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An Overview of the Certification of VSB-30 with Emphasis on Technological Innovation

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Abstract: *This article is focused on the space sector, mainly due to the devices developed and marketed that require high investments in research, development and technological innovation, supported by a permanent need to meet the standard requirement to guarantee their effectiveness, among all the correct certification. In such scenario, this article has examined, highlighting technological innovation, which are the context and elements involved in the certification of the Vehicle Survey Booster – 30 (VSB-30). The research is characterized as a case study, conducted in the first semester of 2011, and it consisted of reviewing the literature on technological innovation and certification as well as information available in various reports, some of which were public, and interviews. The article presents a brief description of the development of the VSB-30, its importance to the market and the relevant aspects of the certification and the Certification Body of Brazil. The conclusion is that the certification is a contribution to technological innovation for it provides benefits in process improvement, especially regarding the question of documentation, creating conditions for the industry to adapt to formal established and qualified processes and, in return, to become restricted to trade companies unable to adjust to these requirements.*

Keywords: *Space Systems, Technological Innovation, Aerospace Certification.*

INTRODUCTION

The search for autonomy, qualification and industrial competitiveness, and also to give something in return to society in the space sector is a triad established in the National Program of Space Activities (PNAE), with the objective to gain technological independence in the space sector in Brazil, once the technology will be reversed to society, regardless of the origin being military or civilian. It is a major way to join the leading countries in the modern space conquest. One scale of this conquest is presented in Chart 1, in which Brazil has progressed to level four.

It is not only about technological independence in the space sector, but also the search for competitiveness in the national aerospace industry, thus making it less technologically dependent, so that knowledge and technology (pillars of the knowledge society) be equipped, and strengthening the industry into one of the supporting pillars of society.

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The national aerospace industry exists in a complex market, in which the developed and sold devices require high investments in research, development and technological innovation. It is constantly subjected to meeting technological criteria, in which the acquisition of technologies and processes is refused, so they need to be developed without subsides of countries who have such knowledge.

With the perspective to overcome these restrictions, Landini and Cabral (2005) reported the technological transfer and cooperation in the Brazilian Space Program. According to the authors, countries like Brazil are forced to develop sensitive technologies in case they want to concrete their programs. In the Brazilian case, there was the need to conceive, project and build processes and products with the country's own resources.

Among the products of the space sector, there are small satellites, flight equipment, sounding rockets, launching vehicles, services of satellite imaging application, propulsion, among others (Brazilian Association of Aerospace Industries, 2011).

Chart 1. Scale of countries in the modern space conquest.

Level	Corresponding objective	Countries or multinational groups
Ten	Manned landing in Mars, Phobos or Deimos.	None
Nine	Permanent base on the moon, enabling visits to objects that are close to the Solar System.	None
Eight	Moon landing, with continuous orbital presence.	The United States of America
Seven	Independent ability to send astronauts into the space	Russia and China
Six	Ability to train astronauts and conduct scientific missions.	Europe and Japan
Five	Independent ability to launch satellites to the Earth's orbit.	India and Israel
Four	Existence of a National Space Agency with its own satellites.	Argentina, Australia, Brazil, Canada, South Korea, Iran, Nigeria, Pakistan, Taiwan and Ukraine
Three	Existence of a National Space Agency without its own satellites.	South Africa, Saudi Arabia, Argelia, Bangladesh, Chile, North Korea, Indonesia, Malaysia, Peru, Thailand and Turkey
Two	Existence of Science Academy and human resources related to space.	Armenia, Belarus, Singapore, Colombia, Croatia, Georgia, Lebanon, Mexico, New Zealand, Servia and Venezuela
One	Existence of observatories, planetarium and/or astronomy clubs.	Albania, Azerbaijan, Bahrein, Belize, Bolivia, Bosnia, Brunei, Congo, Costa Rica, Cuba, Equator, Egipt, the United Arab Emirates, Ethiopia, Philippines, Gana, Jamaica, Jordan, Kazakhstan, Kuwait, Libya, Macedonia, Madagascar, Morocco, Moldova, Montenegro, Namibia, Oman, Qatar, Dominican Republic, Syria, Sri Lanka, Tajikistan, Tunisia, Turkmenistan, Uruguai, Uzbekistan, Vietnam and Zimbabue

This market requires elaborate products that can permanently guarantee to meet the requirements and needs imposed by the clients, considering the will of the stakeholders (including national sovereignty); the main action to ensure this guarantee is the certification.

Then, the certification is seen as an instrument that enables the transfer of technology between the institution of Research and Development (R&D) and the industry, as well as an instrument to deal with barriers imposed by technology.

From this point of view, this article aimed to describe which are the context and elements involved in the certification of the Vehicle Survey Booster – 30 (VSB-30), with emphasis on technological innovation. In order to complement the presented objective, the VSB-30 is described, as well as its importance in the market and relevant aspects regarding certification; the Brazilian certification body is also introduced.

THEORETICAL BASE

Theory is based on academic literature review about technological innovation and information concerning certification.

Technological innovation

Knowledge and technology become increasingly important as one of the most effective instruments to promote economic development in the world scenario. It is about a

view that surpasses the gates of the enterprise and the industry itself, thus leading new services, products and production processes to appear faster and faster in society (Jungmann, 2010).

Taking knowledge and technology into consideration means to search for an efficient way to manage technological innovation.

Technological innovation also causes great economic impacts that can pass unnoticed for the following years, or even for long periods. According to Freeman (1975), innovation may induce the creation of other innovations, so the date innovation was created should not be used as an indicator to analyze its impacts, but the period of its dissemination and diffusion in the market.

Technological innovation can be defined as the implementation of a new product or process in terms of technology that brings significant improvement into the market, that is, it should be introduced in the market (innovation in the product) or used in the production (innovation in the process). As presented in the Oslo Manual, a product or process needs to be new (or substantially improved) for the company (not necessarily to the world) in order for there to be innovation (Organisation for Economic Co-operation and Development, 2005).

For Tigre (2006), a company that implements technological innovation shows that it is possible to be different, thus enabling the accumulation of knowledge and practice for learning, besides the unique competitive advantage after being recognized among competitor companies. Innovation is usually a result of scientific research and the development of a product.

Even if innovation is considered as a factor that can distinguish one company from another and enable a unique competitive advantage, Tigre (2006) says that the efficiency of an industry depends on the specialization pattern of a country and its demand for technology. In order to reach competitive ability levels, the mechanisms of the market are not enough; thus, public policies are necessary for specialization, technological infrastructure and measures that support innovation.

By innovating and improving transferred technologies, the local industry can manufacture new products and develop new production methods, or superior means to employ the acquired technology, thus increasing the technological ability of the industry (Yeo, 1999).

Certification

According to the Brazilian Association of Technical Standards (2006), the certification is a way to evaluate the compliance of an organization, regardless of the parts that are directly involved in the commercial relation. To complement this definition, according to the Department of Aerospace Science and Technology (2009), the certification corresponds to a "process by which an organization checks and confirms the application of requirements that were established for a product. It represents a very important activity in the technological and industrial development".

Likewise, based on the instructions of Aeronautics regarding the certification of products and the governmental insurance of quality (Department of Aerospace Science and Technology (2006), the certification is: "the process by which the Brazilian Aeronautical Command (COMAER) insures the application of requirements established for a product or a quality management system". The mentioned concept is used for:

- Type certificate: process to ensure the project of a product is in accordance with the requirements related to safety and to the accomplishment of the mission, thus officially recognizing this conformity;
- Integration certificate: process to ensure that the integration of a platform project (aircraft, space vehicle and arms) are in accordance with the requirements related to safety and to the accomplishment of the mission, thus officially recognizing this conformity;
- Modification certificate: process to ensure that any changes in the certified product is in accordance with the established requirements;
- Convalidation: process to ensure that an organization that supplies the product is capable of producing it in accordance with the project verified during the process of certification, unlike the one with the type certificate, thus meeting the requirements related to safety and the accomplishment of the mission established for the product;
- Supplier certificate: process to ensure that the quality management system from a supplier organization is in accordance with the established requirements;

- Quality control: activity performed with the suppliers during the length of the contract in order to ensure the that the supplied material is in accordance with the established requirements;

- Authorized operation return: consent of operation return after proving that the services were executed according to previously approved technical data; and

- Product installation: is related to the infrastructure of the product.

The action of certifying a product, service or system means to prove to the market and to the costumers that the organization has a controlled manufacturing system, which invested in training personnel, or even that it has an active management system, which makes sure that the specified activities are in accordance with the rules.

According to the Brazilian Association of Technical Standards (2006), the main benefits brought by the certification are: to ensure the efficacy of the product, service or system; to ensure that the product, service or system will meet the standards; to introduce new products and brands into the market; to face the unfair competition; to reduce losses in the productive process and to improve management; to improve the image of the organization and its products or activities with the clients and decrease control and evaluations from the clients.

The listed benefits, as well as the need to have products that are technologically innovative, show the certification should not be seen only as a bureaucratic instrument, but also as a tool to deal with the barriers imposed by technology, that is, the certification corroborates with technological innovation in terms of implementing a technologically new product (or with significant improvements) in the market, thus allowing the accumulation of knowledge and the practice for learning, in search of a competitive advantage.

METHODS

Minayo (1993) informs that research is a scientific activity to solve problems and to discover reality, based on a process that will enable to discover new facts or data in any field of knowledge as a result of the combination of theory and collected data. The result of the research does not necessarily demonstrate an absolute true, since results and new discoveries are frequently renewed.

The research techniques vary according to the condition of the object of study; in this article, the research is characterized as a case study. Yin (2005) informs that the case study is chosen when questions such as "how" and "why" are used, and also because the control of the investigator over the events is much reduced, or when the temporal focus is in contemporary phenomena in the context of real life. This kind of investigation is particular, since its general feature is limited because the validity of its conclusions is still contingent.

The research was carried out in the first semester of 2001, and consists of the literature review on technological innovation and certification, as well as information that is available in different reports, some of which are public, and interviews with experts involved in the certification of VSB-30.

The analyzed reports were in the Department of Aerospace Science and Technology, the Institute of Aeronautics and Space and the Institute of Fomentation and Industrial Coordination, and some of them are public. An unstructured and qualitative interview was applied to the coordinator of the certification process. The participation of managers of the mentioned institutions guided and facilitated the research.

The steps of the research aimed to understand the relevant aspects about the Brazilian certification body, about the VSB-30 and the used certification process, with the objective to describe which are the context and elements involved in the certification of the vehicle, emphasizing the technological innovation.

NATIONAL CERTIFICATION SYSTEM IN THE SPACE FIELD

In the space field, the Brazilian Space Agency is responsible for the certification and normalization of space activities, and it is established under the terms of Article 3rd, Law n. 8,854, from February 10, 1994, subsections XIII and XIV, with the following attributions: to establish rules and expedite licenses and authorization concerning space activities, and to apply quality and production standards in space activities.

In order to fulfill its goal in the certification and normalization fields, the Brazilian Space Agency created the National System of Certification in the Space Field (SINCESPAÇO), with the objective to promote the quality and safety of space activities in Brazil, as well as to develop the national space sector.

The proposed certification mechanisms can include both the volunteer and the mandatory certification, depending on the standards, technical standards, and other related documents. In order to manage these normative acts the Brazilian Space Agency uses the Program to Support the Normalizing and Quality Activities in the Space Field (QUALIESPAÇO), with the objective to elaborate normative documents and promote them to ensure quality, safety and reliability of the products (goods and services) related to space activities. It is possible to observe that the actions of the certification agency are focused on: implementing and operating the access and propagation of technical standards; accelerating the actions of the Brazilian Association of Technical Standards in regards to the normalization of the space field; stimulating the Brazilian participation in the process of elaborating norms in the context of ISO; and establishing technical and administrative bases to implement national mechanisms of certification in the space field.

The action of the agency in the normalization and certification segments is performed with the Brazilian Association of Aerospace Industries; the National Institute for Space Research and the Institute of Fomentation and Industrial Coordination.

Certification Body

A certification body is an organization authorized by the Brazilian Space Agency to certify within the National Development System of Space Activities (SINDAE).

The Brazilian Space Agency nominated the Institute of Fomentation and Industrial Coordination as a certification body on January 7, 2011, resolution n. 3, which was issued by the Brazilian Space Agency (Diário Oficial da União, 2011, p. 13).

The Institute of Fomentation and Industrial Coordination was considered as a Scientific and Technological institution from the Aeronautics Command (COMAER). It responds to the Institute of Aeronautics and Space and belongs to an innovative research complex of development, teaching and laboratories, as presented in Fig. 1. At COMAER, the Department of Aerospace Science and Technology is in charge of certifications, and delegates the work to the institute.

The institute plans to generate knowledge and assistance especially to three sectorial objectives established by the Department of Aerospace Science and Technology (2010): to establish partnerships with the aerospace and defense industries from the conception of studies, which encourage the aerospace scientific and technological complex; to rapidly meet the demands of the Brazilian Air Force for technical and scientific activities related to the aerospace fields; and to develop technical professional programs to improve cultural and intellectual levels.

Fundraising for R&D projects at the Department of Aerospace Science and Technology comes from different actors and means; sometimes, researchers and technicians are the main sources: federal budget, bodies that lead to the development of science and technologies, partner companies and specialized technical services.

The Institute of Fomentation and Industrial Coordination is internationally recognized and is part of the Brazilian System Evaluation of Conformity (SBAC), with the responsibility to certify in different fields. It is supported by the accreditation bodies such as the National Institute of Metrology, Standardization and Industrial Quality (INMETRO), the International Accreditation Forum (IAF) and the International Aerospace Quality Group (IAQG).

Among the responsibilities of the institute, the ones related to the certification are: Certification of Quality Management Systems (OCS n. 0016), according to registration n. 21 – Aerospace DM 35.3 (Nace); Certification of Aerospace Quality Management System (OCE n. 0001); and Governmental Certification, based on Brazilian Regulations of Aerospace Quality (RBQA).

It is possible to list some activities related to the space field certification: to give a type certificate in an aerospace product; to certificate an aerospace component; to give a modification certificate, in order to complement the type certificate, in an aerospace product; to validate the certification of an aerospace product; to follow-up and monitor difficulties in the service of a certified aerospace product of COMAER; to give technical assistance to the organization of the aerospace sector, in relation to the certification activities of an aerospace product; to give courses about certification of aerospace products and to give a declaration of technical ability to the manufacturing organizations in order to reproduce the certified aerospace product.

The certification activity in the space field is being built, so there is not a definite and consensual standard among certifiers in different countries. Due to this lack of commonly accepted rules, it is important to understand the certification process of the VSB-30, but besides this understanding, it is worth to describe the vehicle and its importance to the national space industry.

Organization		Location	Main goal
	COPAC	Brasília - DF	Aircraft acquisition and development
	ITA	São José dos Campos - SP	Teaching and research
	IAE	São José dos Campos - SP	Research and development
	IEAv	São José dos Campos - SP	Research and development
DCTA	IFI	São José dos Campos - SP	Certification and fomentation
	GIA-SJ	São José dos Campos - SP	Infrastructure
	IPEV	São José dos Campos - SP	Laboratory units
	CLA	Alcântara - MA	Laboratory units
	CLBI	Natal - RN	Laboratory units
	CPORAER	São José dos Campos - SP	Military formation
	PASJ	São José dos Campos - SP	Housing

Figure 1. Organizational positioning of the Institute of Fomentation and Industrial Coordination.
Fonte: Ellaborated from the Aeronautics Command (2009).

VSB-30

It is a sounding vehicle, also known as research rocket. This device was designed to measure and to be used as a tool for scientific experiments during the suborbital flight. Generally, these vehicles can transport loads from 50 to 1,500km above the surface of the Earth.

The VSB-30 (Fig. 2) is a Brazilian double-stage sounding vehicle, launched by rail. The first stage presents fast combustion of the propellant, and the second is widely used in other sounding rockets, such as Sonda III, VS-30 and VS-30 ORION.

The main characteristics of the vehicle are (Brazilian Space Agency, 2005): total length of 12.6m; maximum diameter of 57m; two stages; total mass of 2,570kg; load mass of 400kg and apogee of 270km.

For experiments in microgravity environment, the VSB-30 enables the load to remain above the altitude of 110 km for about six minutes, without atmospheric resistance, without propeller acceleration and in free fall.

In the European scientific program in high atmospheric layers, the operations to launch the VSB-30 happen in the Esrange launch field, in Sweden, which has a launcher with three rails, unlike the one used in *Centro de Lançamento Alcântara*, with only one rail. Due to the differences in the configuration of the launcher, there are two versions of the VSB-30, one to be launched in Alcântara (Brazil), and the other to be launched in Esrange (Sweden).

The rocket received little international contribution for the project, and Brazil developed its own technology by adopting engineering solutions that are different from those adopted in Europe and the United States; some of ours are even preferable.

The VSB-30 was launched by the Institute of Aeronautics and Space, in 2001, with the German Space Agency (DLR), to respond to the Microgravity European Program with around R$ 5 million in investments; 40% of this amount was granted by DLR. The rocket cost about R$ 750,000.

The first launch was in 2004, and there were eleven launches until March 2011. All of them were successful,

Figure 2. Vehicle Survey Booster – 30 .
Source: Brazilian Space Agency (2005).

and two were launched from *Centro de Lançamento de Alcântara* (MA-BR). In May, 2005, after meeting a serious of requirements related to documents and proofs of performance and safety, VSB-30 was approved by the European Space Agency (ESA) and was able to perform flights in Europe, carrying Texus and Maser scientific loads of the Microgravity European program (Kasemodel, 2010).

The VBS-30 is considered as the most interesting alternative to replace the British Skylark, whose most recent launchings occurred in 2005, thus becoming the supplier in this launcher category.

In 2009, COMAR and the Department of Aerospace Science and Technology announced the certification of VSB-30, leading to series production. This was the first Brazilian rocket to have this certificate.

Nowadays, many companies work in its development and production: Villares, Cenic, Fibraforte, Mectron, Compsis, Avibrás, Orbital, among others.

According to a story in the paper *Valor Econômico*, in June 27, 2009, about the certification of the VSB-30, it is estimated that the global market of suborbital sounding rockets, considering only civil applications, exceeds 100 annual launches for loads (scientific and technological experiments). According to the same story, around US$ 1 million is charged per launch, but the expectation is that there will be 1,500 annual flights if the price of loads per pound is reduced to US$ 250.

PROCESS OF CERTIFICATION OF THE Vvsb-30

The process of certification of VSB-30 in Brazil was performed by the Institute of Fomentation and Industrial Coordination as the certification body, based on: Resolution n. 60, from May 17, 2004, of the Superior Council of the Brazilian Space Agency; and by an instruction of COMAER (ICA 80-2), approved by resolution n. 699/GC3, from July 6, 2006, of COMAER – instruction that guides the certification of aeronautic, space, infrastructure and airspace control products, and also the governmental insurance of these products.

The certification was n. 001T2009, that is, " the project of a product that is in accordance with the requirements related to safety and to the accomplishment of the mission, and officially recognizes this conformity", as established by the Department of Aerospace Science and Technology (2006, p. 8).

The process of certification counted on the evaluation of the European Space Agency (ESA), of the DLR and the Swedish Space Agency (SSC), besides the companies Kayser-Threde and EADS.

The certification of VSB-30 is considered as an important step of its life cycle, so, after that, it is no longer a developing project, but operational, and its production should be totally transferred to the Brazilian aerospace industry.

The certificate was officially given on October 16, 2009, in a ceremony held at the Department of Aerospace Science and Technology, with the participation of many military and civilian authorities. Some months before, the VSB-30 had been qualified by Sweden, and then integrated the products/services of that space agency. Such qualification aims to confirm that the vehicle meets the pre-established specifications, so it could be used as a small launcher in suborbital missions of space exploration (Silveira, 2009).

The guidelines of the certification of the VSB-30 are the requirements related to safety and to the accomplishment of the mission, according to the steps presented in Fig. 3.

Each phase – which always involves the participation of the Institute of Aeronautics and Space, the DLR and the Institute of Fomentation and Industrial Coordination – should consider some aspects, thus not being restricted to the following:

- Pre-requirement phase: certification plan; initial discussion on the base of certification, including aspects such as understanding the standards, applicable regulations, adjustments and equivalent levels of safety; getting to know the developing project; means to confirm the fulfillment of certification requirements (ground and flight rehearsals, among others, including the qualification by foreign organizations); information on the costs of type certification processes; list of critical items and confidentiality agreement, besides significant items. To sum up, these are the guidelines of certifications with procedures and deadlines to be considered during this process.

- Planning phase: norms and equivalent levels of safety; submission of the configuration management plan (CMP) to acceptance; definition of certification base; submission of the certification plan to be submitted to the Institute of Fomentation and Industrial Coordination and dossier of the construction of the device. It corresponds to the formal process of certification, with the definition of participants, resources and necessary activities to be delegates, besides the appropriation of adaptations in case of binational agreements to be connected with the foreign certifying organization.

- Execution phase: rehearsal proposals; simulation of analytical demonstration; requirement approval document; official rehearsals of certification with the participation of the Institute of Fomentation and Industrial Coordination; Engineering inspection to check for the fulfillment of non-confirmed requirements only by analyzing designs and reports; and approval of operational manuals presented by the solicitant, including reviews and supplements. It consists of the implementation of the certification plan, with inspections and rehearsals, examination of technical data, fulfillment of applicable requirements and requests to incorporate the necessary changes.
- Approval phase: description of limitations defined by the requirement of applicable certifications and any other limitation and information that can identify the approved project. So, it is the deliberation of the certificate; then, the Institute of Fomentation and Industrial Coordination confirms that the requirements were fulfilled, and the process is filed.

Even with the existence of a formal process in the Institute of Fomentation and Industrial Coordination, the coordinator of the certification process of the VSB-30 describes there is no structure of space certification that can be compared to that established by the International Civil Aviation Organization, nor a similar safety regulation established in the Civil Aviation that is accepted by the member countries. In fact, there are no internationally accepted predefined rules in the process of certification of the space device.

DISCUSSION

The fact that the Institute of Fomentation and Industrial Coordination is the certification body is in accordance with the National Policy of Space Activity Development (PNDAE), which aims to increase the participation of the government, the private sector, and especially of the Brazilian industries in space programs. The idea is to create opportunities to commercialize products and services related to space.

The work of the Institute of Fomentation and Industrial Coordination as the certification body allows the presence of opportunities and threats or uncertainties that are consistent with the competitive environment, and the main ones are demonstrated in Chart 2.

Some aspects should be analyzed in Chart 2. The State is expected to promote and encourage scientific development, research and technological skills, aiming at the progress of

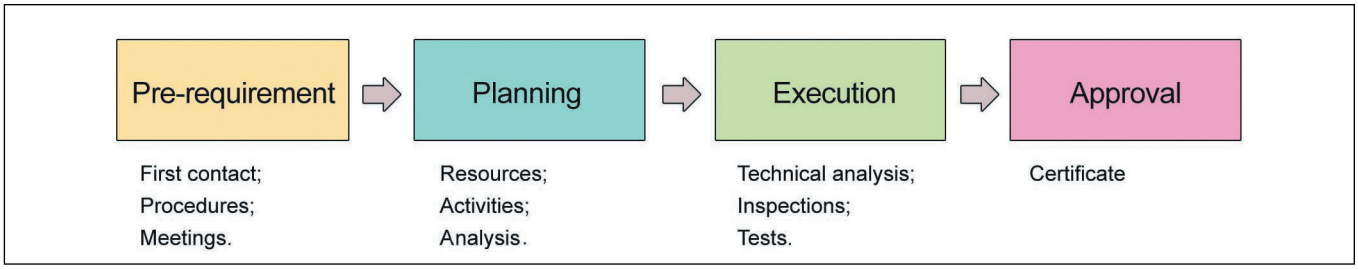

Figure 3. Macro phases of the certification process

sciences and the well-being of society, thus stimulating the internal market in order to enable the cultural and socioeconomic development, and also the technological autonomy of the country.

Technology barriers were seen as a potential threat, due to the increase in commercial restrictions and also to the restrictions to access aerospace technologies. Also, besides the technological barriers, the volume and frequency of resource allocation for R&D activities oscillate, as a consequence of political and economic conjunctures. This leads to interruptions and non-programmed delays, which causes more difficulties to complete what was planned and to search for alternatives to execute the tasks.

However, the PNDAE tries to consolidate and develop the Brazilian advances in space activities. In practical terms, it means to demand that the existing infrastructure be completed and updated, and also that the base of personnel dedicated to space activities be increased and improved. They also ask for more governmental and private participation in space programs, especially concerning the Brazilian industries, so that new commercial opportunities can be created for the products and services related to the space.

To complement the PNDAE, the Ministry of Defense aims to be recognized as a reference organization as to the conduction of subjects related to Science, technology and innovation of interests of national defense by 2015.

The domination of Science, Technology and Innovation management should be pursued both by the Ministry of Defense and the Brazilian Space Agency, once it is seen as an instrument to promote economic development in the world scenario, besides attracting new innovations.

The certification of VSB-30 can be seen as a technological innovation, once it brings significant improvements to the process of acceptance and technological transfer to the market. The mentioned process of certification complements the mechanisms in the market in relation to technological ability, in which the public institution, in this case, the Institute of Fomentation and Industrial Coordination as the certification body, provides mechanisms to leverage the technological infrastructure and to create support measures towards innovation.

The certification helps to show the stakeholders the efficacy of the VSB-30, making sure there is continuous concern to improve and refine the activities, as well as the constant auditing processes that lead the involved personnel to be involved; consequently, the performance generally improved, thus removing the uncertainties and broadening market opportunities.

It is worth to remember that in regards to technological innovation, the certification of VSB-30 allows the accumulation of knowledge and the practice for learning, once it is based on structured stages of pre-requirement, planning, execution and approval, which implies that different institutes (Institute of Aeronautics and Space), the German Space Agency (DLR)

Chart 2. Scale of countries in the modern space conquest.

Factors and variables	Opportunities	Threats or uncertainties
Political	Interest in the development of the aerospace sector.	Competition with resources for other fields (social and education).
Economic	The market demands the certification;High earned value of the products.	Low investments in aerospace products Dependence on governmental actions.
Social	The society demands safe products.	The society does not understand the need to invest in aerospace products.
Technological	Tendency to increase the national ability to develop technologies to the aerospace sector.	Commercial barriers for sensitive Technologies (technological barriers); Lack of qualified personnel.
Legal	The Law is addressed to the certification of products.	The recognition of certifications by the Institute of Fomentation and Industrial Coordination by foreign organizations.

and the Institute of Fomentation and Industrial Coordination can share information and technology.

On one hand, the certification enables the companies to develop technologies and to increase technological skills in the industry; on the other hand, it is a tool of industrial isolation, in which incapable companies may be expurgated from the innovative process.

It is expected that the aerospace certification can increase technological skills based on the principles presented by the "Strategic Concept: Science, Technology and Innovation of Interests in the National Defense", established by the Ministry of Defense (MD). It is important to emphasize that the strategic conception has the mission to enable technological and scientific solutions as well as innovations to attend the needs of the country in relation to national defense and development.

The national aerospace certification is a response to the technological barriers imposed by the countries that have the technology, once it makes the adopted requirements and parameters clear, transferring credibility to the costumers and stakeholders, even if there is not a certification structure that can be compared to that established by the International Civil Aviation Organization.

The response to the technological barrier will be valid for the national industry, as long as it leads to synchronicity and symmetry between the skill level of R&D institutions and national companies. In this sense, the certification becomes part of the public policies that develop formation, technological infrastructure and support measures that lead to innovation.

From an operational point of view, it is possible to observe that the improvement of processes was a great benefit, especially concerning documents and the reduction of failure in projects. It is a way for the stakeholders to have access to technical standards.

Another operational aspect is directly related with SINCESPAÇO, in terms of establishing technical and administrative techniques to implement national mechanisms of certification in the space field, as well as to present certification stages for ABNT.

FINAL CONSIDERATIONS

The article aimed at describing which are the context and elements involved in the certification of VSB-30, with emphasis on technological innovation. To complement the presented objective, the development of the vehicle was described, as well as its importance in the market and relevant aspects about the certification. The Brazilian certification body was also presented.

We understood that Brazil is on level four, "the existence of a National Space Agency with its own satellites", in the scale of countries towards space conquest, together with Argentina, Australia, Canada, South Korea, Iran, Nigeria, Pakistan, Taiwan and Ukraine. The next level (five) is the independent ability to launch satellites in the Earth's orbit. The certification of VSB-30 is a way to reach that level, where India and Israel are located.

The process of certification is a contribution to technological innovation since it provides benefits to improve processes, especially concerning documentation and, at the same time, creating conditions so that the industry can adapt to consolidated formal processes, and also creating barriers to the companies that are unable to adjust to the established requirements.

The homologation certificate searches for international recognition of the country in the space field. It helps Brazil's autonomy in many critic space technologies, thus creating an opportunity to strengthen the national aerospace industry, contributing with PNDAE. It is also a way to overcome the technological barrier.

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