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The Third Mission in Brazilian Federal Universities: An Analysis of their Impact for the Culture and Associated Actions to the Sustainable Development Principles

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Abstract

The concept of Development as synonym of Economic Expansion has been attacked frequently and deeply. Governments, social groups, intellectual and educational circles are questioning and being questioned about the future. Natural resources have been explored and exploited in a massive path, in a platform that combines technology and capital. In the middle of this discussion, innovation comes to light as the main engine of this development. In another dimension, Universities, relevant actors in the innovation systems, expand their activities to fulfill their Third Mission, beyond the first, Teaching, and second, Research, which means the development of their environment, including Sustainability. So, the question of this paper is if Third Mission and Sustainability are autonomous and opposed concepts to solve the economic, social and environmental problems. The proposition is to point the grade of interrelation between the concepts while development tools of society. The investigation, as an exploratory study, evaluates the intensity of internalization of the Third Mission and Sustainability concepts in the Brazilian federal public universities. Supported by a relevant literature review, the analysis axes were defined. In addition, a strategic plans and actions review completed the map. A case study added empirical evidence. Results point that universities use the third mission concept. The

relationship university- third mission – sustainability has solid links in the Brazilian public universities, which include the themes in their strategic plans. The conclusion of this paper is that Third Mission and Sustainability are not oppose but even embedded concepts.

Keywords: Third Mission, Sustainability, Universities extension, Innovation

1. Introduction

The concept of development as a synonym of economic expansion is being attacked more frequently and deeply. Governments, social groups, intellectual and educational circles, are questioning and being questioned about of the environment future and, by consequence, of the mankind, in the perspective of the natural resources will be exploited in an extensive way and with the intensity demanded by the binomial capital – technology, aiming to supply the world population merchandise and services demand.

The environment degradation is discussed since the nineteenth century by intellectuals as Adam Smith and others, but has growth in intensity since 1970. In 1987, the United Nations Organization, in a meeting leaded by the Norway Prime Minister, Gro Harlem Bruntland, has published a document named Our Common Future, as known as Bruntland Report, where it was designed the concept of Sustainable Development, from which derives the substantive Sustainability, which enrolls the worry about the correct exploitation of natural resources, aiming their perennial sparing, at the same time that will be guaranteed reasonable conditions to the mankind survival.

The International Union to the Nature and Natural Resources Conservation defines Sustainable Development as the process which improves life condition of human communities, at the same time while respects the eco systems payload limits (IUCN, 1991).

Turning the view to another axis of the human activity, we see that the social and economic development is supported by the innovation concept, which means the act of introduce anything new, do anything which do not exist in the past (Houaiss, 2001). We will use innovation in a technological - scientific view, as is, the creation, development, production and marketing of products, services or processes. Joseph Schumpeter (1942,1984), analyzing the capitalism, said that that system expands as new merchandises, activities or markets are added to it. He calls this Creative Destruction, a constant movement of renewing and substitution which produces development.

So, an important debate evolves in this paper which demands attention: innovation and sustainability would be autonomous and opposed concepts to the solution of the questions of environmental, economic and social questions? One of the challenges of this work is to show that we are talking about variables that necessarily need to be together, considering the complexity imposed by the sustainable development.

Vilha (2018) clear the BruntlandComission vision, defining eight dimensions of the sustainable development: controlled population growth, food security in the long range, eco systems and bio diversity preservation, decrease of the energy consumption, focused on renewable energy technologies, populations basic needs satisfaction, expansion of the industrial

production in the emerging markets using clean technologies, controlled urbanization, better integration between town and country. Considering the inequality of social and economic development between the populations, innovation crosses horizontally al the topics.

Added to this debate is the role of the higher education institutions in the conception, development and diffusion of innovations, as a critical element since the second half of the nineteenth century, when the Industrial Revolution used the knowledge generated in the universities to structure and to leverage the technological expansion. After years, this rule was improved, positioning the university as a main engine of the economic social development, expanding limits beyond its geographical surroundings. This movement was called Third Mission, added to the two original missions, Teaching and Research.

Considering the exposed, this paper objective is to investigate, in an exploratory way, the intensity of absorption of the Third Mission concept in the Brazilian federal universities, which are in the frontier of the technological and innovative process of the country.

In this investigation, we will do a bibliographic revision, aiming to sustain conceptually Third Mission and Sustainability, followed by a content analysis of the university's web sites, concluding with a case study, which will provide the empirical context of the paper.

The methodology above showed that, even the Third Mission concept is not mentioned in the empirical dimension, all the universities, in different grades and depth practice it, spitted by the activities of Extension and Technology/Innovation (incubators, technological parks, innovation agencies). In terms of Sustainability, it's a main part of the Institutional Development Plans (IDP) analyzed, crossing a broad range of activities and projects of the university community.

2. Bibliography review

2.1 Relationship between higher education institutions, the society and the sustainable development principles

The higher education institutions can be defined as spaces which gather heterogenic and multidisciplinary knowledge, nurturing individuals, developing thinking and knowledge and interfering in the nowadays and future societies, especially around their geographic sites. In this way, Tauschen et al (2006) emphasize that sustainable development has in the universities a relevant agent to the ripening of the theoretical discussion and to the operation of practical advances, especially referring to the qualification of prepared citizens to act in the sustainable development field.

Historically , the United Nations Organization points to the rule of the Higher Education Institutions in documents of the Human Development Conference (UNCHD), in 1972 at Stockholm and the Environment and Development Conference (UNCED) in Rio de Janeiro, 1992, addressing objectives which lead to the sustainable development, in: i) preventing of damaging situations; ii)gathering of education teams; and iii) promotion of the raise and refining

of related capabilities, identification of the rule of science, technology and innovation, generation and spreading of information and associated knowledge (Souza, 2014).

The environmental education was cited primarily in the 6.938 law (1981), which institutes the National Environment Politics, enforcing preservation, improvement and recovering of the environmental quality. This law was added to the Federal Constitution of 1988, which embraced the sustainable development concept.

Brazil, since 1997, has established national education standards, with a transverse environmental perspective. With this, were involved all the universities population, disciplines, departments, courses, *curricula*, research and extension projects. Gathering different stakeholders, the culture evolved of the organizational structures of the universities acts like a trigger of the changing processes aimed to the sustainable development principles. If we define culture as a set of beliefs, values, assumptions norms, symbols knowledge and meanings shared by these structure members, is licit to interpret the rule of shared experiences, the values and actions building which can be spread by the institution (Alves, 1997; Isaksen, Tidd, 2006; Message e Vilha, 2017).

2.2 Third Mission as a vertex of sustainable development in the universities

In their beginning, the European universities aimed to form people to fulfill the intellectual field of medieval society. At this point, they focused Teaching. As the society, population and economy expanded, more knowledge was necessary, especially in the interaction with the nature, in width and depth. It was born the Research dimension, from than understood as the universities Second Mission (Etzkovitz, 2000).

In a parallel way, some institutions invested in the qualification of their geographical surroundings, with an assistance objective. These actions were embodied under the concept of Extension (Benneworth e Osborne, 2012).Extension is a way to integrate the university in the social environment which surrounds it and to spill its knowledge beyond its walls, which we can consider a draft vision of the Third Mission.

The American universities, culturally borne in an applied science concept, aiming economic return, from the beginning were linked to Research and Development departments of industrial corporations, and were funded by the USA government to develop basic research (Etzkowitz, 2001). After the last century eighties, as the Science, Technology and Education complex evolved, and the funding sources developed, the universities were allowed to create adequate environments to innovation, like incubators and technological parks. This is another vision of the Third Mission.

Around the world, the Third Mission is called Engagement, Extension, Third Stream, Outreach, *Extensión,Vinculación*, names that shelter elastic concepts, not always synonyms. Campos (2007) describes the Third Mission in three axes: university activities beyond teaching and research, aiming the economic development of its surroundings, knowledge transference to produce innovation to leverage the sustainable development of the same surroundings, *locus* of

entrepreneurship, based on the transferring of technical-scientific knowledge to the society, creating value, income and employment, by the marketing of intellectual property, products and processes.

Gimenez made a wide review of the seminal studies about the subject and synthesizes the Third Mission as the interface which links the university in a straight way to the society, gathering teaching, research, hardware equipments, knowledge capabilities, that is, the joint of physical structure – libraries, museums, laboratories, sport culture and leisure activities installments, and by the knowledge stocks and expertise of the academic community. There are three dimensions which embrace the involvement: innovation and technology transference, continued education and social compromising (2017, pp 140). We will use this definition in our analysis, in addition, we need to explain that, all the times the surroundings are mentioned, we are talking about the social, economic, cultural and political environment in which the institution is embedded, not only the geographical one.

The European bibliography about Third Mission points some threats to the implementation of the concept: university culture, organizational and decision structure, funding sources and internal processes. The Green Paper of the European Union 3M Project – project which aims to align the concept implementation in the continent universities, included evaluation metrics of progress and performance - shows that some requests are need to the project succeed, as friendly internal culture, receptive mindset, specific competencies and dedicated resources, institutional mechanisms and support structures. In Brazil, the National Education Bases and Standards Law, of 1996, 9394/96, in its article 43, subsection VII, establishes that:

> *Article 43. The Higher Education aims:*
>
> *VII – to promote the extension, opened to the population participation, to split de conquests and benefits resulted of the cultural creation and scientific and technological research generated by the institution (Brazil, 1996)*

The Pro-Deans Forum of the brazilian Higher Education Institutions, in the National Politics of Universities Extension, launched in 2012 establishes:

> *(...) Higher Education Extension means academical practice, to be developed as expressed in the 1988 Constitution, in inseparable form with Teaching and Research, to promote and to guarantee the democratic values, equality and development of the society, in the human, ethical, economical, cultural and social dimensions (FORPROEX, 2012, p. 15-16).*

In both cases we observe that, beyond the social dimensions of Extension, it is added the technological and economical dimensions, which bring together the texts of the Campos vision. But it is important to emphasize there are no mention to Sustainability.

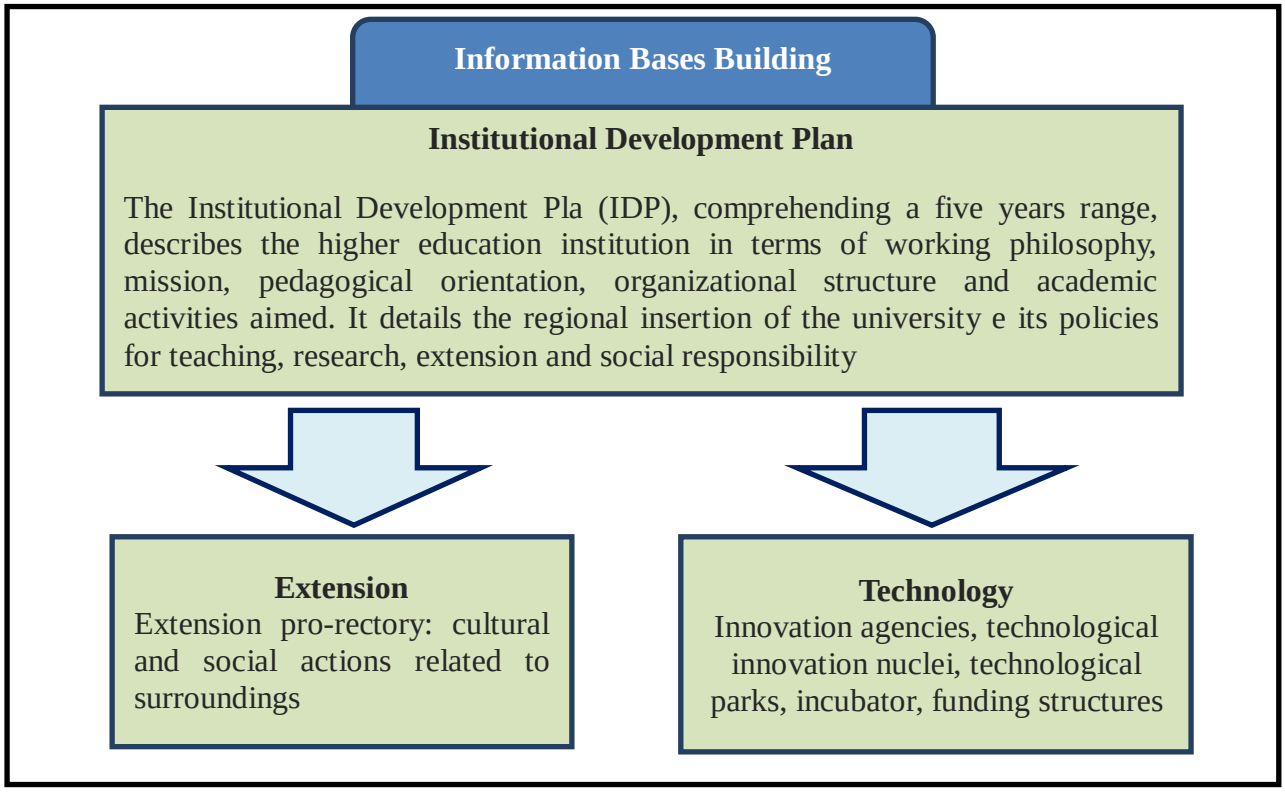
3. Procedures and method used in the research

This research is defined as exploratory and qualitative, and used combined sources of procedures to investigate the intensity of the understanding of Third Mission concept in the Brazilian federal public universities.

We combined three research dimensions:

- Bibliographical review supporting the definitions of Third Mission, Universities and Sustainability, based on Gimenez (2017), Vilha (2018), Etzkowitz (2001), between others
- This review results allowed us to go to a content analysis, building an empirical-analytical body about the way universities are involved with their social, economic and cultural contexts, to aim sustainable development principles. We selected five federal universities, four because of their distinction as scored in the big ten patent appliers in the INPI (National Intellectual Property Institute) in 2017. They are Universidade Federal de Minas Gerais (UFMG), Universidade Federal do Rio Grande do Sul (URGS), Universidade Federal do Ceará (UFC) e Universidade Federal da Paraíba (UFPB). The last is Universidade Federal do ABC (UFABC), choose because of its original multidisciplinary conception and technological basis. We searched the websites of the universities to build our database, in three layers (Graphic 1)

Graphic 1 – Information Bases Building



Source: The authors 2019

- The results of the content analysis allowed us to create three analytical axes to explore the third line of research, which was a case study examining the policies and actions developed by the UFABC to accomplish the Third Mission. This study combined interviews with the university team working at the Innovation Agency and the institutional documents of the university. The table below (Table 1) presents the analytical axes.

Table 1: AnalyticalAxes: UFABC case

Axe	Analysis Dimensions
Concept Structure	• Sustainability vision • Third Mission vision • Conception of the Sustainable Logistics Plan • Objectives • Framework of the Plan • Perception of the concepts by the university community
Organization	• Work teams – structure and composition • Timetable • Operation Model • Performance evaluation model – metrics and goals
Operation	• *Statu quo* evaluation – surveys an databases • Diagnosis • Benchmarking • Action plan
Communication	• Portal • Awareness • Events

Source: The authors 2019

4. Results of the study

4.1 Content analysis of the federal public universities

Vilha (2018, pp 338) says:The Third Mission perspective of the here proposed interpretative model points to development and incentive of innovation, technology, entrepreneurship, continued education and social compromise. When applied to the sustainable development principles, it expands the range of acting and the impact to the environment and the society.

None of the five universities analyzed use the term Third Mission to name its activities, but all of them have initiatives aligned with the concept. In the Institutional Development Plans (IDP) the activities that address the surroundings are frequently allocated in the Extension Department, but, after all, the conscience of the involvement is solidly embedded, and also the vision of the university as an essential tool of development, including the sustainability of this development. We will approach the sample in three dimensions: technological-economic

(innovation, entrepreneurship, intellectual property), the social-cultural (life quality, social inclusion, cultural actions) and the environmental (technical actions and culture implementation), framing the work of the universities in each one dimension, based on data captured in the websites.

In the technological-economic dimension, we detect that the universities of south-southeast regions (more developed economically) have robust structures and maintain bigger networks with their communities, especially considering the economic and corporative environment where they are inserted.

The Universidade Federal do Rio Grande do Sul has a Technological Development Secretary and a Science and Technology Park, which develop entrepreneurship education and actions related, like junior companies and entrepreneurs training and coaching; the prescribed functions of the Technological Innovation Nuclei (TIN), like intellectual property management and legal advising to researchers, the training of intellectual capital in Innovation Culture, and information and advising about funding alternatives.

The UFMG has a department of innovation and research, which encapsulates Specialists and Science Production, Research Teams, Entrepreneurship (with Junior enterprises, incubator, technological park and funding options), Laboratories, Transdisciplinary Studies Patents, Technological Transference, including legal support to researchers and Documental Management, with the databases of the intellectual production of the area.

The UFABC has an Innovation Agency, "an initiative which aims to manage the institutional policy about intellectual property, technological transference and entrepreneurship". In this agency there are cells dedicated to Intellectual Property and Licensing (patents search, legal consulting, counseling to patent and licensing), Research and Development (opportunities prospection in the corporate community), Innovation (university-enterprise relationship management, including prospecting and managing projects), Incubator (supporting entrepreneurs and training the university community about skills and knowledge to undertake) and Technological Display, to present to the corporate community the innovation portfolio of the agency, in a permanent basis.

Although in a previous stage of development, UFCE e UFPB have in their IDPs the goal to transfer technological knowledge to the surroundings. The question is that the local corporate universe is small, so, part of the efforts are directed to improve the agricultural technologies, and they are succeeding.

The social-cultural dimension shows more homogeneity between the sample components, as the extension concept as a lever of human development of the surroundings is totally assumed by the Brazilian public universities. In addition, the operation of extension projects demands little resources but intellectual capital and crosses transversally all the disciplines, curses and programs of the institution.

URGS has eight macro-areas (Communication, Culture, Human Rights, Education, Environment, Health, Technology and Labor), with 45 categories for its Extension actions. In 2018 were implemented 2.453 projects in the community surrounding;

For UFMG, the survey pointed 1.150 projects ongoing, from 01/01/2018 to 12/31/2018, involving all the disciplines. Some examples:

- Nutritional treatment of bones loss patients (Nursing).
- Conception, design and management of National Program of Country Sanitation (Civil Engineering).
- Biopolitical Urbanism Platform (Architecture).

UFABC has developed 199 Extension actions along 2018, courses, events, projects and products. The three analytical dimensions proposed are present in this scope.

In Ceará, UFC uses the same division in macro-areas of URGS, with the follow distribution of projects: Communication (17), Culture (24), Human Rights (37), Education (112), Environment (20), Health (162), Technology (16) and Labor (18). Reflecting the support for the community, it's important to emphasize the volume of projects in Education and Health.

Paraíba uses the same criteria. Table 2 shows the distribution:

Table 2 – Extension Projects UFPB

Extension Projects UFPB 2016	
Area	**Actions**
Communication	29
Culture	56
Human Rights	31
Education	161
Environment	83
Health	339
Technology	66
Labor	50
TOTAL	815

Source: The authors 2019

As in Ceará, the university involvement focus in the segments where the action of the Government lacks, Education and Health.

The macro areas of Technology and Labor envelop technological-economic projects, reinforcing that Third Mission is present on the academic life, even with another badge.

The efforts of university to reach the surrounding society are visible, what shows that Third Mission is relevant portion of the everyday of the institution. It can be observed that in Paraíba and Ceará, regions with technological low density and vulnerable populations, the efforts run from adults' literacy to water resources management, from agricultural techniques to

distribution and trading models, for example. In the other institutions, there is dominance of urban projects, but this do not exclude questions of gender, violence, family health and care, chemical addiction, between others.

The environmental dimension crosses all the IDP, as it is one of the macro-areas of performance.

To produce an UFMG agenda to Environment and Sustainability, gathering areas, sectors and organs of the institution, aiming to make UFMG a referring point to the society environment question (IDP, UDMG, 2018-2023). Generation and diffusion of knowledge to provide scientific, technological, social, cultural and environmental development, promoting activities of teaching, research, and extension (IPD UFPB, 2014-2018)

Additionally, all the universities offer disciplines which address environment and sustainability questions, to all undergraduates, as general knowledge.

The websites analyzed content shows that the environmental and sustainability approach aim to reach professors, pupils and management personnel, which confirms Vilha's vision (2018, pp. 330) "Involving several different stakeholders, the culture imposed by the organizational structure of the universities acts like a propeller of the changing and transforming processes to the sustainable development principles".

The Table 3 summarizes the findings:

Table 3 – Websites Analysis Summary

University	Technological Economic Dimension	Cultural, Social and Environmental Dimensions
UFRGS	• Technological Development Secretary • Technological Park • Incubator • Innovation Management • Patenting	• 8 macro areas • 45 categories of action • 2.453 actions ongoing
UFMG	• Innovation Agency • Incubator • Junior Enterprises • Technological Park • Partnership and Funding Enterprises • Patenting	• 1.150 actions ongoing
UFPB	• Patenting • Agricultural Technology • Innovation Agency Project	• 8 macro areas • 815 actions in 2016
UFCE	• Patenting • Agricultural Technology • Innovation Agency Project	• 8 macro areas • 406 actions in 2016
UFABC	• Innovation Agency • Incubator • Patenting • Technological Show	• 199 actions

Source: The authors 2019

4.2Case study: Federal University of ABC and the Third Mission practices addressing sustainable development principles

Federal University of ABC has been constituted fourteen years ago and its institutional project reflects this modernity, with base principles interdisciplinarity, excellence and social inclusion. Its Pedagogical Institutional Plan highlights "the formation of higher education level professionals, scientifically and technically capable and qualified to the exercise of their functions, conscientious of the ethical compromises and of the need to defend human rights, to overcome social inequalities and promote the sustainable development" (PIP, 2017, pp 8).

Addressing the Sustainable Development, the university produced, in 2015, a Sustainable Logistics Plan, aiming to propose actions which build the Sustainability Policy of the institution. Seven fronts were defined, with work teams attached, involving professors, students and management personnel which, during 2015, collected, organized, analyzed and revised data, and developed survey and communication actions to support the plan design. The fronts are Water and Sewage, Energy, Sustainable Consumables, Waste Management, Spaces, Urban Mobility and Commuting, Implementation and Communication.

A set of performance measures was established for each front, building the backbone to follow the process and to support a culture of sustainability.

Table 4 details the project and the proposed actions embedded:

Table 4 – Sustainable Logistics Project - Summary

Work Team	Goals	Actions
• Water and Sewage	• To reduce the consumption of drinking water • Sewage and rain waters recycling • Infrastructure preemptive maintenance • Improving of the discard of laboratories waste	• Dual flush boxes and ongoing supervising of drinking water disposals • Consumption monitoring each building • Transporting recycled water in alternative pipe structure • Recycling and storage of water in available hardware • Building of effluent treatment station • Building of dedicated area to discard laboratories products in São Bernardo
• Energy	• Optimize the use of energy sources • Supervise equipments to detect opportunities of updating and reduction of consumption	• Monitoring individual consumption by equipment or appliance • Optimization of energy sources, combining public and private suppliers • To analyze alternative sources, for example, photovoltaic cells • To optimize the lamps use, addressing technology and spatial distribution • Optimization of elevators and conditioning air use • Workbook of conscientious consumption • Continuous improvement policy
• Sustainable Consumables	• To optimize consumables use • To define analytical model to select suppliers framed on sustainability	• Centralized management of printers –front and verse printing, to encourage digital messaging and publishing, individual printing identification • Analysis of economic viability of substitution of

		paper towels by electronic dryers • Replacement of disposable cups with washable individual containers • Framework to evaluate the supply chain including sustainable cost, in the long term range
• Waste management	• To manage collect of waste, especially of laboratories	• Improving of selective collect process • Program to communicate benefits of selective waste, including third part suppliers • Improving of the batteries discard program • Project of recycling organic waste to produce fertilizers • Implementation of medical waste management program
• Spaces	• Improvement of use of the spaces of the university	• Establish a director plan of the use of spaces • To centralize in a system information about use and occupation
• Urban Mobility and Commuting	• Improvement of commuting system – especially inter and intra campi • Use of sustainable commuting	• Benchmarking of mobility models • Conscientious use of transport: bicycles hiking, for example • Design of an information system of mobility
• Implementation and Communication	• To act as a facilitator of the implementation, informing and improving conscience of the university stakeholders • To help building and enforcing a sustainability culture	• ABC Sustainability Forum • Survey to evaluate knowledge level of the university population about the program • Communication of the agendas of work teams • To create o Sustainability portal

Source: UFABC Sustainable Logistics Plan, 2015

5. Final considerations

The university is a main actor in the design of the human future. Its set of knowledge, in a time historical and in continuous accumulation process is an essential lever in building a sustainable and inclusive development process.

The Third Mission concept, which addresses the social and economic compromises of the institution in the surroundings development, added to the First Mission (Teaching) and Second Mission (Research), aims that the university and its constituents mix, in a transforming mode, with the social fabric, involving and developing it.

In addition, as the university has critical responsibility in the building of citizenship and of the technologically innovative *apparatus,* the concept of Sustainability imposes itself to the everyday of the institution, in a naturalization process which is more and more visible.

Supporting both concepts is the principle of Innovation, as a concern to think or rethink the reality in an unprecedented way, from basic and simple actions like rational use of printing to very complex initiatives like to create a technological start up

With this paper, we aim to show an exploratory vision of the nowadays status of the relationship university – third mission – sustainability, in the *loci*of the Brazilian federal universities. This relationship has solid links, is part of the strategic picture of the institution and

has clear agency in the surroundings. The theoretical base allowed us to contrast the key themes to the reality and conclude that both have firm and stable roots in the latter. It proves that both are linked in projects and actions ongoing.

This article was built over three blocks of knowledge: i) Literature review, which detailed, in a historical and spatial perspective the concepts of Sustainability and Third Mission, as pointing to potential contact or complementary areas between the concepts in the nowadays brazilian reality; ii) Content analysis of the Internet sites of five brazilian federal universities, linked by their status as knowledge frontier players; iii) Case study about the UFABC, an institution since its conception driven by multidisciplinary knowledge and sustainability and managing a daring and large project of sustainable logistics.

These three blocks allowed a panoramic vision of the efforts aimed to create and solidify a sustainability culture in the university, main actor in the expansion and spreading of the science and technology knowledge in Brazil, as in the building of critical conscience and citizenship. In addition, their combination gave robustness to the literature.

Although the conceptof Third Mission is presented with other names, it is part of the university fabric. Relevant is the fact that, being spread in several areas of the institution, there is a big risk of overlap of resources, activities and efforts. Complementarily, we observed that the actions involve a huge set of actors, in a long term range.

As an exploratory study, this paper opens space to expand the literature about the theme, in depth and width, by empirical studies in federal universities, as its grouping in analytical blocks, aiming the deepening quantitative and qualitative of the knowledge. It opens a theoretical road to collect information which allows building a set of performance measures, to document and standardizing the efforts of these institutions, monitoring their performances and the reaching of goals.

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