supply three more components to the KC-390 military airlifter and tanker jet.

September 2011: Embraer Defense and Security has chosen Cobham, with headquarters in Dorset, England, to supply the wing-mounted aerial refueling pods for the KC-390 military airlifter and tanker jet.

July 2011: Embraer Defense and Security has selected BAE Systems to provide hardware, embedded software, system design, and integration support of the flight control electronics for the KC-390 military transport jet.

7.2.4. Embraer – alliances

Table15:Embraer– Alliances			
Alliance	**Partner Company**	**Year Formed**	**Strategic Objectives and Focus Area**
Agreement	Boeing	2016	To market and support multi-mission air refueling aircraft named KC-390
Memorandum of understanding (MoU)	SAAB	2014	To partner in joint programme management for the F-X2 Project
Memorandum of Understanding (MoU)	Boeing	2014	Tocreate a joint biofuels research center for the purpose of developing andmaturing the knowledge and technologies that make it possible to establish a sustainable biofuels chain for aviation.
Strategic Agreement	Pall Cooperation	2013	**Product Focus:** For the supply of hydraulic filters for the Brazilian Air Force's (FAB) KC-390 tanker aircraft development program.
Memorandum of understanding(MoU)	AgustaWestland	2013	**Product Focus:** To form a joint venture and study production of helicopters in the Latin American country.
Joint Venture	Boeing	2012	**Product Focus**: To collaborate on KC–390 program in order to share specific technical knowledge and evaluate markets.
Joint Venture	Zodiac Aerospace	2012	**Product Focus:** To manufacture cabin interior parts for the Embraer 170/190 family of jets in a manufacturing facility located in Mexico.
Joint venture	Elbit Systems	2011	**Product Focus**: To develop new unmanned air systems (UAS) and supply a key component for the KC-390 airlifter and tanker.
Teaming agreement	BAE Systems	2010	**Product Focus**: To provide software, hardware, system design, and support integration of the flight control computer.
MoU (Memorandum of Understanding)	CDB Leasing Co. Ltd (CLC)	2009	**Market focus**: Embraer and CDB Leasing Co. Ltd. (CLC) signed a memorandum of understanding. CLC is a major financial leasing company held by the China Development Bank (CDB). The deal was formulated to enhance the financial opportunities for the acquisition of Embraer aircraft in China and abroad. The deal value is expected to rise to US$2.2 billion over the next three years in aircraft financing and leasing.
Source: Company website and SDI analysis			© SDI

7.2.5. Embraer: recent contract wins

Table16: Embraer– Recent Contract Wins

Date	Contract value	Client	Description
April 2016	NA	Rheinmetall Defence Electronics Simulation and Training	To provide latest simulation technology for the KC-390 programme.
May 2014	US$3.35 billion	Brazilian Air Force	A contract to build 28 of its newly launched mid-sized cargo planes
April 2013	NA	Maya Biosphere Reserve, Guatemala	The project for "Constructing the Surveillance and Protection System of the Maya Biosphere" provides for the acquisition of six A-29 Super Tucano airplanes, a command and control system, and three primary three-dimensional radars.
April 2013	US$111 million	Brazilian Air Force	To provide logistics support and services for the fleet of 92 A-29 Super Tucano aircraft operated by the FAB
April 2013	NA	Senegal's Air Force	For the acquisition of three A-29 Super Tucano light attack, advanced training turboprops from the company
April 2013	NA	Austral LíneasAéreas	To provide two E-190 jets, which are the Advanced Range (AR) models
February 2013	US$ 215 million	Brazilian Air Force (FAB)	To modernize five EMB 145 AEW&C (Airborne Early Warning and Control), designated E-99 in the FAB.
January 2013	US$4 billion	Republic Airways	For the sale of 47 E-175 jets. The new aircraft will be operated by Republic Airlines, a Republic subsidiary, under American Eagle brand in the American Airlines' regional network
October 2012	US$ 50 million	Mauritania Air Force	To provide A-29 Super Tucano type turboprop aircrafts for counter-insurgency missions.
August 2012	US$ 404 million	Tepro consortium	For the implementation of Phase I of the Sisfron program with Tepro consortium.
January 2011	US$1.12 billion	Brazilian Air Force's COMAER (Comando da Aeronautica)	To modernize 43 AMX International–built AMX jet fighters.
July 2011	US$105.3 million	Ghana Air Force	To buy one Embraer E 190 jet and a hangar.
June 2011	Not available	Indonesian Air Force	Sale of eight Super Tucano light attack and advanced training turboprops.

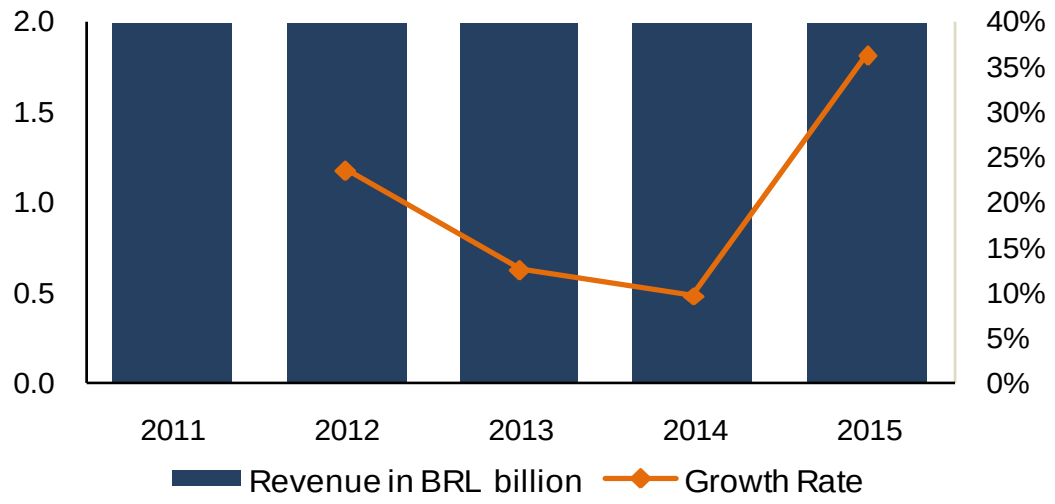
Source: Company website and SDI analysis © **SDI**

7.2.6. Embraer – financial analysis

Embraer recorded revenues of BRL20.3 billion for the fiscal year 2015; this grew at a CAGR of 19.97% during the period 2011–2015.

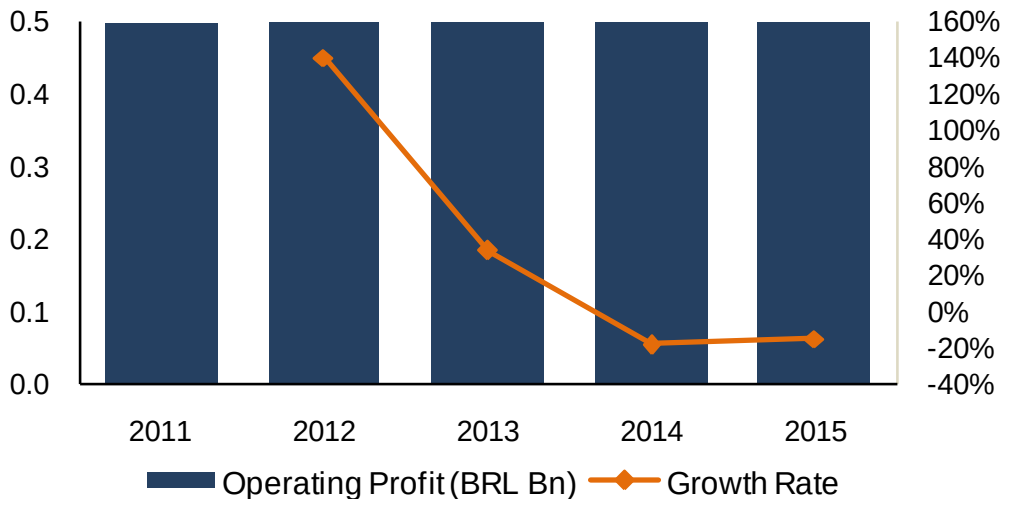
The following figures show the trend for revenue, operating profit, and net profit:

Figure 34: Embraer – Revenue Trend Analysis (BRL Billion), 2011–2015



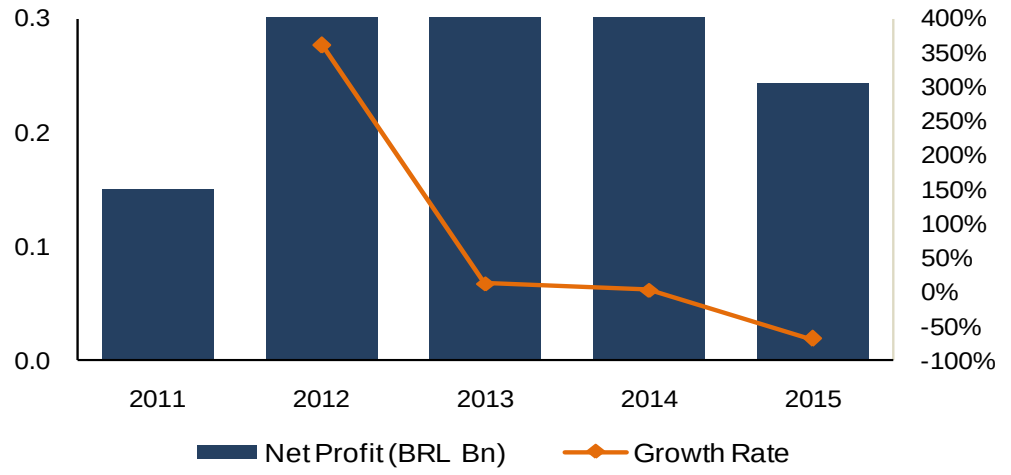
Source: Company website, annual reports and SDI Analysis © SDI

Figure 35: Embraer – Operating Profit Trend Analysis (BRL Billion), 2011–2015



Source: Company website, annual report and SDI analysis

Figure 36: Embraer–Net Profit Trend Analysis (BRL Billion), 2011–2015



Source: Company website, annual report and SDI analysis

7.2.7. Forjas Taurus SA: overview

Forjas Taurus SA was founded in 1939 and the company designed and produced its first revolver in 1941. Forjas Taurus SA is a manufacturer of firearms, and its subsidiary and affiliated companies produce handguns, motorcycle helmets, large machine tools, tools for construction, mechanics and gardening, and bullet-proof vests. The company's product portfolio includes steel-frame pistols, polymer-frame pistols, revolvers, and law enforcement weapons. Forjas Taurus SA is a leading producer of firearms for professional and personal security in Brazil and abroad, and its products are sold in 70 countries worldwide.

Polimetal Participacoes SA holds an 84% stake in Forjas Taurus SA. The company's subsidiaries and affiliates are Taurus Armas, Taurus Forjados, Taurus Wotan, Tuarasplast, Taurus International, and Famastil. The company has eight manufacturing plants, three of which produce handguns; three manufacture injected plastic products, one that produces machine tools, and another that manufactures forged and machine tools. These plants are located in Rio Grande do Sul, Parana, and Miami, Florida. Famastil Taurus SA has four factories located in Gramado, Brazil.

7.2.8. Forjas Taurus SA: products and services

Pistols

- PT 100
- PT 100 Plus
- PT 101
- PT 101 Plus
- PT 138 PRO
- EN 1911
- PT 24 / 7 DAO 40
- PT 24 / 7 9mm DAO
- PT 24 / 7 L D
- PT 24 / 7 PRO 40
- PT 24 / 7 PRO 9mm
- PT 24 / 7 PRO 40 DS
- PT 24 / 7 PRO 9mm DS
- PT 24 / 7 PRO 40 TACTICAL
- PT 24 / 7 PRO 9mm TACTICAL
- PT 24 / 7 TRAINING I
- PT 24 / 7 TRAINING II
- PT 58HC Plus
- PT 59
- PT 609
- PT 609 PRO
- PT 638
- PT 640
- PT 640 PRO

- PT 840
- PT 915
- PT 917
- PT 92
- PT 92 Simulation
- PT 938
- PT 940
- PT 945
- PT 99

Revolvers

- RT 410
- RT 44
- RT 605
- RT 65
- RT 66
- RT 669
- RT 689
- RT 817
- RT 82
- RT 827S
- RT 82S
- RT 838
- TEN 85 IT / Multi-alloy
- RT 851 Multi-alloy
- RT 85S
- RT 85UL
- RT 88
- RT 889
- RT 94
- RT 94 UL
- RT 970

Rifles

- CP 16”
- CP 20”
- CP 20” MAG
- CP 20” WIN
- CP 24”
- CP 24” LAT
- EP 12
- EP 36/22LR

Machine guns

- CT 30
- CT 40
- MT 40
- MT 9

Air Rifles

- Rifle 400
- CF-30
- CF-X
- Delta
- Delta Fox
- Hunter-440
- Shadow Matic
- Shadow RSV
- Shadow Sport
- Viper Max
- Viper Skeet

7.2.9. Forjas Taurus SA: recent announcements and strategic initiatives

2013: The company, which acquired metal injection molding (MIM) producer Steel inject Injeção de Aços Ltd from the Lupatech Group at the end of 2011, announced its strategy of expanding its footprint to previously unexplored global markets for MIM products.

2011: The company announced the introduction of the 405 model type revolver and the 445 Ultra-Lite model type revolver.

2011: The company introduced the Taurus Tracker 992 model type revolver, equipped with the Taurus Ribber Grip and 4–6.5 inch barrel, and which has an overall length of 8.9–11.4 inches.

2011: The company announced that it won the Gun of the Year 2011 award for its PT 740 model type slim pistol.

2011: The company announced that it would expand its interest in the market of non-lethal weapons, such as pistols and revolvers with rubber bullets.

2009: The company announced a US$9.9 million investment for a new factory. The money will be used to purchase land, buildings, machinery, and equipment. The new facility is expected to create 150 jobs.

2009: Forjas Taurus and the Federal Police signed an agreement to facilitate the acquisition of firearms by members of the Metropolitan Civil Guard (GCM) from Sao Paulo, Botucatu, Campinas, Franco da Rocha, Guarulhos, Maua, and Praia Grande.

2008: Forjas Taurus approved the purchase of Metus, a company located in Osasco, Sao Paulo, Brazil. The company manufactures light boiler materials that are widely used by Taurus and its subsidiaries.

The deal will increase new technology acquisitions to Forjas Taurus, which traditionally uses heavy boilers.

2008: The Brazilian Minister for Defense announced Forjas Taurus's part in the plan to modernize the national defense industry. The plan is designed to strengthen and improve companies that supply equipment for the armed forces. Forjas Taurus agreed to develop new models to meet the requirement of the armed forces.

7.2.10. Forjas Taurus SA: alliances

Table17: Forjas Taurus SA– Alliances

Alliances	Partner Company	Year Formed	Strategic Objectives and Focus Area
Agreement	Diamondback Firearms LLC	2013	**Product Focus:** To provide global distribution support of products and accessories.
Partnership	Heckler & Koch	2011	**Product focus**: To provide sales and support of products and accessories, as well as the exchange of technology used to manufacture weapons in Brazil.
Joint venture	Israel Weapons Industries (IWI)	2009	**Product focus**: Forjas Taurus and Israel Weapons Industries (IWI) have entered an agreement to develop the Tavor-21 assault rifle. However, the future of the deal depends on the approval of the Brazilian Army. Once the product is approved, both companies will invest US$22 million in a special production line at the factory of Forjas Taurus in Sao Leopoldo.

Source: Company website and SDI analysis © **SDI**

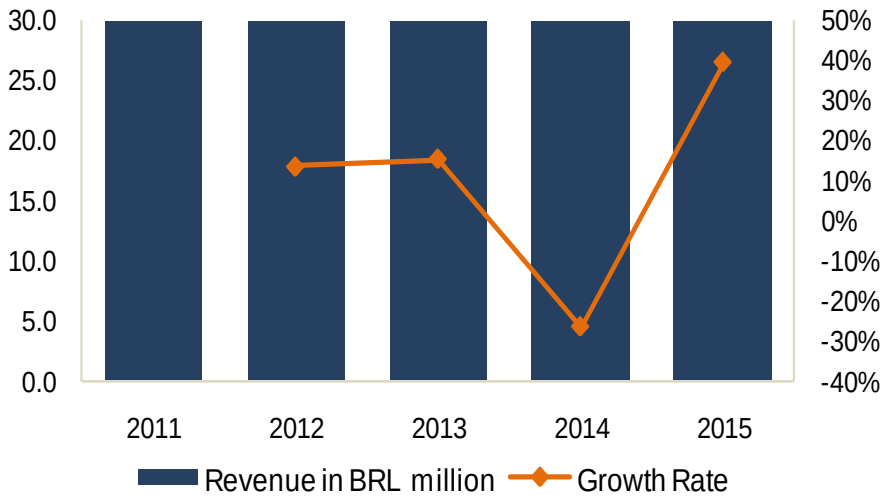
7.2.11. Forjas Taurus SA: recent contract wins

Table18: Forjas Taurus SA– Recent Contract Wins			
Date	**Contract value**	**Client**	**Description**
Not available	US$20 million	The Indian Army	Forjas Taurus has won a deal to supply 3070 Tavor rifles to the Indian Army, at a cost of US$20 million. The deal is inclusive of spare parts and training of technical personnel.
Source: Company website and SDI analysis			© SDI

7.2.12. Forjas Taurus SA: financial analysis

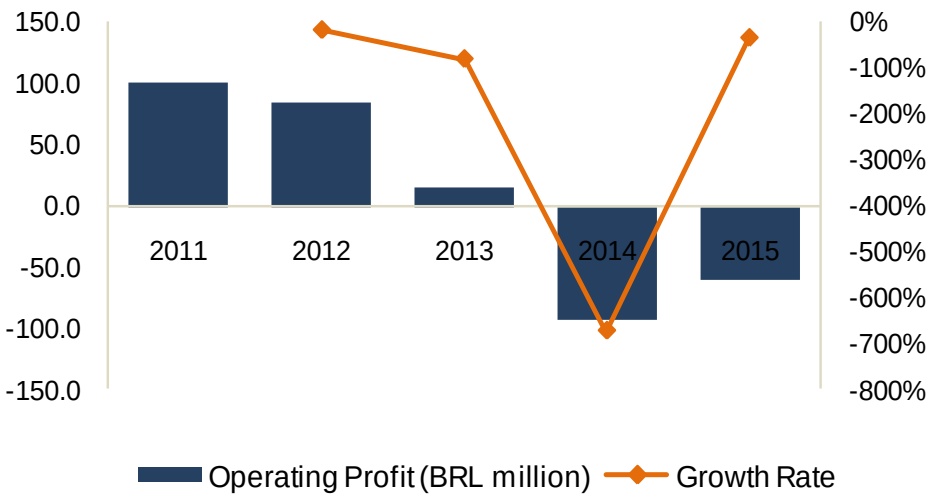
Forjas Taurus SA recorded revenues of BRL823 million in FY2015, and grew at a CAGR of 7.47% during 2011–2015:

Figure 37: Forjas Taurus SA – Revenue Trend Analysis (BRL Million), 2011–2015



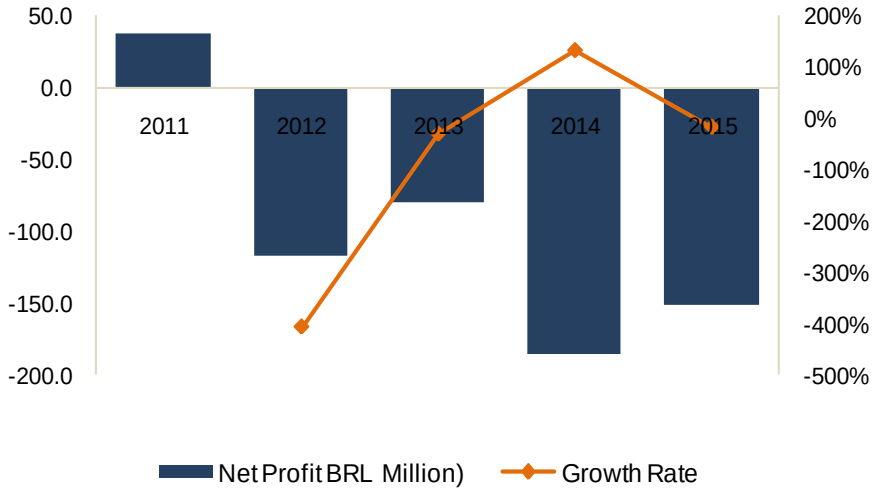
Source: Company website, annual report and SDI analysis © SDI

Figure 38: Forjas Taurus SA – Operating Profit Trend Analysis (BRL Million), 2011–2015



Source: Company website, annual report and SDI analysis

Figure 39: Forjas Taurus SA – Net Profit Trend Analysis (BRL Million), 2011–2015



Source: Company website, annual report and SDI analysis

7.2.13. Avibras Industria Aerospacial: overview

Avibras Industria Aerospacial (Avibras) is a Brazilian company that designs, develops, and manufactures defense and civilian products. It provides a range of defense products including air-to-ground and surface-to-surface artillery saturation rocket systems, 70mm air-to-ground systems, and fiber optic multi-purpose guided missiles. It also develops armored vehicles, aircraft defense systems at low altitude, and provides system integration capabilities. Avibras also has extensive operations in electronics, telecommunications, and satellite communications. The company possesses research and development (R&D) expertise, manufacturing, integration, tests, and integrated logistic support for the systems it supplies.

7.2.14. Avibras Industria Aerospacial: products and services

Artillery saturation rocket system

- Astros - II
- HAWK

Rockets and missiles

- SKY FIRE - 70 air-to-ground rocket system
- FOGTREIN Training Rocket
- FOG - MPM fiber optics guided multiple purpose missile
- AV–TM missile

Armored vehicles

- AV-VBL 4x4 light armored vehicle
- AV-VB4-RE light armored reconnaissance version

Unmanned Aerial Vehicles (UAV)

Aircraft defense at low attitude

- FILA fighting intruders at low altitude

Simulators

- AV-LMU Universal Multiple Launcher
- AV-UCF Fire Control Unit
- AV-VCC and AV-PCC Command and Control

7.2.15. Avibras Industria Aerospacial: recent announcements and strategic initiatives

April 2016: The company launched its Guara 4WS 4X4 vehicle at LAAD Security.

November 2014: The company delivered the first batch of ASTROS (Artillery Saturation Rocket System) II artillery rocket systems (ARS), which were ordered in 2012, to Indonesia.

2013: The company is anticipated to participate in an upgrade contract of ASTROS-II Mk.3 systems to the Mk.3M configuration, incorporating most of the new Mk.6′s advances but retaining the existing Mercedes Benz truck platform.

2012: The company announced that the assembly of its Falcão model domestic aircraft, which can be used for surveillance, reconnaissance, patrol, and sensor tasks, is expected to be completed shortly.

2009: Avibras received US$9.4 million from the Financier of Studies and Projects (FINEP) in order to develop a UAV with civil and military application in the reconnaissance, environmental monitoring, and the inspection of transmission lines for electricity, gas pipes, and urban traffic.

7.2.16. Avibras Industria Aerospacial: alliances

Table19:Avibras Industria Aerospacial– Alliances

Alliances	Partner Company	Year Formed	Strategic Objectives and Focus Area
Joint development	Elbit and Embraer	2013	**Product focus:** The three companies will jointly manufacture unmanned aircraft in Brazil
Joint development	General Command of Aerospace Technology (CTA), Technological Centre of the Army(CTEx),Research Institute of Navy	2005	**Product focus:** Avibras acted as an industry partner of a consortium developed to produce Brazil's first UAV. The UAV development is an entirely domestic project that utilizes only Brazilian technology. The UAV is expected to conduct civilian and military operations.
Licensed production	Sukhoi	2002	**Product focus**: Avibras Aerospacial signed a deal with Sukhoi for the production of its military and civil aircraft. The agreement is linked to Sukhoi's bid for the Brazilian Air Force's US$700 million F-X BR fighter program. This allowed Sukhoi to meet the requirement of becoming associated with a domestic manufacturer to supply the required aircraft.

Source: Company website and SDI analysis © **SDI**

7.2.17. Avibras Industria Aerospacial: recent contract wins

Table20:Avibras Industria Aerospacial– Recent Contract Wins

Date	Contract value	Client	Description
2012	Not available	Indonesia Ministry of Defense	A contract to supply Indonesia with two batteries MRLS "Astros-2" (ASTROS - Artillery Saturation Rocket System).
2007	Not available	Undisclosed	Avibras signed a US$500 million contract with an undisclosed customer in Asia. The deal required Avibras to provide rockets, Astros - II rocket launchers, launch systems, and support units.

Source: Company website and SDI analysis © **SDI**

7.2.18. Companhia Brasileira de Cartuchos: overview

Companhia Brasileira de Cartuchosis one of the largest military and commercial ammunition manufacturers in the world and has 81 years of experience in the manufacture of small- and medium-caliber ammunition. The company is privately owned, with Arbi Investment as its principal shareholder. CBC acquired the Brazil plant Metallwerke Elisenhutte Nassau (MEN) in 2007, and the Czech company Sellier & Bellot in 2009. The company has two manufacturing units, in Sao Paulo and Rio Grande do Sul. The Sao Paulo unit, Ribeirão Pires, is spread over 500 acres, with a 377,000-square-feet building area. The facility contains ammunition, propellant powder, and primer composition manufacturing operations and central offices. The Rio Grande do Sul unit produces fire arms and shot-shells. CBC has 1,200 employees and annually produces 415 million rounds of ammunition.

The company carries out its distribution though the Brazil CBC distribution center. All commercial cartridges made by CBC are sold under the brand Magtech, and are exported to 50 countries through its two distribution centers in Minneapolis, the US, and New Hamburg, Brazil. The company exports 70% of its total ammunition production and 80% of its firearms to countries across the world.

The company produces a variety of cartridges for commercial and military use, including center fire and rim fire ammunition for small and medium calibers ranging from .22LR to 30 mm, for shotguns and rifles for both the civilian and military markets. The company supplies cartridges to the Brazilian Armed Forces, and a number of military forces worldwide. Caliber handgun ammunition accounts for the majority share of the company’s production.

7.2.19. Companhia Brasileira de Cartuchos: products and services

Military arsenal

- 9 x 9 mm Parabellum
- 5.56 x 45 mm
- 7.62 x 51 mm
- 12.7 x 99 mm (.50)
- 12.7 x 76 mm (.50)
- 20 x 102 mm
- 20 x 110 mm
- 20 x 128 mm
- 30 x 113 mm

Ammunition

- Pistol ammunition
- Handgun ammunition
- Gold ammunition
- Ammunition copper bullets
- Hunting cartridges
- Cartridges competition
- Cartridges for police use
- .22 ammunition
- Rifles and ammunition for machine guns
- Ammunition for cannons

- Cartridges for industrial use
- Fuses
- Cases
- Projectiles
- Powders

Weapons

- Pump CBC 12
- Rifle CBC 199
- Rifle CBC 7022

Vests

- Aramida
- NFT (new fibers technology)
- Gold flex
- Polyethylene
- Spectra shield
- Dyneema
- Spectra flex
- Multi-vest threat CBC
- 30 x 113 mm

7.2.20. Companhia Brasileira de Cartuchos: recent announcements and strategic initiatives

2011: The company announced that it has introduced a new technology for military ammunition to be used by the armed forces.

2010: The company participated in the space Magnum Show - VI International Exhibition of Arms, Ammunition, Knives, and Accessories to showcase its product line including cartridges, ammunition, guns, rifles, and ballistic pressure vests.

2009: CBC acquired Sellier & Bellot, a traditional manufacturer of ammunition for small arms for civilian, military, and police use. The company is located in the city of Vlasim, in the Czech Republic. This acquisition was part of the acquisition program started by CBC in the 1990's. The company exports to over 70 countries, with its major customers located in Europe.

2009: CBC's subsidiary, Metallwerke Elisenhutte Nassau (MEN), received certification for completely lead-free law enforcement ammunition.

2007: CBC acquired Metallwerke Elisenhutte Nassau (MEN) and celebrated 50 years of business operations. It is a renowned company in the European market with its advanced technology and high-quality products. The company is located in Nassau, Brazil and manufactures military and police ammunition for the armed forces and for several European police forces.

2007: The company inaugurated the Brazil CBC distribution center in the capital Sao Paulo's Anhanguera Highway. The distribution center aims to improve services to the customers of CBC and assist business expansion.

7.2.21. Companhia Brasileira de Cartuchos: recent contract wins

Table21: Companhia Brasileira de Cartuchos (CBC)– Recent Contract Wins

Date	Contract value	Client	Description
2010	Not available	Police Forces of all Nordic countries	To supply 9x19mm ammunition for police forces from Nordic countries, including Sweden, Denmark, and Norway.
2009	US$2 million	Philippines Army	CBC won a contract for the supply and delivery of new ammunition for the armed forces of Philippines. The contract was worth US$2 million.

Source: Company website and SDI analysis © SDI

7.2.22. Helibras: overview

Helibras is a wholly owned subsidiary of the European Aeronautic Defence and Space Company (EADS), and is a leading turbine helicopter manufacturer in the Brazilian market, with a 54% stake in the civilian market and a 66% share in the military market. It is also responsible for the assembly, sales, and after sales support of Eurocopter helicopters in Brazil.

Helibras is one of the top two manufacturers of helicopters in Latin America. The Itajuba Helibras factory is an ISO 9001:2000 certified manufacturing unit, and the company owns a 3,800-square-meter shopping area, parts warehouse, and workshop, which allows it to serve its fleet more efficiently. The company produces and delivers squirrel model helicopters, which account for 70% of its total helicopter production. Helibras also exports helicopters to countries such as Argentina, Bolivia, Chile, Mexico, Paraguay, Uruguay, and Venezuela.

7.2.23. Helibras: products and services

Helicopters

- Hummingbird EC 120B
- Fennec AS 550 C3
- Fennec EC 130 B4
- Fennec AS 555 NS, UN / NA
- EC 635 P2/T2
- Panther AS 565 UB / MB
- Cougar AS 532 AL / SC
- EC 725
- Tiger HAP / HCP
- NH 90

7.2.24. Helibras: recent announcements and strategic initiatives

December 2015: The company completed H225M integration tests with two AM-39 exocet missiles

October 2015: The company completed first flight test of multi-role helicopter for the Brazilian army

November 2014: The company delivered the fifth helicopter EC725 to the Brazilian Armed Forces.

September 2014: The company delivered a helicopter EC725 under a contract for 50 model aircraft acquired by the Ministry of Defense of Brazil, for the three armed forces of the country.

December 2013: The company held its first flight of the first upgraded AS550 Fennec of the Brazilian Army, after completing its rebuild and modernization at their Itajubá plant.

November 2013: The company announced the first maiden flight of the first EC725 to be entirely produced in-country, around two months ahead of schedule.

October 2013: Training Center (TC) Helibras located in Itajubá (MG), in October reached the milestone of 12,000 students served.

August 2013: The company received authorization to produce the Eurocopter EC225 in Brazil.

April 2013: The company announced the construction of the simulators & training center, in Rio de Janeiro, at LAAD.

April 2013: The company presented the two upgraded Panther K2 unit to the Army Aviation at LAAD - Defence& Security 2013

December 2013: The workshop in São Paulo received certification from the Directorate of Army Aviation Material (DMAvEx), the sector support body responsible for managing the helicopters Avex.

October 2012: The company inaugurated a factory in Brazil for manufacturing large helicopters.

October 2012: The company announced that it will be demonstrating the Eurocopter X³ (X-Cubed) model helicopter based on the concept of H^3(Helicopter Hybrid high speed and long range) to the US Army, and these helicopters will be evaluated for performance.

October 2012: Helibras announced the opening of a new US$300 million extension to its Helibras Itajuba facility, set up for the assembly of the EC725 model helicopters.

7.2.25. Helibras: alliances

Table22:Helibras– Alliances

Alliances	Partner Company	Year Formed	Strategic Objectives and Focus Area
Agreement	Sagem	2015	To modernize the flight controls of Panther helicopters of Brazil.
Partnership	Safran Engineering Services	2013	Strategic Focus: To supply the design and full integration of multiple avionics communication and navigation systems, including a sophisticated new Glass Cockpit System, along with the integration of the auto-pilot system, for the modernization of 34 Esquilo and Fennec helicopters for the Brazilian Army
Cooperation agreement	Sagem Aeroelectronica	2010	Strategic Focus: To jointly develop new solutions in avionics to modernize the dashboard of the AS350 Squirrel.

Source: Company website and SDI analysis © **SDI**

7.2.26. Helibras: recent contract wins

Table23:Helibras– Recent Contract Wins

Date	Contract value	Client	Description
2014	NA	German Army	A contract for the for the acquisition of six aircraft of the model EC145 T2
2014	NA	AGS Holding	A contract to transport the turbines to be used by the Armed Forces helicopters EC725
2013	NA	Secretary of State for Public Security and Social Defense of Pará	A contract to supply two new helicopters: AS350 B2 Squirrel model aircrafts
2012	NA	Brazilian Army Aviation	Helibras signed the first contract of sale of the EC130 T2 model in Brazil

Table23:Helibras– Recent Contract Wins			
2011	Not available	Brazilian Army Aviation	Helibras signed a contract with the Brazilian Army Aviation to modernize 36 AS 350 Ecureuil model helicopters.
2010	Not available	National Secretariat of Public Security of the Ministry of Justice and the Government of Bahia	Acquisition of Multi-Squirrel helicopters by the military police of Bahia.
2010	Not available	Brazilian Army	To modernize its fleet of 34 AS365K Pantera.
2009	Not available	Brazilian Army Aviation	Helibras signed a contract with the Brazilian Army Aviation to modernize 34 AS365K Pantera helicopters. The contract includes the installation of new engines with increased power, new avionics navigation, and radio communication. Delivery will commence in 2011 and be completed by 2021, at a rate of four helicopters per year. This was the biggest contract win in the service area for the company in 30 years.
2008	Not available	Brazilian government	The Brazilian government has signed a contract with the consortium formed by Helibras and Eurocopter for the procurement of 50 EC725 helicopters. The first deliveries of this aircraft are scheduled for 2010 and will be operated by the Brazilian Armed Forces. This contract expands the market of Eurocopter in South America.
Source: Company website and SDI analysis			© SDI

7.2.27. Industria de Material Belico do Brasil (IMBEL): overview

Industria de Material Belico do Brasil (IMBEL) is a company under the jurisdiction of the Ministry of Defense through the Brazilian Army. It produces small arms, ammunitions, explosives, ammunition components, and communication and electronic equipment. It also trains engineering graduates through the Military Institute of Engineering. Its considerable experience in manufacturing has assisted the company's creation and upgrading of proprietary technology and the development of a more varied range of civilian goods.

In order to meet its production requirements, the company operates five factories: Fábrica Presidente Vargas (FPV), the Star Factory (FE), Fabrica de Juiz de Fora (FJF), Factory Itajuba (FI), and Factory Communications and Electronics Equipment (FMCE). IMBEL has established partnerships with the Springfield Armory in the US, EADS, Camargo Correa, EMGEPRON, and VALE.

7.2.28. Industria de Material Belico do Brasil (IMBEL): products and services

Rifles

- 5.56 mm rifles and carbines
- 7.62 rifle M964 A1 - PARAFAL
- 7.64 M964 rifles
- Rifle .308 AGLC

Pistols

- .45 Pistols M911A1
- GC .45 pistols
- GC .40 pistols
- 9 Gun M973
- Pistol .380 GC
- .380 Pistols
- Communications and electronics
- Computer Palmar Military CPM1220
- Telephone UNA 2000
- Radio Transceiver TRC 1193 MALLET

Explosives

- Friction lighters
- Lighter percussion - STAR
- Anfo/Carbonitrato
- Load breaker – Rompel
- COMPOSITIONS B, A3, A4 and A5
- Detonating cord – BELCORD
- Nitroglycerin dynamite
- Emulsion explosive
- Fuzebeldeton
- Espoletim Star
- Hydraulic fuse - BELPIM
- Ethyl ether

- Gelatin explosive
- HMX (octogen)
- Nitrate Monoethanolamine
- Nitrocellulose
- Nitrocellulose Collodion
- Nitropenta (PETN)
- Small firecrackers
- Plastex
- Black powder
- Double-base powders
- Single-base powders (powders Hunting)
- RDX (hexogen)
- Reinforcer (Booster) - Belex
- Delay Belmaker
- Simulacrum of Granada
- Trinitrotoluene (TNT)

Munitions components

- In Ex-Head 70 M1
- War Head AC-70
- War Head 70-AP
- Fuze for warhead and percussion - EOP EE 1105
- Percussion fuse for warhead and EOP M3 A1
- Percussion fuse for warhead and EOP M6 A1
- Estopilha IMBEL 2494
- Estopilha IMBEL 2517 A2
- Estopilha IMBEL M1A2
- Estopilha IMBEL M1A3
- Estopilha IMBEL MD3
- Estopilha IMBEL MD4
- Estopilha IMBEL MD7
- Estopilha IMBEL MD8
- Propellant grain and Tracer
- Motor maroon SBAT 70

Munitions

- Rocket SBAT M4B1-70, w / cab Ex In M1
- 70-maroon SBAT M4B1 c / cab 70AP
- Maroon SBAT-70 M4B1, c/cab.70AC
- Shot Saves 105 M 395
- Shooting 105 AE - IMBEL MD1 A1
- Shooting AE 120 CONV
- Shooting 120 AE PR
- Shooting 120 AE PRPA
- Shooting 40 L/60 TrLst M1
- Shooting SR 57 AE - IMBEL MD1
- Shooting SR 57 Lst - IMBEL MD1
- Shooting 75 Saves
- Tire 90mm (HEAT-T) TP-T

- Shooting 90mm HE-T
- Shooting 90mm HEAT-T
- Shooting 90mm HESH-T
- Shooting 90mm Smoke WP-T
- Mortar shot 60 AE M1 A1
- Mortar shot 60 AE A1 M2
- Mortar shot 81 AE M1 A1
- Mortar shot 81 AE M2

7.2.29. Industria de Material Belico do Brasil (IMBEL): recent announcements and strategic initiatives

2012: The company participated in the 2012 Feria Internacional del Airey del Espacio (FIDAE) exhibition to showcase the IA2 model rifles and assault rifles.

2011: The company demonstrated its radio mallet device, used in the military, to the department of Science and Technology.

2011: IMBEL sought to develop an Evacuation System (SATI).

2010: IMBEL sought to develop its product line through the replacement of the IMBEL MD-2 service rifles (MD-3 and MD-4) variants. These may be replaced by FN-SCAR or the IWI Tavor.

7.2.30. Industria de Material Belico do Brasil (IMBEL): alliances

Table 24: Industria de Material Belico do Brasil (IMBEL)– Alliances			
Alliances	**Partner Company**	**Year Formed**	**Strategic Objectives and Focus Area**
Memorandum of Understanding (MoU)	EID	2011	**Product focus:** A co-operation agreement was signed between IMBEL and EID (Portugal) to locally produce the Integrated Communication Control System (ICCS) components for Brazilian Navy warships.
IMBEL to provide communication systems	Iveco	2009	**Product focus**: IMBEL agreed to provide communication systems for VBTP-MR armored vehicles for the transportation of personnel. This is part of the agreement between the Brazilian Army and Iveco to supply 2,044 vehicles.
Memorandum of Understanding (MoU)	Rippel Effect Weapon Systems	2007	**Product focus:** A memorandum of understanding was signed between IMBEL and the South African private sector defense enterprise Rippel Effect Weapon Systems for the manufacture of Rippel's 40mm multi-shot grenade launcher in the South American market.
Partnership	EADS	2004	**Product focus:** IMBEL partnered EADS to produce armored PATRIA, targeting the foreign market.
Source: Company website and SDI analysis			**© SDI**

7.2.31. Industria de Material Belico do Brasil (IMBEL): recent contract wins

Table25: Industria de Material Belico do Brasil (IMBEL)– Recent Contract Wins			
Date	**Contract value**	**Client**	**Description**
2004	US$9.2 million	The government of Minas Gerias	The government of Minas Gerias signed an agreement with IMBEL for the supply of weapons to the military and city police for 10 years. This will assist IMBEL in clearing its debt ofUS$9.2 million.
1999	US$20 million	Venezuela	Imbel won the contract for the modernization of military rifles in Venezuela. The contract was worth US$20 million and the company was required to provide this service from 2000–2001.
Source: Company website and SDI analysis			**© SDI**

7.2.32. Aeroelectronica: overview

Aeroelectronica is a Brazilian company involved in the design, development, qualification, manufacture, maintenance, and logistical support for military and civil electronic products, with applications in aircraft, waterborne craft, and motor vehicles. Elbit Systems Ltd., one of the largest defense companies in Israel, acquired a controlling stake of Aeroelectronica in 2001. The company's quality management system conforms to NBR ISO 9001:2008 and NBR 15100:2004 standards, and is also certified by the Brazilian Aeronautical Authority. It also carries a qualification from the Aeronautic and Military Materials Board, DIRMAB, and the Military Aviation Materials Board, DMAvEx.

7.2.33. Aeroelectronica: products and services

F-5 modernization

- AAP - Avionics activation panel
- MC - Mission computer
- ARB - Armament relay box
- HUD - Head up display
- DVR - Data video recorder
- SIU - Station interface unit
- CMFD - Color multi-function display

A-1 avionics

- GEU (SAHRS) - Gyro electronic unit
- CP (RECCE 3) - Control panel for reconnaissance
- ADI - Altitude director indicator
- CP (RECCE 1/2) - Control panel for reconnaissance system pallet ½
- HUD - Head up display
- MDU - Magnetic detector unit
- SWAH - Signal warning audible for the headset
- HSI - Horizontal situation indicator
- GCU - Generator control unit
- MDU (SAHRS) - Magnetic detector unit
- CTA - Current transformer assay
- CCTVS - Color cockpit TV sensor
- CP (V/UHF 2) - Control panel of V/UHF #2
- RIFU - Aerial reconnaissance system interface computer
- CP (V/UHF 1) - Control panel of V/UHF #1
- CP (SAHRS) - Control panel of the standby attitude heading reference system
- EPCU - External power control unit
- V/UHF - Transceiver V/UHF

T27 avionics - Aeroelectronica has developed, manufactured and provides maintenance

- PTR - Radio transference panel
- USV - Voltage sensor unit
- UAS - Sound alarm unit
- CRA - Armament relay box
- UAB - HDG tray adaptor box

- PCA - Armament command panel
- CTR - Radio transference box
- TAC - Alarm temporizer of low level fuel
- PRA - Armament repeater panel
- UCT - Temperature control unit
- ISA - Armament system intervalometer

A-29 Super Tucano Avionics

- DVR - Data video recorder
- MDP - Mission display processor
- SIU - Station interface unit
- CMFD - Color multi -function display

7.2.34. Aeroelectronica: recent announcements and strategic initiatives

2010: The company announced the installation of a center for the development and manufacture of UAVs in Brazil. The initiative is in accordance with the Brazilian government's aim to develop and understand this technology domestically, and it also meets the intent of Air Force Command to acquire UAVs for the use of the Brazilian Air Force.

2009: Aeroelectronica is one of the nine companies that received a request for information (RFI) from the Brazilian Air Force for the acquisition of a UAV. The UAV will be used in reconnaissance missions and as a communications relay platform.

7.2.35. Aeroelectronica: alliances

Table26:Aeroelectronica– Alliances

Alliances	Partner Company	Year Formed	Strategic Objectives and Focus Area
Joint ventures	Embraer Defesa e Seguranca S.A.	2011	**Product focus:** To create HarpiaSistemas, eventually maintain, modify, and offer the Hermes and other unmanned aerial vehicle (UAV) to Brazil and other countries in Latin America.
Partnership	Raytheon Corporation	2011	**Product focus:** To provide cables, harnesses, and wiring for defense systems and defense mechanisms**.**

Source: Company website and SDI analysis © **SDI**

7.2.36. Aeroelectronica: recent contract wins

Table27:Aeroelectronica– Recent Contract Wins			
Date	**Contract value**	**Client**	**Description**
2009	Not available	The Brazilian Army	The company was selected to integrate the new armored vehicle personnel carrier for the Brazilian Army VBTP-MR 6×6 of Iveco, a remotely controlled weapon system.
Source: Company website and SDI analysis			**© SDI**

7.2.37. Indústria Naval do Ceará: overview

Indústria Naval do Ceará (INACE), located in Fortaleza, Brazil, is a mid-sized shipyard involved in the construction and repair of ships, primarily steel and aluminum luxury yachts and warships. The range of vessels manufactured and repaired by INACE includes fishing boats, tug boats, towboats, barges, offshore support vessels, luxury yachts, and patrol craft. The company also manufactures marine parts and accessories.

7.2.38. Indústria Naval do Ceará: products and services

Naval patrol vessels

- Guanabara
- Guarujá
- Brendan Simbwaye
- NAPA 500

Naval fast patrol boats

- AvisoPatrulhaDourado
- Barracuda
- Marlim
- Steel landing craft mechanized (LCM) - (EDVM 25 Class)

7.2.39. Indústria Naval do Ceará: recent announcements and strategic initiatives

May 2016: INACE delivered two tugboats for the Cargill.

February 2015: The company delivered its Hidroceanográfico Fluvial (NHoFlu) to the Brazilian Navy.

2010: INACE delivered a first-class patrol boat called Macaéfor the Brazilian Navy.

2009: INACE delivered the Warning Patrol Golden model boat to the Brazilian Navy, to be used for marine patrol in ocean areas off the Brazilian coast.

7.2.40. Indústria Naval do Ceará: recent contract wins

Table28:Indústria Naval do Ceará– Recent Contract Wins

Date	Contract value	Client	Description
September 2009	US$1.4 million per unit	The Brazilian Navy	The company supplied warning patrol boats to the Brazilian Navy for the patrol of ocean areas off the Brazilian coast. The boat has the capability to transport six crew members and to displace 45 tons with a full tank. It can operate unmanned and reach speeds of up to 27 knots.
June 2009	Not available	The Brazilian Navy	The company entered an agreement with the Brazilian Navy to construct 12 naval patrol boats in Fortaleza, with funding available for a further six boats. The shipyard also produced two NAPA 500s naval petrol craft for US$38 million each.
January 2009	Not available	The Namibian Navy	The company sold a patrol boat to Namibia, the first naval vessel ever produced in Brazil for an African country.

Source: Company website and SDI analysis © **SDI**

7.2.41. Northrop Grumman Brazil: overview

Northrop Grumman Corporation (Northrop Grumman) is a defense and aerospace technology company based in the US. It was formed in 1994, following the purchase of Grumman by Northrop. The company is one of the largest defense contractors in the world and the largest naval vessels construction company. The company operates five business units: information and services, electronics, aerospace, shipbuilding, and technical services. The electronics unit produces a large variety of advanced defense electronics and systems. The company also manufactures marine parts and accessories.

7.2.42. Northrop Grumman Brazil: products and services

Navigation systems

- Navigation systems for NAPA 500-ton patrol boats
- Navigation radars
- Integrated bridge systems (IBS)
- Heading and speed sensors
- Mission data recorder
- Steering control
- Echo sounders
- MK27F and MK39 ship inertial navigation systems (INS)
- MK 27F fiber-optic attitude and heading reference systems

Communication systems

- Air traffic communication systems
- Multi-role electronically scanned array (MESA) airborne early warning system
- PAE T6 and PAE M7 multi-mode digital radios

UAVs

- Fire scout vertical take-off and landing UAVs

Naval system

- APN-241 radar and the International Patrol Frigates

7.2.43. Northrop Grumman Brazil: recent announcements and strategic initiatives

2013: The company participated in the Latin America Aerospace and Defence (LAAD) 2013 exhibition held in Rio de Janeiro, and showcased an array of global defense and security capabilities, including marine navigation and unmanned ground systems.

2011: The company announced that it participated in the Latin America Aerospace and Defence (LAAD) 2011 exhibition held in Rio de Janeiro, and showcased its defense and security capabilities such as marine navigation, communications, command and control, and unmanned aerial systems.

2009: The Sperry Marine business unit of Northrop Grumman secured a contract to supply the Brazilian Navy with advanced navigation systems for four new NAPA 500-ton patrol vessels, with the option of six additional vessels. Sperry Marine will supply integrated bridge systems based on its new-generation VisionMaster FT navigation technology, including VisionMaster FT consoles, an electronic chart display and information system, navigation radars, heading and speed sensors, echo sounders, steering control, mission data recorder, and other sub-systems.

7.2.44. Northrop Grumman Brazil: alliances

Table29:Northrop Grumman– Alliances			
Alliances	**Partner Company**	**Year Formed**	**Strategic Objectives and Focus Area**
Partnership	Flight Technologies Sistemas SA	2012	**Product focus:**To develop a system to monitor Brazil's borders through radars, communications systems, and drones to detect smuggling, terrorism, and drug trafficking activity.
Memorandum of Agreement (MoA)	GNS Industry and Trade and RCS Precision Machining and Maintenance	2012	**Product focus:** To explore work packages useful for precision-machined aluminum components and sub-assemblies, to be used for aerospace and defense machining work.
Source: Company website and SDI analysis			**© SDI**

7.2.45. Northrop Grumman Brazil: recent contract wins

Table30:Northrop Grumman – Recent Contract Wins			
Date	**Contract value**	**Client**	**Description**
August 2014	US$300 million	The US Air Force Weather (AFW)	A contract to deliver a full range of terrestrial and space environmental information, products and services to military users worldwide
February 2014	US$200 million	The US Air Force	A contract for the purchase and sustainment of its embedded global positioning/inertial navigation systems (EGI)
February 2014	US$12.4 million	The US Army	A contract to provide an important subsystem for a military global satellite communications (SATCOM) network
December 2013	Not available	Brazilian Airspace Control System Implementation Commission (CISCEA)	To upgrade the air traffic communications systems for the entire Integrated Centre for Air Defence and Air Traffic Control 3 (CINDACTA3) airspace region of Brazil
September 2009	Not available	The Brazilian Navy	The Sperry Marine business unit of Northrop Grumman signed a contract to supply the Brazilian Navy with advanced navigation systems for four new NAPA 500-ton patrol vessels, with options for six additional vessels.
April 2009	Not available	The Brazilian Navy	The Sperry Marine business unit of Northrop Grumman has been awarded contracts to supply state-of-the-art navigation systems for two new 500-ton patrol boats for the BrazilianNavy.
March 2009	US$19 million	CISCEA	Park Air Systems, a European air traffic control systems subsidiary of Northrop Grumman, secured a contract with the Brazilian Airspace Control System Implementation Commission (CISCEA), to supply and install the complete UHF/VHF T6 extended range communication stations, at multiple sites across Southern Brazil.
Source: Company website and SDI analysis			**© SDI**

7.2.46. Lockheed Martin Brazil: overview

Lockheed Martin Corporation (Lockheed Martin) is involved in the research, design, production, integration, and sustainment of advanced defense systems and products. The company was formed in 1995 through the combination of the Lockheed Corporation and Martin Marietta Corporation. The company operates in four business segments: aeronautics, electronic systems, information systems and global services, and space systems. Its defense products are manufactured by the company's electronic systems business division. The company is involved in defense operations with a number of countries, including Brazil. Lockheed Martin offers Brazil a range of defense products and services, including aircraft, radars, combat systems, logistics support, and training.

7.2.47. Lockheed Martin Brazil: products and services

Combat systems

- Open-architecture combat system for submarines
- Sonar and fire control
- Weapons launch systems

Radar systems

- Long-range 3D radars
- The vigilance of the Amazon (SIVAM) B-34 radar

Aircrafts

- C-130 transport aircraft
- P-3 Orion maritime surveillance aircraft

7.2.48. Lockheed Martin Brazil: recent announcements and strategic initiatives

2011: The company announced that its integrated combat system, which is used on the SS Tapajo U209 model type of Tupi-class submarine, was tested by the Brazilian Navy.

7.2.49. Lockheed Martin Brazil: alliances

Table31: Lockheed Martin– Alliances

Alliances	Partner Company	Year Formed	Strategic Objectives and Focus Area
Teaming agreement	AtmosSistemasLtda	2011	**Product focus**: To pursue the Brazilian Air Force's future 3-D long-range radar procurement program, which seeks to upgrade and enhance air space control over South America's largest country.

Source: Company website and SDI analysis © **SDI**

7.2.50. Lockheed Martin Brazil: recent contract wins

Table32:Lockheed Martin– Recent Contract Wins

Date	Contract value	Client	Description
May 2014	US$20 million	The Brazilian Air Force	A contract to upgrade six Brazilian Air Force B34 (TPS-77) radar systems, used for air surveillance and air traffic management
April 2009	US$1.6 million	The Brazilian Air Force	Lockheed Martin received a contract from the Brazilian Air Force to support six of its TPS-77 long-range air surveillance radars, which are currently monitoring airspace in the Amazon region.
January 2008	US$35 million	The Brazilian Navy	Lockheed Martin secured a contract with the Brazilian Navy to deliver advanced, open-architecture combat systems that will modernize four Tupi-class submarines, one Tikuna-class submarine, and one shore-based trainer system for the Brazilian Navy. Under a contract administered by the US Navy, Lockheed Martin will provide systems engineering, sensors, software, and electronics for the modernization of the diesel submarines' control, and combat management, as part of a foreign military sale of weapons and combat systems to the Brazilian Navy.

Source: Company website and SDI analysis

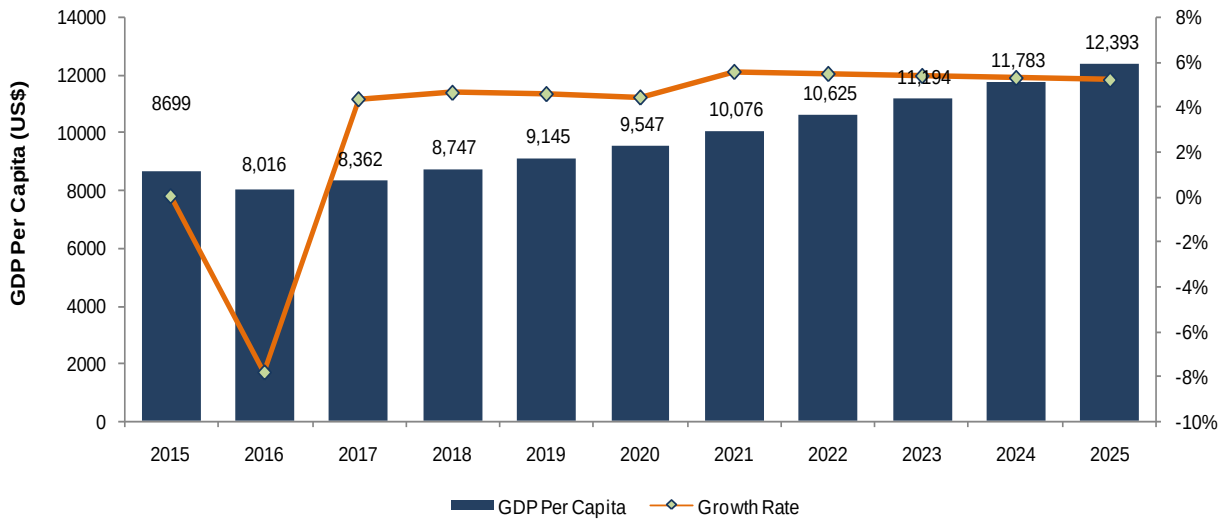
8. Business Environment and Country Risk

The following sub-sections detail a range of indicators and assess the Brazilian business environment and country risk.

8.1. Economic Performance

8.1.1. GDP per capita at constant prices (US$)

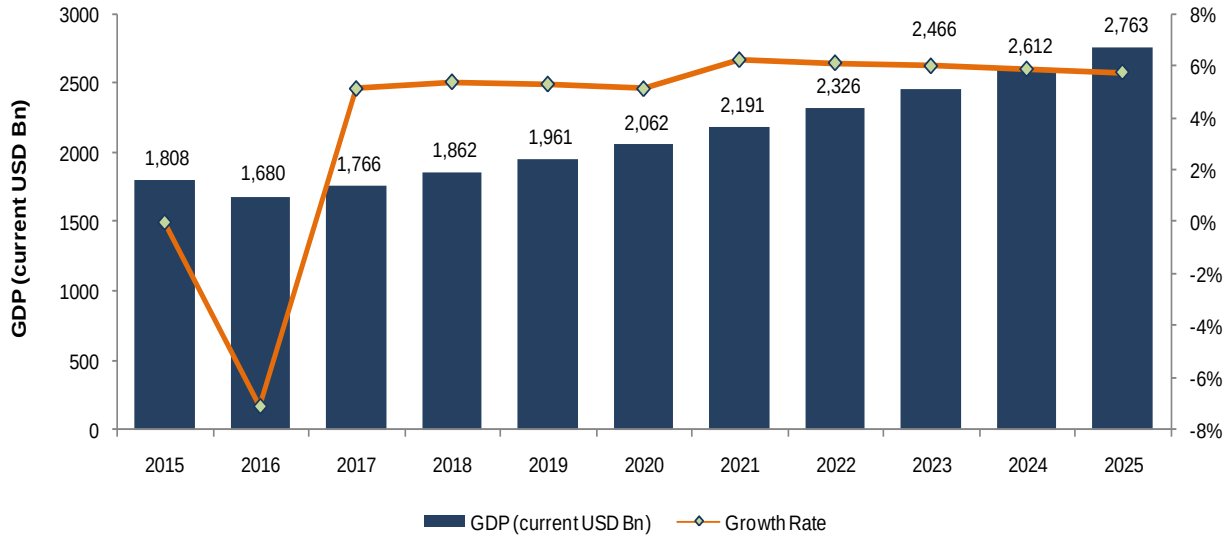
Figure 40: Brazilian GDP Per Capita at Constant Prices (US$), 2015–2025



Source: World Bank and SDI analysis

8.1.2. GDP at current prices (US$)

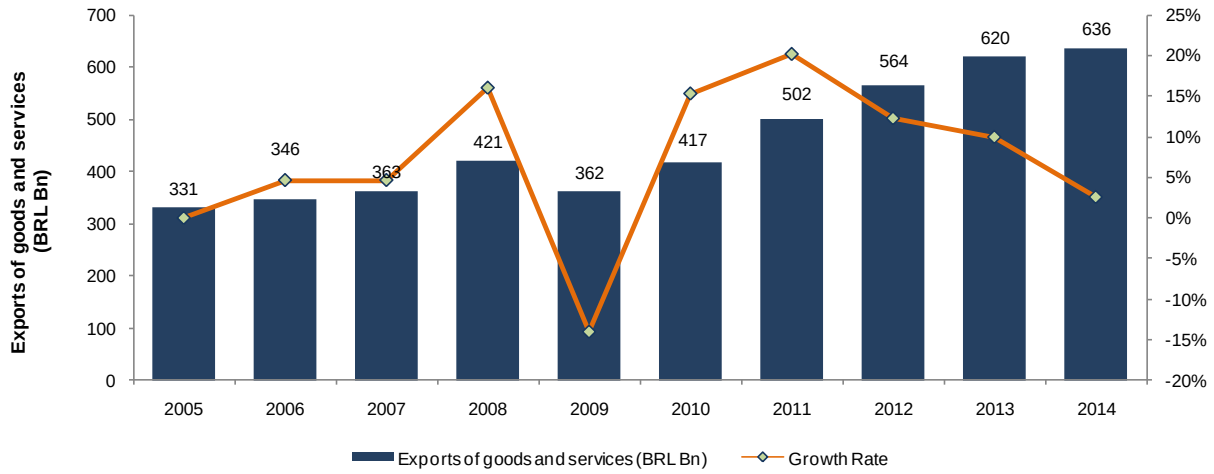
Figure 41: Brazil GDP at Current Prices (US$ Billion), 2015–2025



Source: World Bank and SDI analysis

8.1.3. Exports of goods and services (BRL)

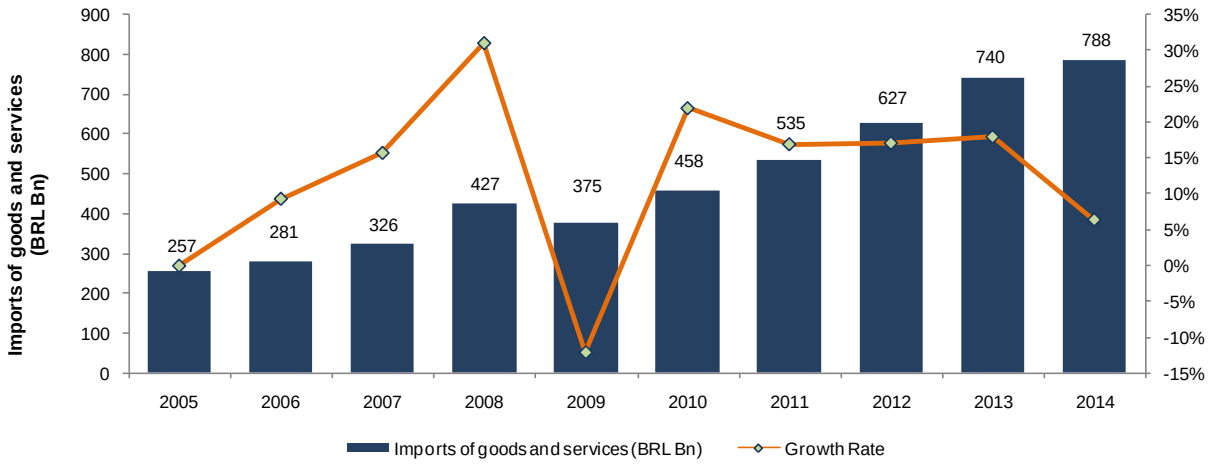
Figure 42: Brazilian Exports of goods and services (BRL Billion), 2005–2014



Source World Bank and SDI analysis

8.1.4. Imports of goods and services (BRL)

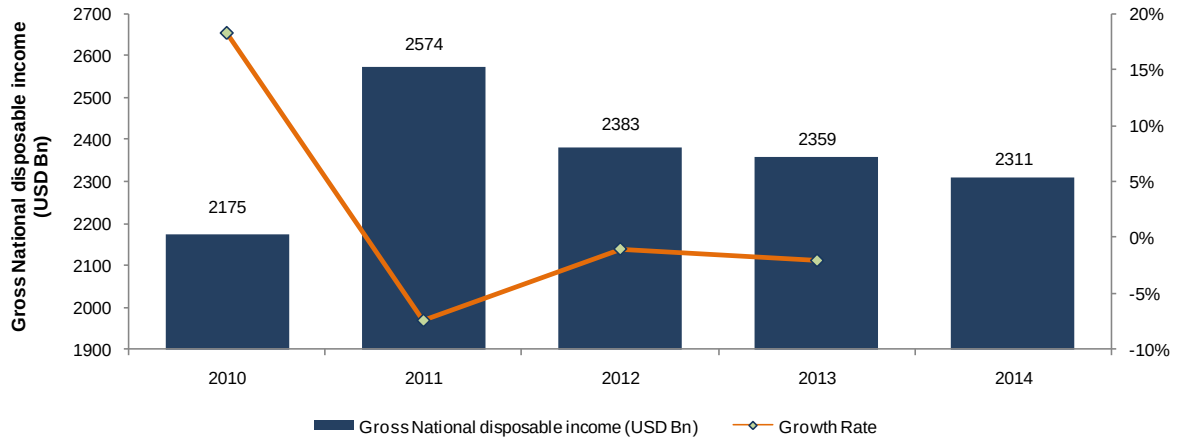
Figure 43: Brazilian Imports of goods and services (BRL Billion), 2005–2014



Source: World Bank and SDI analysis

8.1.5. Gross national disposable income (US$ Billions)

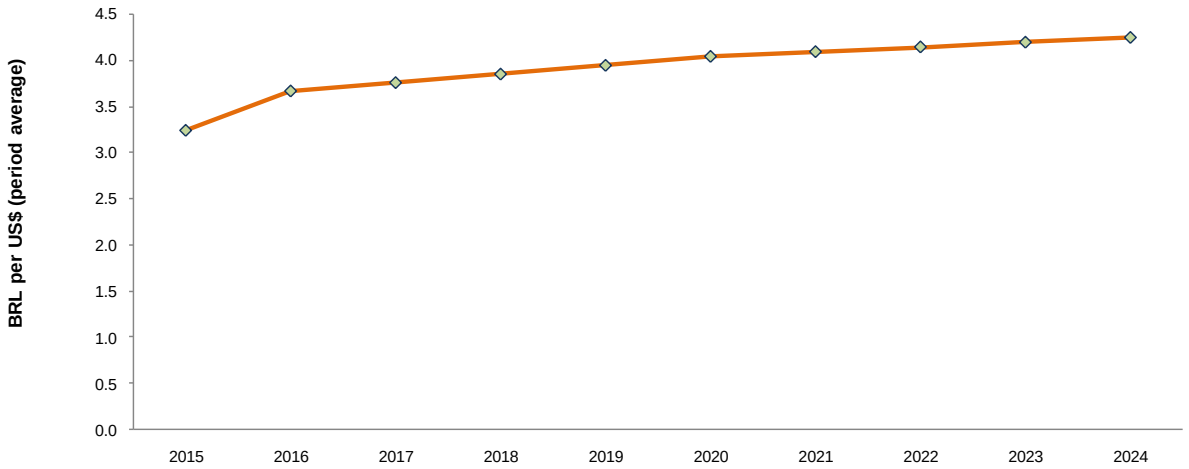
Figure 44: Brazilian Gross National disposable income (US$ Billion), 2010−2014



Source: World Bank and SDI analysis

8.1.6. BRL per US$ (period average)

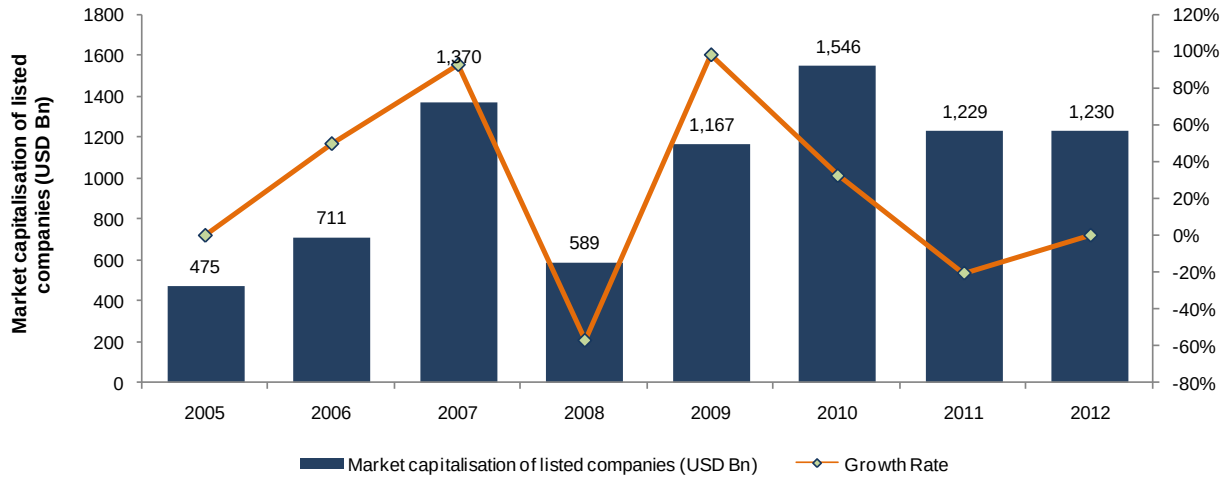
Figure 45: Brazilian BRL per US$, 2015–2024



Source: World Bank and SDI analysis

8.1.7. Market capitalization of listed companies (US$ Billions)

Figure 46: Brazilian market capitalization of listed companies (US$ Billion), 2005–2012



Source: World Bank and SDI analysis

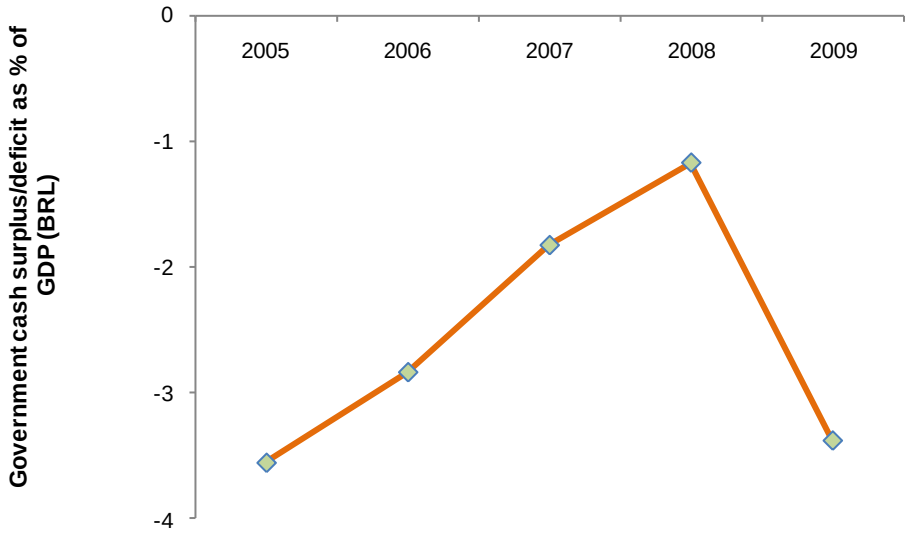
8.1.8. Market capitalization of listed companies (% of GDP)

Figure 47: Brazilian market capitalization of listed companies (% of GDP), 2005–2012

Source: World Bank and SDI analysis

8.1.9. Government cash surplus/deficit as a percentage of GDP (BRL)

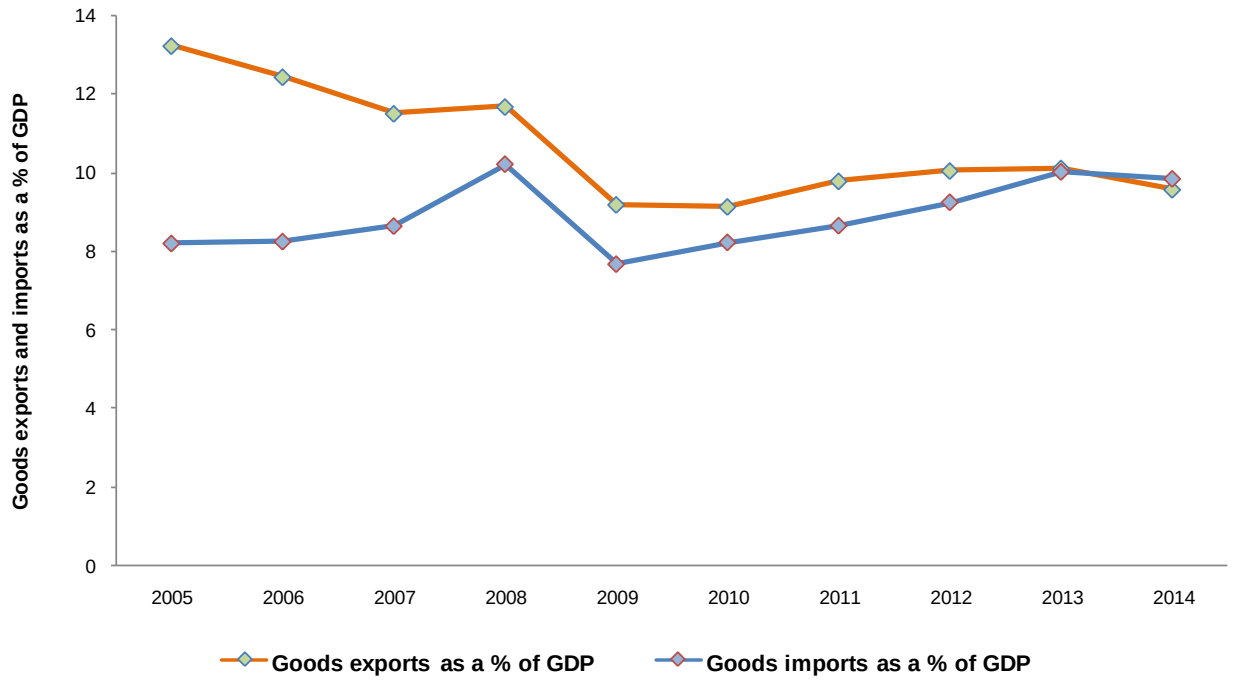
Figure 48: Brazilian Government cash surplus/deficit as % of GDP (BRL), 2005–2009



Source: World Bank and SDI analysis

8.1.10. Goods exports and imports as a percentage of GDP

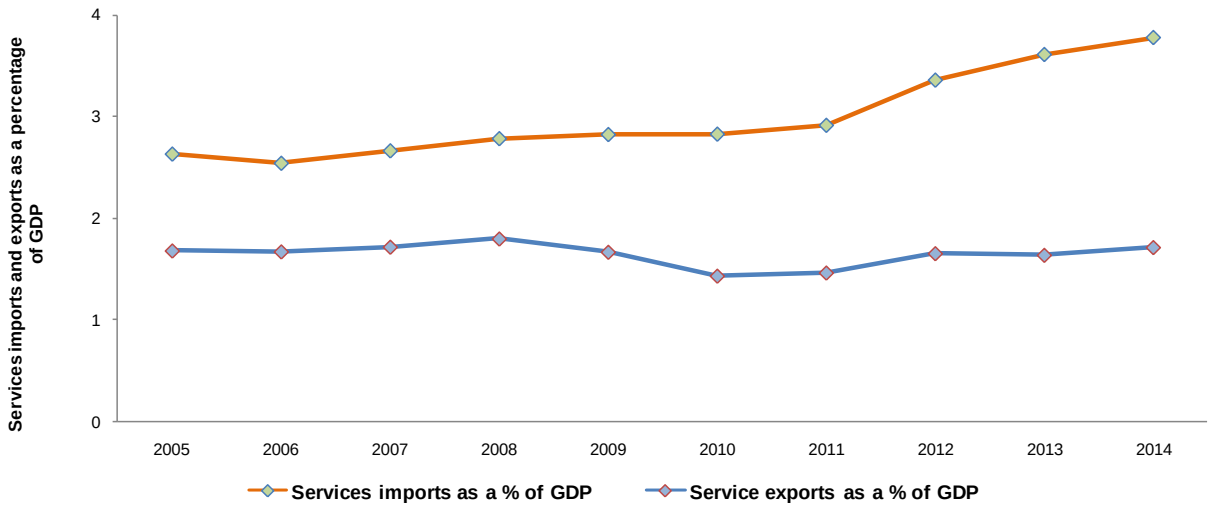
Figure 49: Brazil– Goods exports and imports as a % of GDP (%), 2005–2014



Source: World Bank and SDI analysis

8.1.11. Services imports and exports as a percentage of GDP

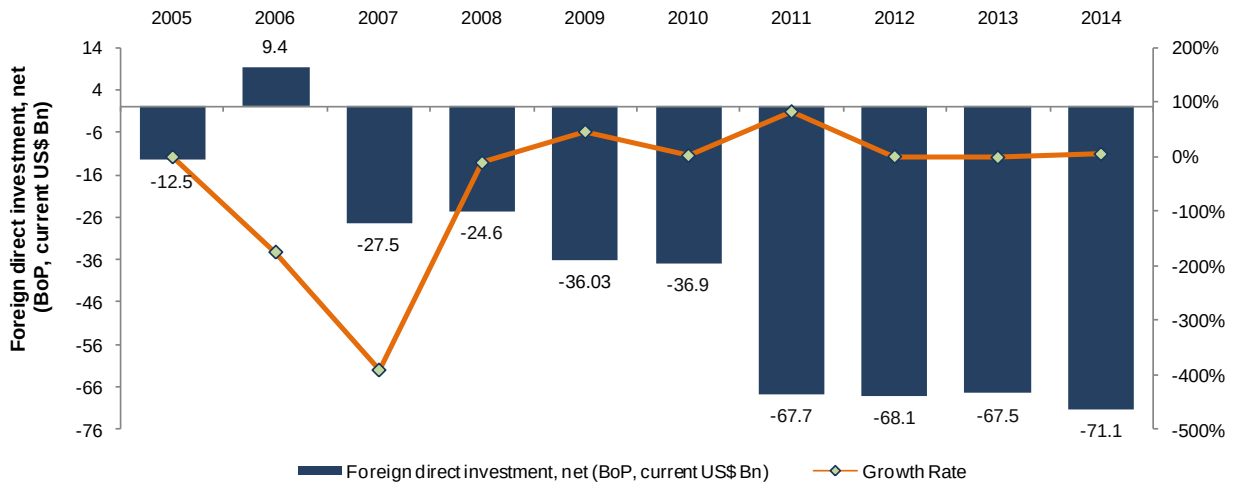
Figure 50: Brazil–Services imports and exports as a % of GDP (%), 2005–2014



Source: World Bank and SDI analysis

8.1.12. Foreign direct investment, net (BoP, current US$ Billions)

Figure 51: Brazilian Foreign direct investment, net (BoP, current US$ Billion), 2005–2014



Source: World Bank and SDI analysis

8.1.13. Net foreign direct investment as a percentage of GDP

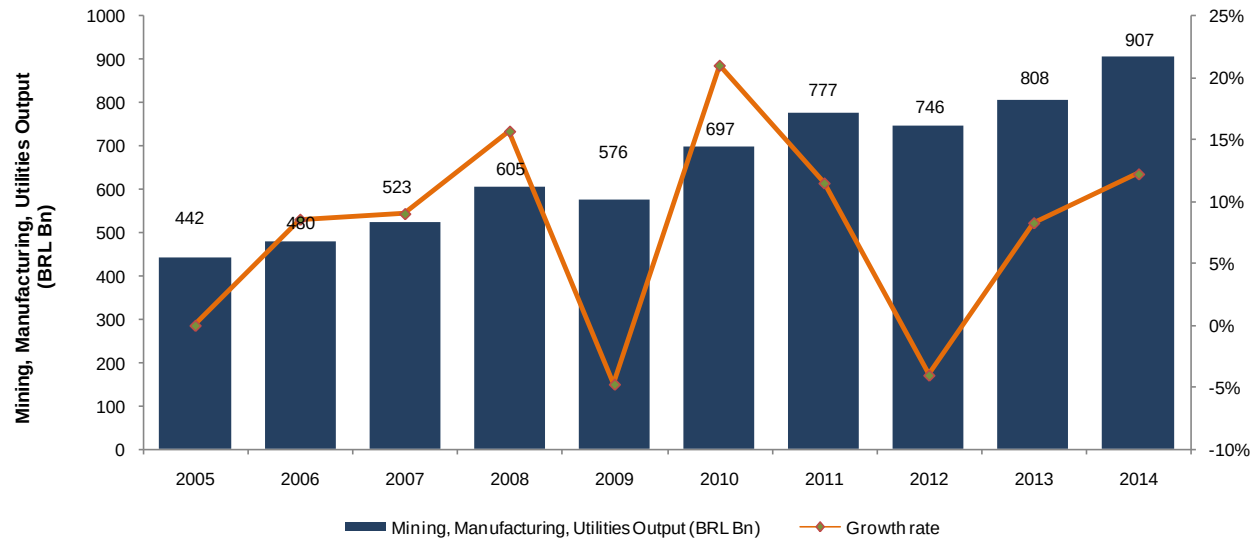
Figure 52: Brazilian Net foreign direct investment as % of GDP, 2005-2014

Source: World Bank and SDI analysis

8.2. Mineral

8.2.1. Mining, Manufacturing, Utilities Output (BRL Billion)

Figure 53: Brazilian Mining, Manufacturing, Utilities Output (BRL Billion), 2005–2014



Source: UNSTATS, World Bank and Timetric analysis and SDI Analysis

9. Appendix

9.1. About SDI

SDI is a premium business information brand specializing in industry analysis.

9.2. Disclaimer

The facts of this report are believed to be correct at the time of publication but cannot be guaranteed. Please note that the findings, conclusions and recommendations that SDI delivers will be based on information gathered in good faith from both primary and secondary sources, whose accuracy we are not always in a position to guarantee. As such, SDI can accept no liability whatsoever for actions taken based on any information that may subsequently prove to be incorrect.