Sustainable Entrepreneurial University: Basic Elements

Universidade Empreendedora Sustentável: elementos basilares

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ABSTRACT

The objective of this research was to propose a framework of elements that underpin a sustainable entrepreneurial university. To this end, cases from two renowned Brazilian universities were investigated: the University of São Paulo (USP) and the State University of Campinas (Unicamp), ranked in the Folha University Ranking (RUF), the National Ranking of Entrepreneurial Universities, and GreenMetric World as the best institutions in Brazil. Guided by the theoretical approaches of the entrepreneurial university and the sustainable university, this thesis focused on a qualitative approach and the integrated case study method with multiple units of analysis. In the data collection phase, 17 interviews were conducted with managers of the researched institutions using a semi-structured instrument. Data was also collected from documentary sources, including public documents available on the universities' websites, and others provided and indicated by the interviewees, in addition to published articles and books. The Atlas.ti software version 22 was used for data analysis, employing content analysis techniques. The findings led to the creation of tables for each institution, resulting in a synthesis of elements necessary for building a sustainable entrepreneurial university. The results also allowed for the proposition of a framework, which generated guidelines for implementing the actions. In this sense, it was found that building a sustainable entrepreneurial university is a challenge that requires an integrated approach committed to innovation, sustainability, and entrepreneurship. To build a sustainable entrepreneurial university, it is fundamental to have: an entrepreneurial culture, committed leadership, supporting infrastructure, incentives for sustainable research and innovation, strategic partnerships, and engagement with the Sustainable Development Goals (SDGs).

Keywords: Sustainability. Innovative Management. University Management.

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RESUMO

O objetivo desta pesquisa foi propor um *framework* de elementos que alicerçam uma universidade empreendedora sustentável. Para isso, foram investigados casos de duas conceituadas universidades brasileiras: a Universidade de São Paulo (USP) e a Universidade Estadual de Campinas (Unicamp), classificadas no *Ranking* Universitário Folha (RUF), pelo *Ranking* Nacional de Universidades Empreendedoras e GreenMetric World como as melhores instituições do Brasil. Guiada pelas abordagens teóricas da universidade empreendedora e da universidade sustentável, esta tese se centrou na abordagem qualitativa e no método de estudo de caso integrado com múltiplas unidades de análise. Na etapa de coleta de dados foram realizadas 17 entrevistas com auxílio de instrumento semiestruturado a gestores das instituições pesquisadas. Foi feita, ainda, coleta em fontes documentais, efetuada a partir de documentos públicos disponíveis nos sites das universidades, e outros fornecidos e indicados pelos entrevistados, além de artigos e livros publicados. Para análise de dados foi utilizado o *software* Atlas.ti versão 22. E utilizada a técnica de análise de conteúdo. Os achados originaram tabelas para cada uma das instituições, resultando em uma síntese de elementos necessários para construção de uma universidade empreendedora sustentável. Os resultados permitiram, ainda, a proposição de um *framework*, que gerou diretrizes para implementações das ações. Nesse sentido, constatou-se que a construção de uma universidade empreendedora sustentável é um desafio que exige uma abordagem integrada e compromissada com a inovação, a sustentabilidade e o empreendedorismo. Para construir uma universidade empreendedora sustentável, é fundamental que haja: cultura empreendedora, liderança comprometida, infraestrutura de suporte, incentivo à pesquisa e inovação sustentável, parcerias estratégicas e engajamento com os Objetivos de Desenvolvimento Sustentável (ODS).
Palavras-Chave: Sustentabilidade. Gestão Inovadora. Gestão Universitária

Introduction

The concepts of entrepreneurship and sustainability are being studied together, especially in the field of management, due to the growing interest of organizations in these topics. To survive, organizations must be innovative and sustainable, demonstrating entrepreneurial skills. Every organization, whether for-profit or non-profit, needs entrepreneurial skills to learn how to be sustainable (Celikdemir & Katrinli, 2016).

In this sense, considering that universities make a significant contribution to the development of society, they therefore assume a social responsibility, particularly with regard to the education of young people and public awareness of sustainability (Viebahn, 2002). In general, a sustainable university must "practice what it preaches" in relation to its sustainability agenda, that is, it must not only teach the concept and philosophy of sustainable development to its students, but must also be able to embrace the concept in its daily organizational life; in other words, sustainability must be part of university management and its operations.

Furthermore, a sustainable university, through the development of teaching programs that incorporate sustainability concepts, applied research, and community engagement, should aim to train a new generation of professionals and citizens committed to building a more just, democratic, and environmentally responsible society (Leal Filho, 2017).

According to Shah et al. (2019), to become a sustainable university, the institution needs to be prepared for change and, most importantly, understand the sustainability curriculum. At the same time, the knowledge produced by universities and other research institutes is expected to help solve social problems and crises and achieve sustainability goals more efficiently.

This university model is called a Sustainable Entrepreneurial University (SEU), a relatively new concept that combines academic tradition with entrepreneurial innovation and environmental responsibility. These universities seek not only to provide high-quality education, but also to develop solutions to global sustainability challenges and act as leaders in their local and global communities, and, not least, to foster sustainable entrepreneurship within universities (Shah et al. 2019).

Equally important is evaluating the sustainable entrepreneurial university, both in relation to other educational institutions and in relation to the job market, highlighting the importance of investing in sustainable and innovative practices to stand out in an increasingly conscious and responsible world (Liu, He, Lyu & Fang, 2018).

Thus, this research focuses predominantly on the combination of entrepreneurship and sustainability, as well as seeking an alignment with the Sustainable Development Goals (SDGs). It is important to investigate the challenges and opportunities faced by a higher education institution in becoming a sustainable entre-

preneurial university, and how the university can reconcile the demands of the job market with environmental and social needs, promoting the training of conscious and responsible professionals.

Thus, this research aims to propose a *framework* of elements that underpin a sustainable entrepreneurial university, thereby answering the following research question: **What are the fundamental elements that comprise a sustainable entrepreneurial university?**

Entrepreneurial and Sustainable University

The study by Apostolopoulos et al. (2018) led to the conceptualization of an ideal type of university, entitled Sustainable Entrepreneurial University (SEU), based on the principle of fulfilling the SDGs in an integrated way with the existing missions of the entrepreneurial university, considering that entrepreneurship can be a driver for the SDGs, agreeing with Lans et al. (2014) and Wyness et al. (2015), who affirm that entrepreneurship education can lead to sustainability. It is noteworthy that interaction with industry is one of the pillars of the entrepreneurial university, as pointed out by Etzkowitz (2000, 2003a) and Lazzeroni and Piccaluga (2003), an element that creates an interface between the entrepreneurial and sustainable university and is aligned with the principles of HESI.

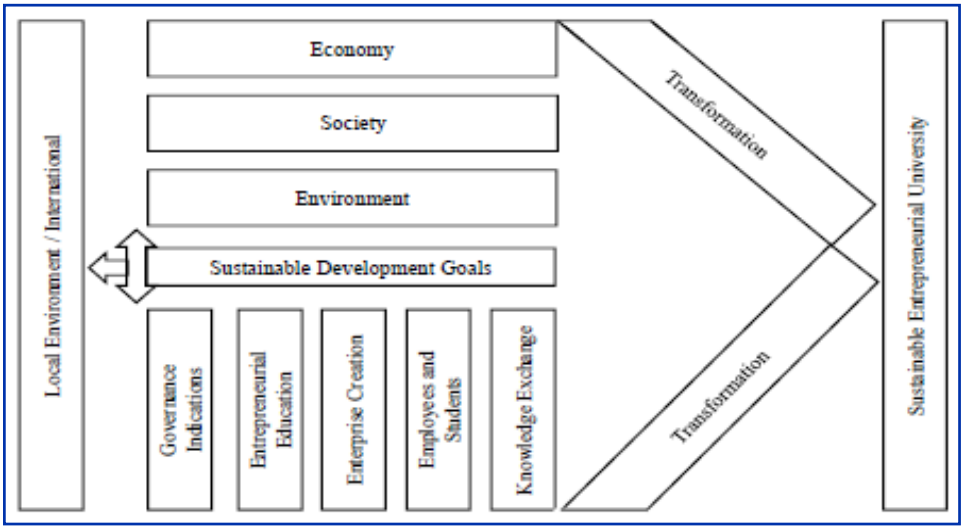
In this sense, the interface between the entrepreneurial and sustainable university can also be verified through Research and Development (R&D) spending, which is one of the important elements that guide the transformation of universities towards the sustainable entrepreneurial university, stimulating academic research and commitment to the SDGs (Apostolopoulos & Liargovas, 2018). This element is present in the activities of universities already labeled as entrepreneurial (Gibb et al., 2013; Budyldina, 2018), as are challenges involving the maintenance of the university's integrity while being interested in generating revenue from intellectual property and generating research results, focusing on sustainability (Audy, 2006). Takala and Korhonen (2019) warn that, during the transition process to become a SUE (Student Entrepreneurial University), when addressing the SDGs by integrating economic, social, and environmental responsibility into the missions of universities, there may

be uncertainties in the management of institutions due to the lack of objective indicators to evaluate the new functions performed.

Another relevant aspect is that universities should follow the Sustainable Development Goals (SDGs) defined by the United Nations (UN). The SDGs are a global agenda for promoting sustainable development in all countries of the world by 2030 and are composed of 17 goals and 169 targets. Universities, as institutions that play a fundamental role in the training of professionals and the production of knowledge, have a responsibility to contribute to the implementation of the SDGs in their teaching, research, and outreach activities. Furthermore, the adoption of the SDGs can contribute to building a sustainable entrepreneurial university, promoting the integration of sustainability with entrepreneurship and innovation (Sachs, 2015).

Figure 1 below presents a conceptual *framework of SEU*.

Figure 1. SEU *Framework.*



Source: Adapted from Apostolopoulos et al. (2018, p. 361).

According to Apostolopoulos and Liargovas (2018), tensions exist between the objectives of the entrepreneurial university, focused on the commercialization of knowledge and the generation of new sources of income, and the objectives of a sustainable entrepreneurial university, which promotes education for sustainable

development at all levels. These tensions could be mitigated, given that Etzkowitz and Zhou (2008), in their proposal for a reorientation of the Triple Helix, foresaw sustainability as a necessary element of the model. It is noteworthy that the flexibility that higher education institutions possess in their research offers opportunities for collaborative work, capable of addressing SDG targets and knowledge transfer to the private sector (König et al., 2021), aspects that allow for a reduction in internal tensions between entrepreneurship and sustainability.

Higher education can lead to sustainable transformation across society (Whitmer et al., 2010). The university, through its actions and practices, is capable of promoting prosperity in the economy, society, and environment (Apostolopoulos & Liargovas, 2018).

In short, an entrepreneurial and sustainable university is a higher education institution that integrates entrepreneurial practices and sustainable development into its culture, teaching, research, and activities. These universities recognize the importance of contributing to social, economic, and environmental well-being and promoting innovation and responsible growth.

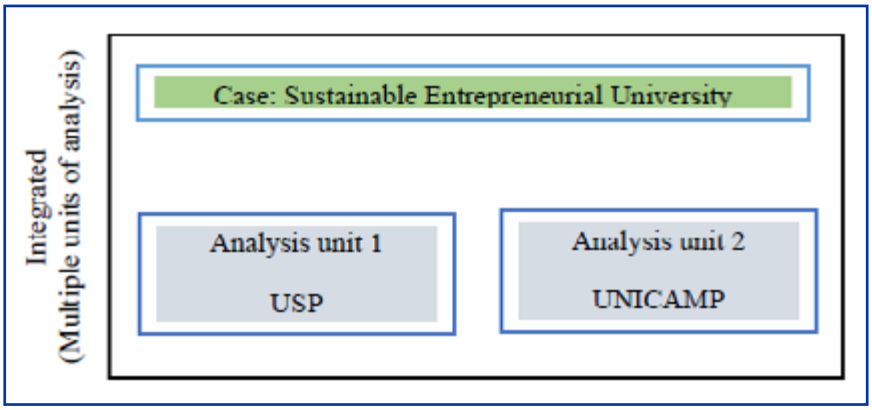
Methodological Procedures

For this research, an integrated single case study (Yin, 2015) was employed, with multiple units of analysis. It adopts a qualitative approach, which, in turn, uses the natural environment as a data collection location, has a descriptive character (Flick, 2009), and regarding its objectives, the research is characterized as descriptive, aiming to describe perceptions, expectations, and suggestions (Yin, 2015).

Figure 2 presents the units of analysis for this research.

Regarding the criteria for choosing the units of analysis, rankings of entrepreneurial universities and sustainable universities were accessed, providing the basis for selecting the universities participating in this study. The following were used: *Ranking* Brasil Júnior (2019) (2021), Ranking Universitário Folha (RUF) (2019), and UI GreenMetric World University (2020) by country. The University of São Paulo (USP) and the State University of Campinas (Unicamp) are ranked 1st and 2nd, respectively.

Figure 2. Case and units of analysis.



The data collection for this research followed the guidelines of Flick (2009). Among these sources are: semi-structured interviews with university managers related to entrepreneurship and sustainability, institutional documents, databases, and study reports.

In total, 25 participants were invited, of which 17 accepted. The interviews took place between May and October 2022 and, for accessibility reasons, were conducted via *Google Meet.* With prior authorization, the interviews were recorded and the informed consent forms were signed. Subsequently, the interviews were transcribed, categorized, and coded using Atlas.ti *software.* Table 1 presents summarized information on the profiles of the interviewees.

It is observed that, in this study, the questions were structured according to the studies of Clark (1998; 2004); Etzkowitz and Leydesdorff (2000); Etzkowitz (2000; 2004; 2013); Guerrero et al. (2006); Urbano and Guerrero (2013); Salamzadeh et al. (2011); Sooreh et al. (2011); Organization for Economic Cooperation and Development (OECD, 2012); Ruiz (2018); Borhani et al. (2020), and Liu and van der Sijde (2021) and the metrics of the International Economic Development Council (IEDC, 2017).

Regarding the ethical aspects of the study, this thesis project was submitted to the Research Ethics Committees (CEP) of UNOESC, under registration CAAE 57435622.0.0000.5367; USP, under registration CAAE 57435622.0.3001.5564; and UNICAMP, under registration CAAE 57435622.0.3002.5404. After evaluation, the project was approved by all committees.

Table 1. Profile of respondents.

		Local	Position	Time at the Institution	Academic Background	Interview duration	Transcription pages
USP	E1	Rectory	Professor - Head of the Rector's Office	25 years	PhD	1:16 h	18
	E2	INOVA	Lecturer – Coordinator, Center for Entrepreneurship	14 years	PhD	34 min	12
	E3	AUSPIN	Lecturer – Responsible for the Entrepreneurship Area	11 years	Doctor	37 min	28
	E4	AUSPIM	Innovation Agent	19 years old	Teacher	1:02 h	38
	E5	Super Park	Administrative Assistant	6 years	MBA	48 min	10
	E6	Super Park	Coordinator of the Innovation Center	10 years	Teacher	38 min	19
	E7	Super Park	Innovation Agent	16 years old	Doctor	54 min	19
	E8	Institute of Biosciences Rectory	Teacher – Director Senior Assistant to the Rector	16 years old	PhD	33 min	11
	E9	Environmental Management Superintendency	Lecturer - Member of the Sustainability Committee at EESC	16 years old	PhD	34 min	18
	E10	INOVA	Lecturer - Associate Director	17 years old	PhD	54 min	33
	E11	INOVA	Park and Incubator Manager	12 years	Doctor	37 min	6
	E12	INOVA	Director of Institutional Relations	17 years old	PhD candidate	1 hour	14
UNICAMP	E13	Executive Board of Integrated Planning	Lecturer - Coordinator	20 years	PhD	35 min	13
	E14	Extension Directorate	Lecturer – General Coordinator	25 years	PhD	32 min	15
	E15	Executive Board of the Sustainability Coordination Office	Architect and Urban Planner - Coordinator	7 years	Doctor	36 min	15
	E16	Sustainability Coordination Office	Civil Engineer	10 years		42 min	27
	E17	Sustainability Coordination Office	Civil Engineer	14 years		21 min	12

Source: Survey data.

The data were analyzed using the content analysis technique, according to Bardin (2011). Therefore, the interpretation of the data occurred in three stages: pre-analysis: organization of the data and a preliminary reading of the data; exploration: categorization and coding of the data; and treatment of the results: interpretation of the data.

Software was used. All research material that could be *downloaded* was entered into the system for subsequent processing, systematization, and analysis. After manual coding, in addition to the previously defined categories, new categories and elements of analysis emerged from the research data. With the use of the *software,* The results were organized into folders and networks.

Data Presentation and Analysis

UNIT OF ANALYSIS – USP

Founded in 1934, USP is a public university, maintained by the State of São Paulo and linked to the Secretariat of Economic Development. The talent and dedication of its faculty, students, and staff have been recognized by various world *rankings,* created to measure the quality of universities based on several criteria, mainly those related to scientific productivity (USP, 2022).

This performance, generated over more than eight decades of an intense pursuit of excellence, allows USP to be part of a select group of world-class institutions. Currently, USP is responsible for more than 20% of Brazilian scientific production (USP, 2022).

Table 2. Characteristics of USP.

University of São Paulo	
Acronym	USP
Type	State
Foundation	1934
Headquarters Location	Butantã, São Paulo – SP
Campi	8
Teaching and research units	42

Number of undergraduate courses	340
Number of postgraduate courses	264
Number of Students	97,000
Number of Teaching Staff	5,380
Number of Technical Staff	13,360
Website	https://www5.usp.br/

Source: Depar - USP Partnership Development Office (2023).

With the aim of presenting the basic elements, as well as the difficulties pointed out by the interviewees for the university to become entrepreneurial and sustainable, tables were prepared with the main points.

Thus, in Table 3 In summary, the observations made by those interviewed at USP are presented.

Table 3. Basic elements, challenges and difficulties in becoming a sustainable entrepreneurial university - USP.

E 1	"So, a sustainable university depends on two central movements and a third movement that would be, let's call it, an operational movement." "There would have **to be a sustainability policy**, and within that sustainability policy, you would have to establish the actions to be taken and the goals to be achieved—not necessarily all at the same time, but what you will do first, second, third, and so on—and you then apply that to your day-to-day activities." p. 1 "From the *campus* itself, in such a way that you look at how **issues of water supply, sanitation, and waste management are being handled**. How do you dispose of this waste? How do you solve problems, how do you maintain **trees**, what care do you take of them? How do you treat **domestic animals** if they appear on *campus*? And within all of this that we are talking about, how is the **mobility of students, professors, and staff handled**, with policies that have even been able to encourage public transportation, the use of bicycles, and so on?" p. 1 **"A gradual process. It's a kind of role, something you build up gradually."** p. 2 "A second step is **to put this into teaching**." p. 4

E 1	"We implemented an **institutional program** that addressed the **Sustainable *Campus*** , and it was developed on this *campus* in the capital and also on several other *campuses*. And, in the way it was developed, it managed to bring a lot of that to the seminars that were held with the Units. But it's the same old story: **if you stop for a while, you start to regress** again. So you have to do it again and again, continuing actions that never end." p. 5
E 2	"She has a lot of patents, a lot of patents. This makes the university's ranking go up, but whether that will translate to the top, I don't know, that's a hurdle." p 1 "One obstacle is that USP's innovation policy has yet to be created" p. 1 "There is a lack of a reward system to promote entrepreneurship." p. 6
E 3	"I always raise the issue of solutions to problems linked to one of the **17 Sustainable Development Goals.** The university didn't consider this metric, and we started being held accountable for it about two years ago. And now, on my initiative, we've been presenting it everywhere I go as a solution." p. 24 "To grasp the complexity of this world of intellectual property. So there's a vacuum there. It's an institutional barrier, a **communication barrier,** a **knowledge barrier.** The researcher is very much in need of this information." p. 3 "There's a huge **gap,** another enormous valley, which is the **communication gap between researchers and those in the market.** The researcher's vision is scientific, and the market's vision is business-oriented. This lack of communication creates a need for curation. The university has the impression, it operates on the principle that the market wants to appropriate its wealth. And the market has the impression that the university is incompetent. We need to resolve this issue." p. 7 **"The university still doesn't know how to connect with the market,** largely due to a lack of communication culture. And so there are problems that remain unresolved, and the university doesn't know how to solve them." p. 9 "First, **the researcher has to know that he cannot work alone.** Second, that he needs someone to manage the finances; he needs to know someone who understands business management. So this is important: he needs to know that he is not God and that he needs other people, that nobody builds an empire alone." p. 16

E 3	"Our **regulations are very outdated,** aren't they? Because the audit court and the prosecutor's office that are making the decisions are still very heavy-handed; if a researcher is in a *startup,* they can be penalized. So, the regulations are very bureaucratic, and on top of that, they penalize." (p. 17-18)
E 4	"I see that there is a **distortion of what it means to undertake** in general." p. 16 "And I think **institutions don't prepare for failure,** do they? So they should, in some way, not focus only on the vision of success, which is the media's vision. There is a lot of successful entrepreneurship, but the university could play a better role if it focused on a slightly more realistic view, also showing that failure exists and is part of the journey, even because of mistakes, and that success is possible later on, right? Preparing future entrepreneurs." p. 18 "It's an issue that is still controversial, let's say. **There isn't a consensus** across the entire university that **entrepreneurship should be part of the institution's mission.**" p. 21 "Perhaps the main bottleneck is the **budget cuts.** Here in Brazil, unfortunately." p. 27 "The issue with traditional research development that you'll hear from everyone is that there's a legal problem, a bureaucratic problem, that the institutions are bureaucratic, that the legal department gets in the way. In a general way, these are true to a certain extent, but I would say that the main problem is the **lack of support on these administrative and technical matters. Normally everything is centralized.** The researcher assumes all the responsibility for it. And they don't know how to do it." p 27
E 5	"There's this difficulty among researchers in understanding this process; **people come very uninformed.** Sometimes they want to do it, but they don't know anything." p. 2 "We have all this **bureaucracy.**" p. 5 "The obstacles we face, I think, are the **regulatory issues themselves,** right? It ends up being a significant obstacle." p. 8 "What is still needed is a **cultural shift.** Not only students, but teachers also need to embrace entrepreneurship more. There's an absurd amount of intellectual production in Brazil, many articles and patents, but we need to observe the external environment more." p 10

E 6	"It will necessarily involve a **change of mindset.**" p. 10 "The main obstacles we have to deal with here are precisely about **breaking down taboos in terms of entrepreneurial mindset.** That's the first thing to do." p. 11 "It's the **lack of knowledge in business management,** for example, in the health-care field. So that's an obstacle." p 11 "**Qualify" In terms of business management,** this is an individual who is already extremely qualified within the scientific field. Many talk about the issue of financial resources, which I, personally, do not see as an obstacle." p. 12
E 7	"I think there's still a lack of internalization of innovation across various teaching and research units." p. 11 "There are still obstacles regarding the **cultural issue,** which is very important. I also see this greater need for integration." p. 15 "One thing that's lacking, not only in universities, but I'm speaking in terms of government at any level, is **a master plan with defined policies.** Because then, no matter how many managers change, you'll have that guiding principle that will continue development. And today, these management changes without continuity in plans are very harmful. You're doing one thing, then suddenly another administration stops everything. And then, we go to do other things, and, like, what had already been done by people, they don't analyze if it's good. That's a difficulty." p. 16 "Everyone had to be fighting together for the same goal. We have to **cooperate.** Because nobody does anything alone, actions happen through this exchange of ideas. Having that, then you foster and generate, right? The result of the impact is greater, so, I think we have to look at the result." p. 17 "The agreements, in order to be processed quickly, already have templates, there's an agreements portal, there are templates already approved by the attorney general's office, and the flow has improved a lot. However, I still think we can **further reduce bureaucracy and be more agile,** and this is necessary for generating innovations" p. 12

E 8	"This, I consider a great challenge, which is the **challenge of cultural change."** p. 3 "**Few people know the Sustainable Development Goals.** In fact, they have heard of them, but they don't know them." p. 3 "Putting it **into practice** requires the entire management team. You really **need to collect the indicators."** p. 3 "**Managers** will probably have to **be retrained** to learn systemic management **in order to work towards sustainability."** p. 3
E 9	"The hardest part is really **getting these people into this movement."** p. 9 "But if we **don't engage people,** things don't happen at the necessary speed." p. 9 The **students "They are not arriving** here at the university **with the awareness,** with the engagement **that they should have,** learning from childhood." p. 10 "**Raising awareness within the academic community** of a university like Unicamp is our greatest challenge. And, in **society as a whole,** it's even more so." p. 10 "A huge challenge also in relation to **curriculum modernization.**" p. 11 "Resistance to change. **People always resist change.** I think that's the first difficulty they face." p. 13 "**Resources.** You need an **initial investment.** This initial investment eventually pays off, but it is fundamental." p. 13
E 10	"It's a topic that's being discussed a lot. We're still in the early stages of taking action, for example, something we're trying to do is **introduce ESG issues into the University."** p. 21 "We still don't have **established sustainability criteria."** p. 22 "So we still have a way to go. We've already started walking, but we still have a lot to evolve. It's a very recent area that's happening, in the sense of inclusion. And **bringing that into practice is a challenge."** p. 22

UNIT OF ANALYSIS – UNICAMP

Unicamp was officially founded on October 5, 1966. Even in a recent university context, where the oldest Brazilian university is just over seven decades old, Unicamp can be considered a young institution that has already established a strong tradition in teaching, research, and relations with society (Unicamp, 2022).

Accounting for 8% of academic research in Brazil and 12% of national postgraduate studies, Unicamp maintains its leadership among Brazilian universities in terms of patents and the number of articles *per capita* published annually in journals indexed in the ISI/WoS database.

Table 4. Characteristics of Unicamp.

State University of Campinas	
Acronym	Unicamp
Type	State
Foundation	1966
Location	Campinas – SP
Campi	3
Number of undergraduate courses	66
Postgraduate number	153
Number of Students	34 thousand
Number of Teaching Staff	1,708
Number of Technical Staff	6.835
Website	https://www.unicamp.br/unicamp/

In 2017, Unicamp implemented tools for developing its strategic plan, ensuring that strategic management was effectively incorporated into the university's management. In this implementation, actions were aligned with the 2020-2030 Agenda for Sustainable Development, and several projects related to the topic were also implemented.

In an improved manner, the institution developed the 2021-2025 plan, initiating a new cycle of planning, execution, and evaluation, and consolidating the interface between Institutional Planning and Evaluation. (DOC12), in addition, by linking each Strategic Objective to the Sustainable Development Goals (SDGs), it unequivocally demonstrated an institutional commitment to sustainable development.

Table 5 presents a summary of the respondents' observations regarding the fundamental elements and challenges to becoming an entrepreneurial and sustainable university at Unicamp.

Table 5. Basic elements, challenges and difficulties in becoming a sustainable entrepreneurial university - Unicamp.

Source	Reference
E 10	"It's the difficulty in **contracting services and works**" p. 25 "It's time-consuming, it's expensive. The quality doesn't come out right." p. 26 "Having ESG issues - Environmental, social and corporate governance - at the University." p. 21 "Having established criteria for measuring sustainability." p. 22 "It's a topic that's being discussed a lot. We're still in the early stages of, for example, what we're trying to do is **introduce ESG issues into the University.**" p. 21 "We still don't have **well-established sustainability criteria.**" p. 22 "So, we still have a long way to go. We've already started walking, but we still have a lot to evolve. It's a **very recent area** that's happening, **in the sense of inclusion.** And bringing that into practice is a challenge." (p. 22)
E 12	"So, the **availability of resources from companies to conduct research** would be an obstacle. Because, if you look at the composition of the resources that come in, external resources that come in for research at Unicamp, most of it comes from exclusivity clauses and not from mandatory funding." p. 2 "In the United States, there is money for research, but we know that this is due to a preference among large companies to conduct research at their headquarters. But this would be an obstacle for Brazil, for research in partnership between universities and companies, and for **greater availability of resources from the companies themselves.** " (p. 2)

"It's also important to mention that we need sustainability indicators to understand how sustainable the university actually is, and how and where to begin making improvements." p. 10

"It's important to have guidelines, to have indicators. That's when we started with the Green Metric; we needed to know where we were in the master plan, and we didn't know. We didn't have a diagnosis of Unicamp. So we started the metrics to have our own diagnosis, to know our own indicators." p. 10

"We are searching, and I think that's why we have the Sustainable Development Goals as our guiding principle." p. 10

"It's a challenge. **This engagement,** I think, is one of the main ones." p. 5

"Internally, the main challenge was the **visibility that was necessary for the university to be sustainable,** when this wasn't even considered within the university. And then, there's the **support from senior management.**" p. 5

E 15 "When we start developing projects and need funding, and senior management needs to release the **funds,** that was the main obstacle—how do you organize it?" p. 5

"Sustainability needs to be a cross-cutting theme. **Many teachers don't even know what the SDGs are,** so there's this aspect of bringing sustainability to the academic level, as an institutional guideline." p.8

"At the operational level, **having a departmental structure, a board of directors closer to senior management.**" p. 9

"And it still is today. We're facing a problem: there's sustainability understood at an academic level, and there's sustainability at an operational level. But to work with the indicators, at some point, we need to **combine these two issues, the academic and the operational ones.** In the sustainability coordination office, we only work with the operational ones, because we understand that the academic ones are a different scope. But then another internal group emerged that works on sustainability, directly linked to the rector's office, and then there's a dispute about how far each group goes. Today, a major internal obstacle is **who is responsible for what.**" p. 5

E 15	"We needed funding to carry out the projects, and this funding didn't fit within the university's existing budget; **in the expenditure categories, there isn't an account called 'sustainable'**." p. 7
	"We have 2020 and 2030 as deadlines to **achieve the SDGs,** and the deadline to become a zero-carbon university is also approaching, 2030, and decarbonization is a long way off." p. 10
E 16	"Mobility and Accessibility. We also have an electric bus, and it's free." p. 2
	"We are already listed in the Sustainable Development Goals section." p. 4
	"We have a legal understanding, and often these companies are not interested because of the **bureaucracy** and end up not participating in bidding processes." p.7

CROSS-REFERENCING THE DATA

It is noticeable that, even though the universities surveyed are considered entrepreneurial, the findings, predominantly from USP (University of São Paulo), still highlight several aspects that hinder the development of entrepreneurship in universities, including: a change in mindset, breaking down taboos about entrepreneurship, a distortion of what it means to be an entrepreneur, and the cultural issue, which is emphatically pointed out. This perception aligns with Clark's (1998) assertion that the development of an integrated and engaging entrepreneurial culture is a key element in an entrepreneurial university. Other key points include: a lack of knowledge and qualification in business management; the existence of a communication barrier, especially between researchers and the market; and the difficulty in transforming inventions and research into innovation. In this sense, Salamzadeh et al. (2011) reinforce that the promotion of innovation should occur through incubators, technology parks and networks, structures that drive development. In the same vein, Fernández-nogueira et al. (2018) point to innovation as an essential factor that must be present, and the challenges to its development need to be overcome.

Other aspects, also pointed out as obstacles, are the very outdated regulations, excessive bureaucracy, the lack of a support infrastructure closer to the rese-

archer, a master plan with defined policies, and greater availability of resources from companies to conduct research at the university. Regarding the need for flexible structures, Rohani (2013) and Guerrero et al. (2015) define this need as an important point in building an entrepreneurial university, as well as a governance structure geared towards entrepreneurship.

Finally, becoming an entrepreneurial university can be a complex challenge, requiring a significant shift in institutional culture and strategies. Therefore, one of the main challenges and difficulties faced by universities seeking to become entrepreneurial includes cultural change; that is, a change in organizational culture is needed, valuing creativity, innovation, and collaboration instead of tradition and bureaucracy, and fostering engagement within the academic community, emphasizing that the pursuit of promoting entrepreneurship and sustainability needs to be a priority for the institution (Liu et al., 2018; Schaper, 2019; Etzkowitz et al., 2021; and Rasmussen & Lindgren, 2021).

Regarding sustainable universities, the majority of respondents indicated that, for a university to be sustainable, it needs, among other elements: a new governance structure, ESG considerations, and a new culture; the creation of an institutional sustainability policy; a strategic plan with indicators to develop and monitor; the integration of sustainability into teaching; the creation of an institutional program for a Sustainable *Campus;* continuous actions to avoid regression; sustainability as an evaluation criterion for projects; attention to basic elements such as energy, water supply, sanitation, waste management, tree planting, pets, and student and staff mobility; a focus on diversity, inclusion, and student retention; the transformation of *campuses into* living laboratories; and, very strongly, working with the UN's sustainability agenda, incorporating the SDGs into institutional activities.

Universities must carry out their activities both in promoting sustainability and in training professionals capable of facing the environmental, social and economic challenges of the 21st century (Sachs, 2007).

Regarding the challenges in creating a sustainable university, the reports, similarly across universities, point to the following aspects as predominant criteria: regression in actions due to lack of continuity and attention; cultural change, as people resist change; curricular modernization; implementation of developed plans; lack of knowledge of the SDGs by the academic community; data collection; training

of managers; engagement of people in the movement for sustainability; students arriving at the university without awareness of what sustainability is; awareness of the academic community and society as a whole; resources for investment; inclusion of ESG issues at the University; support from senior management; departmental structure; a specific sustainability department, closer to senior management; bureaucracy; and the development of a strong sustainability policy. It is noticeable that the challenges are precisely the points listed as necessary elements for creating a sustainable university, emphasizing and confirming the results found.

Regarding the challenges, Ramaswami et al. (2012) point out that few *campuses* develop in a thoughtful manner; most often, change is the product of *ad hoc decisions* made at many different times, in many different places, without much or any consideration for the whole. Infrastructures are substantially fixed, practical, and fragmented.

Along the same lines, Lipschutz, Wit, and Lehmann (2017) describe the need to transform university *campuses* into sustainable entities, rather than just institutions with sustainability projects, thus offering programmatic models and practices that can be applied in the future. A good starting point is to ensure that the entire university community is involved in building a sustainable *campus* and has a voice in the dialogue and decision-making. It is important to ensure that their message is not only about 'green' issues, but also includes social and financial aspects. This will broaden the range of people who see sustainability as relevant and useful to them.

The institutions surveyed advocate for the establishment of actions that transform and maintain universities as sustainable entrepreneurial entities. They incorporate into their discourse the need for strategic planning that seeks curricular and structural reform for both entrepreneurial and sustainable practices. They argue that research needs to take into account the demands of society and the market, meaning that universities need to invest in providing answers to the external environment.

New roles are being assigned to the university, such as entrepreneurship, with an emphasis on social responsibility, and sustainability, with an emphasis on environmental responsibility; it was possible to identify in the plans of both institutions that both placed sustainability among their guiding principles, as well as a concern

for promoting a culture of innovation and entrepreneurship through the creation of mechanisms to stimulate and support the entire academic community in favor of the core activities of the University.

It became evident that the universities' senior management recognized the institutional commitment to sustainable development and the challenge arising from this commitment, especially regarding meeting as many sustainable development goals as possible. Both universities affirm that they have been acting emphatically at all levels, seeking to overcome the weaknesses that still exist in this area.

The findings clearly demonstrated the participation of the universities studied (USP and Unicamp) in local, national, and perhaps even international development. Both institutions recognize their role in local development, acknowledge the importance of partnerships established with other higher education institutions, the government, and the productive sector, focused on solving societal problems and on insertion and participation in local innovation systems, thus corroborating the assertions of ETZKOWITZ (2000).

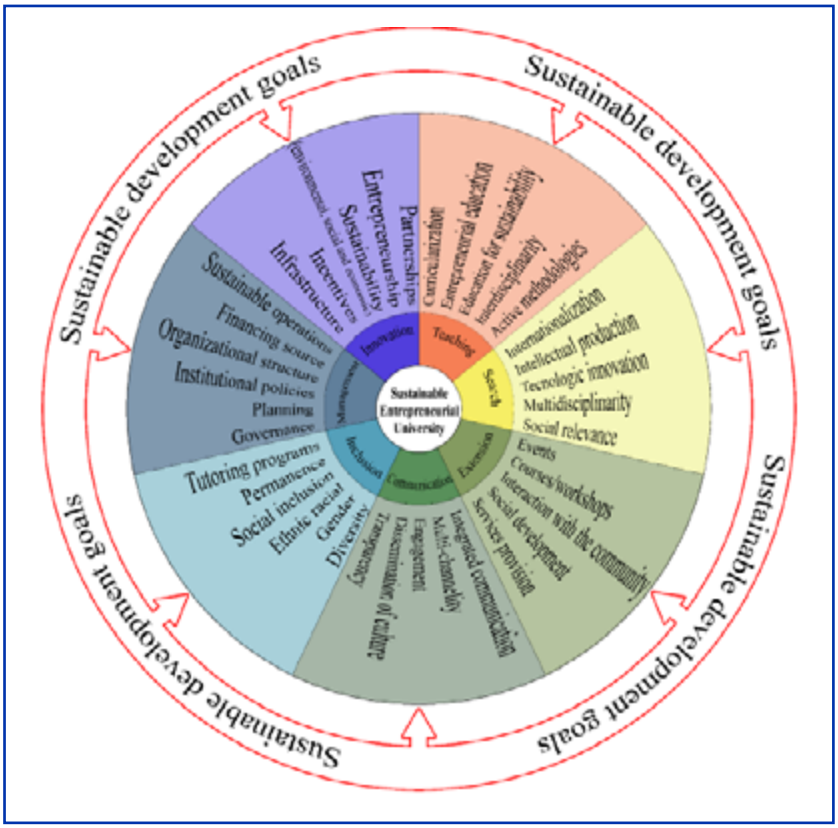
The experiences developed at USP and Unicamp relate to mechanisms and strategies in the area of entrepreneurship, innovation, and sustainability, in line with models incorporated in developed countries. In this sense, although there is still a long way to go to reach high levels of results, at the level they are at, the two institutions studied manage to foster intense engagement with society and market demands, without separating their social functions and their pillars of teaching and research.

FRAMEWORK

To develop the *framework,* the cross-referenced results of the case studies were analyzed. Figure 4 presents an overview of the entire framework, outlining the axes and necessary elements that comprise a sustainable entrepreneurial university.

The proposed *framework* integrates the predominant categories in the research, which are designed into axes/dimensions: teaching, research, outreach, innovation, inclusion, and communication. Each axis includes sub-dimensions that describe specific characteristics, or rather, the elements that compose them. The SDGs serve as guiding principles for all categories and subcategories.

Figure 4. *Sustainable* entrepreneurial university *framework.*



O *framework* proposto integra as categorias predominantes na pesquisa, estas desenhadas em eixos/dimensões: ensino, pesquisa, extensão, inovação, inclusão e comunicação, cada eixo contempla subdimensões que descrevem características específicas, ou seja, elementos que as compõem. Os ODS aparecem como norteadores de todas as categorias e subcategorias.

Final Considerations

The objective of this study was to propose a *framework* of elements that underpin a sustainable entrepreneurial university and its developed practices. To this end, the

following question was answered: What are the fundamental elements that comprise a sustainable entrepreneurial university?

Based on the research findings, it was possible to ascertain that the universities analyzed are in a constant process of construction, seeking to become effectively entrepreneurial and sustainable. Although the universities surveyed do not always offer immediate and satisfactory answers to these demands, they have been making an effort to adapt in order to adjust, increasingly, to the current context.

Building a sustainable entrepreneurial university is a challenge that demands an integrated approach and a commitment to innovation, sustainability, and entrepreneurship. To build a sustainable entrepreneurial university, it is necessary to maintain an entrepreneurial culture, with committed leadership, supportive infrastructure, incentives for sustainable research and innovation, as well as strategic partnerships and engagement with the Sustainable Development Goals (SDGs).

In short, a sustainable entrepreneurial university is one that seeks to develop an entrepreneurial culture among its members and incorporates sustainability principles into its activities. This concept combines the ideas of entrepreneurship, innovation, and sustainability, and seeks to create an environment conducive to knowledge generation and the transformation of ideas into sustainable solutions.

A sustainable entrepreneurial university should be an institution engaged with society and contemporary socio-environmental challenges, seeking to create innovative and sustainable solutions that can contribute to building a more just, democratic, and environmentally responsible society. It is important to emphasize that building a sustainable entrepreneurial university is not an easy process; it requires time, resources, and collective effort.

Regarding practical contributions, this includes the development of guidelines for implementing entrepreneurial and sustainable practices in universities. A sustainable entrepreneurial university can contribute to the training of highly skilled professionals capable of developing innovative and sustainable solutions, as well as generating knowledge and technology that can be applied in society.

Regarding managerial contributions, the study presents the elements that underpin the construction of a sustainable entrepreneurial university. This includes creating an environment that encourages innovation, establishing strategic partnerships with companies and other organizations, promoting entrepreneurship pro-

grams, and implementing sustainable management practices. Furthermore, integrating the UN Sustainable Development Goals (SDGs) can help universities align their activities with global demands for sustainable development.

This study is socially relevant because it contributes to the training of skilled professionals committed to sustainable development, capable of proposing innovative and sustainable solutions to address challenges affecting global society. The university is an institution that exerts a great influence on society, whether in the training of professionals, the generation of knowledge, or the promotion of innovation and entrepreneurship.

The main theoretical contribution was the construction and development of a conceptual *framework* that addresses the fundamental elements to aid in the understanding and implementation of a sustainable entrepreneurial university. This study therefore sought to advance the area of knowledge that interconnects university entrepreneurship and sustainability, allowing managers, academics, and other stakeholders to better understand the characteristics, challenges, and benefits of this university model.

Regarding the limitations of this study, firstly, the fact that the study's interviews are limited to the state of São Paulo, with only two participating public universities, even though they are considered benchmarks and are at the top of academic *rankings,* is considered a limitation. In this situation, there are probably several private and other public universities that have also developed entrepreneurial and sustainable activities and could contribute to this study.

Secondly, not all those invited to participate accepted, and therefore it was not possible to obtain a complete overview of the activities of all divisions within the organizational structure that develop entrepreneurial and sustainable activities in the institutions.

In order to overcome these limitations, it is suggested that future studies map university entrepreneurial activities and sustainability-oriented activities in a larger number of cases, i.e., participating institutions, conducting comparative studies between different universities, analyzing their practices, management models, results, and social and environmental impacts.

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