



Innovation, Virtual Internationalization, and Interdisciplinarity: the pillars of scientific entrepreneurship for the institutional excellence

Inovação, Internacionalização Virtual e Interdisciplinaridade: os pilares do empreendedorismo científico para a excelência institucional

ISSN: 2319-0639
OPEN ACCESS

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Received on:

January / 2025

Approved on:

March / 2025

Editor:

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Evaluation Process:

Double blind peer review

Reviewers:

Reviewer 1

Reviewer 2



Este artigo não possui nenhum arquivo associado
This article does not have any associated files.

HIGHLIGHTS

- This study proposes a theoretical-reflexive framework linking innovation, virtual internationalization, and interdisciplinarity to Knight's internationalization cycle, offering Higher Education Institutions a holistic approach to achieving institutional excellence amid global academic and technological transformations.
- Virtual Internationalization is presented as a central pillar, enabling inclusive academic exchanges and cooperation through digital platforms, especially relevant in post-pandemic contexts where physical mobility is limited and access inequalities persist in traditional international programs.
- Interdisciplinarity fosters creativity, cooperation, and knowledge integration, reinforcing awareness, planning, and commitment within internationalization strategies, and offering a dynamic means for HEIs to respond to complex global challenges and collaborative academic environments.
- The proposed framework provides a managerial tool for HEIs to identify and implement strategic actions for internationalization, contributing to institutional development through innovative, inclusive, and interdisciplinary practices embedded across all levels of academic operations.

HOW TO CITE:

Snoeijer, E., Stallivieri, L., Costa, A. M., & Melo, P. A. de. (2025). Innovation, virtual internationalization, and interdisciplinarity: The pillars of scientific entrepreneurship for the institutional excellence. *Brazilian Journal of Management and Innovation (Revista Brasileira De Gestão E Inovação)*, 12(2), 1–9.
<https://doi.org/10.18226/23190639.v12n2.01>



RBGI

KEYWORDS

Internationalization of Higher Education Institution

Innovation

Virtual Internationalization

Interdisciplinarity

The Internationalization Cycle

ABSTRACT

Objective: This research investigated how Higher Education Institutions (HEIs) use innovation, virtual internationalization (VI), and interdisciplinarity to achieve institutional excellence.

Method: The methodological procedure involves a discussion of authors on bibliographic material, a descriptive and qualitative method, and content analysis.

Originality/Relevance: This paper is a singular theoretical-reflexive study connecting three elements (innovation, VI, and interdisciplinarity) under the lens of the HEIs' internationalization process.

Main Results: The result was the elaboration of a framework based on a theoretical-reflexive study comparing the stages of the internationalization cycle described by Knight (1994) and the three proposed pillars of internationalization, which are innovation, virtual internationalization, and interdisciplinarity. It is possible to identify links between stages and each of the three proposed pillars, resulting in a framework composed of these elements, since they surround and connect these steps in a broad perspective, promoting an overview of the institution.

Theoretical contributions: The six cycle steps of Knight (awareness, commitment, planning, operationalization, review, and reinforcement) are considered essential for institutional internationalization. On this basis, this study starts discussions about strategies related to internationalization, especially considering the virtual environment as a potential alternative to HEIs achieving institutional excellence.

Managerial contributions: The framework might help universities indicate the steps and elements they should implement to improve the results of institutional internationalization. For many HEIs, constructing some strategies to foster international actions is difficult to support.

PALAVRAS-CHAVE

Internacionalização de Instituições de Ensino Superior

Inovação

Internacionalização Virtual

Interdisciplinaridade

Ciclo de Internacionalização

RESUMO

Objetivo: Esta pesquisa investigou como Instituições de Ensino Superior (IES) utilizam inovação, internacionalização virtual (IV) e interdisciplinaridade para alcançar excelência institucional.

Método: O procedimento metodológico envolve discussão de autores sobre material bibliográfico, método descritivo e qualitativo e análise de conteúdo.

Originalidade/Relevância: Este artigo é um estudo teórico-reflexivo singular conectando três elementos (inovação, IV e interdisciplinaridade) sob a lente do processo de internacionalização das IES.

Principais Resultados: O resultado foi a elaboração de um framework baseado em um estudo teórico-reflexivo comparando as etapas do ciclo de internacionalização descrito por Knight (1994) e os três pilares propostos para a internacionalização, que são inovação, internacionalização virtual e interdisciplinaridade. É possível identificar ligações entre as etapas e cada um dos três pilares propostos, resultando em um framework composto por esses elementos, uma vez que eles circundam e conectam essas etapas em uma perspectiva ampla, promovendo uma visão geral da instituição.

Contribuições Teóricas: As seis etapas do ciclo de Knight (conscientização, comprometimento, planejamento, operacionalização, revisão e reforço) são consideradas essenciais para a internacionalização institucional. Com base nisso, este estudo inicia discussões sobre estratégias relacionadas à internacionalização, especialmente considerando o ambiente virtual como uma alternativa potencial para que as IES alcancem a excelência institucional.

Contribuições Gerenciais: O modelo pode auxiliar as universidades a indicar as etapas e os elementos que devem implementar para aprimorar os resultados da internacionalização institucional. Para muitas IES, a construção de estratégias para fomentar ações internacionais é difícil de sustentar.

1. Introduction

To gain a competitive edge, governments, businesses, public and private organizations, and educational institutions all work to stay current on strategic knowledge (García Rodríguez, Shriner Sierra, Martínez Luis & Caamal Cauich, 2020). From this perspective, education could be recognized as a significant differentiator for these organizations as they aspire to rise in the future (Carvalho & Araújo, 2020).

Considering globalization, internationalization is one of the forces that most impacts and defines higher education, as it is one of the most important challenges facing the new century (Miranda & Stallivieri, 2017). Internationalization and globalization have affected every nation's economic, social, cultural, and educational spheres. For instance, offering bilingual courses in elementary and secondary education is becoming more and more widespread, particularly in the field of education (Boal, Chaves & Stallivieri, 2015).

Whereas this scenery, Higher Education Institutions (HEI) should pursue alternatives to improve institutional structures (such as information technology) and personnel (staff and faculty members) to achieve its goals. But more than that, HEI uses innovations to define new routes to stand out and achieve its goals. A higher education innovation "system" can be thought of as a collection of features, characteristics, and connections that enable us to examine the evolution of innovation in higher education and deconstruct the many levels of interactions among its constituent parts (Brennan, Broek, Durazzi, Kamphuis, Ranga & Ryan, 2014).

Information and Communication Technology (ICTs) has fundamentally been the bridge between the academic community (students and faculty), especially considering the recent pandemic period caused by Covid-19. In the perspective of ICTs, we can conceive of students, even before Covid-19, as "digital natives" who grew up in a world heavily influenced by technology (Costa, Pozzebon & Lopes, 2020). Alongside innovation, through interaction, teamwork, application, and the merging of disciplinary borders, interdisciplinarity is frequently seen as a means of fostering creativity, innovation, and synergy (Haynes, 2017).

Through the use of ICTs, it is possible to move from an internationalization model based on in-person interactions to one based on online interactions, called Virtual Internationalization (VI) (Stallivieri, 2022). In light of foregoing, this research aims to investigate how innovation, virtual internationalization (VI) and interdisciplinarity are used by HEI as elements to achieve institutional excellence.

It is understood that these three elements (innovation, VI, and interdisciplinarity) are relevant to HEI internationalization process mainly considering: fast changes in the work positions scenery around the globe that requires excellent professional quality; requirement of university assessment systems (national and international rankings); university (academic community) and entrepreneurial partnerships; technology expertise to maintain institutional activities; and virtual environment as the way HEI should develop and explore its activities and attract the academic community.

This paper is divided into 5 sections as follows: the introduction, with theme contextualization, the research purpose, and justification; the theoretical foundation, composed by authors whose works enrich the discussion; a theoretical-reflexive study involving innovation, virtual internationalization and interdisciplinarity and the internationalization cycle of Knight; and the final considerations followed by the references.

2. Theoretical Foundation

This section approaches the prominent authors who contribute with subsequent topics: Higher Education Institution, Internationalization of Higher Education Institution, Innovation and Technology, and Higher Education Institution Interdisciplinarity.

2.1 Higher Education Institutions

Higher Education Institutions (HEIs) could be considered organizations that are the cradle of training professionals and creating leaders to act in

many market fields (Berchin, Santos Grando, Marcon, Corseuil & Andrade, 2017). Universities worldwide have diverse ways of responding to the problems caused by globalization. The internationalizing function of academia has also absorbed greater interconnectedness as the importance of global interdependence in economic, political, and social dynamics has been acknowledged (Jibeen & Khan, 2015).

Historically, academic capitalism — a particular intellectual subtype of capitalism — began in the United States and is characterized by expanding the market economy's laws and regulations to include higher learning and science. In the past, higher education and science belonged to the non-profit intellectual activity sector and were created with the goal to discover, create, and disseminate knowledge for the benefit of all humankind (Romanovskiy, Romanovska, Romanovska & El Makhdi, 2021).

HEI, by its nature as a social institution, preserves the principles of sustainability and stability of its mission, preventing sudden changes, even in response to crises that may affect its institutional status: hence the complexity and slowness of institutional changes (Colossi & Baade, 2015). According to the authors, however, the context in which the educational institution is situated is significantly impacted by the worldwide alterations of modern society, which also foster institutional and organizational changes as well as behavioral changes in participants.

The knowledge of the academic staff and how well they are coordinated would establish the prime objective of a higher education institution. In other words, the academic community directly influences the quality of higher education (Gulua, 2020). This condition is also fundamental to cross-institutional borders aiming for a global field, new cooperation with other international HEI and its community (mainly students and faculty). This topic is discussed in the sequence.

2.2 Internationalization of Higher Education Institution

International organizations have repeatedly emphasized higher education institutions' significance for world development (Morosini, Corte & Guilherme, 2017). Humanity's behavior changed due to the changes experienced in several spheres, including the economic, political, social, and cultural scenes. It thus necessitated the development of new solutions to the demands put forward by this globalized society (Stallivieri, 2017).

The World Conference on Higher Education (WCHE)/UNESCO, which occurred in Paris in 1998, highlighted that higher education's global dimension is strongly intertwined with its quality (WCHE, 1998). According to the discussion over this conference, training programs in developing nations in centers of expertise establishing regional and worldwide networks, and with brief periods of intensive study abroad should be given priority.

Considering mobility as a potential activity on the historical process of internationalization in the last decades, De Wit (2015) points out the Erasmus program, in particular, has been the driving force behind a broader and more strategic approach to internationalization in higher education in Europe. This program provides an example for institutions, countries, and regions around the world that internationalization is possible (De Wit, 2015).

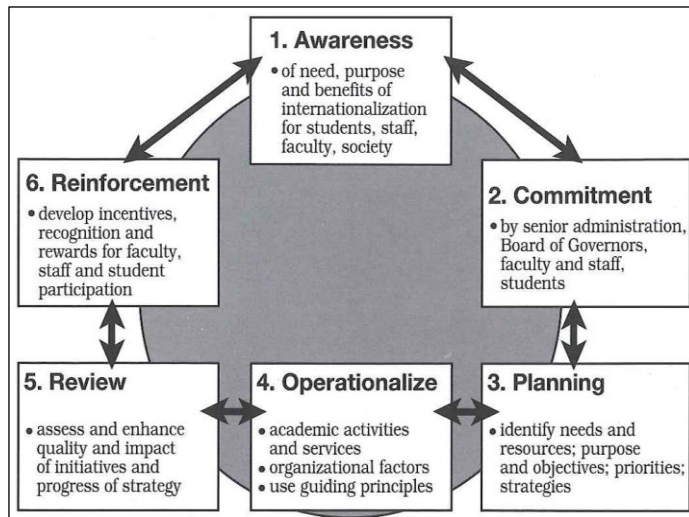
On the other hand, Stallivieri (2022a) cited that study abroad is not an inclusive program that can benefit all students of an institution due to its access restrictions. This can be caused by a lack of resources, a language barrier, or institutional issues; more specifically, not everyone will be able to benefit from international academic mobility. One alternative was the Internationalization at Home (IaH), which could develop the internationalization process in the university also requiring the necessity of training citizens and academic community with some new skills (soft and hard skills) to be effective (Stallivieri, 2022). IaH and other actions permit the inclusion of students that do not have financial or linguistic conditions to access some international institutions (Stallivieri & Vianna, 2020).

The internationalization process of HEI is not a recent discussion, conversely, is a theme approached by universities in the last decades and continues in the recent time. Internationalization has grown to be a large and complex notion that incorporates new logics, techniques, and strategies in various contexts that are always changing (Knight & De Wit, 2018). In this perspective, the process of incorporating international, intercultural, or

global characteristics into the goals, operations, or delivery of higher education is known as "internationalization of higher education" (Knight, 2003).

How to transform what appears to be a serious commitment to internationalization into a comprehensive but realistic strategy that institutionalizes the international dimension into university processes and values is a challenge that many universities face (Knight, 1994). When seen objectively, the construction of such a strategy is a very difficult task. However, the process can be thought of as a cycle if one treats it as a sequence of flexible, interconnected processes, as proposed by Knight (1994) and presented in Figure 1.

Figure 1. The Internationalization Cycle



Source: Knight (1994).

The 6 steps proposed on this cycle involve: awareness (of the importance and benefit of internationalization for students, staff, and faculty); commitment (to the process of integrating and international dimension into teaching and training, research and service functions); planning (developing a comprehensive plan or strategy); operationalization (implementing the different aspects of a strategy and creating a supportive culture); review (assessing and continually enhancing the quality and impact of the different aspects of the process); and reinforcement (the reward and recognition of faculty and staff participation) (Knight, 1994). According to the author, in an effort to foster ongoing innovation, the internationalization cycle identified techniques to ensure that the international dimension is incorporated into a college or university's culture and systems. Innovation and institutionalization are not mutually exclusive ideas; rather, they can strengthen one another.

The discussion about the internationalization of HEI surrounds many countries by conferences, such as Annual Conference of Brazilian Association of International Education (FAUBAI), Interinstitutional and Multidisciplinary Conference of Higher Education Internationalization (Afya Global Meeting), Internationalization in Higher Education For Society (IHES) Conference, among others. In America, for instance, this theme was approached as a central topic in 2 editions (Brazil - 2011 - and Mexico - 2012) of the International Colloquium on University Management (CIGU), even though the discussions of HEI internationalization happens in all CIGU editions, which began in 2000 in Brazil. CIGU is an itinerant colloquium that round some countries (Mexico, Brazil, Argentina, Peru and Ecuador) (Snoeijer, da Silva, de Oliveira Cabral, Stallivieri & de Melo, 2022).

However, considering the complex process that internationalization in higher education represents, it is unclear how to link higher education institutions with other institutional players for innovation, globalization, and economic growth. In addition, there are doubts about how to explore the knowledge potential of higher education through both individual and organizational learning (Li-Hua, Wilson, Aouad & Li, 2011). This theme is discussed as follows.

2.3 Innovation and Technology

Innovation has changed over the past thirty years to become synonymous with national development, technological advancement, and corporate success. Currently, innovation encompasses more than just the "development of something new"; it also serves as a magic bullet for a wide range of issues (Kotsemir, Abroskin & Meissner, 2013). Since innovation is a key component of regional, national, and international development strategies, it benefits from legislative support to encourage creativity among organizations. Innovation is a crucial resource for sustainable economic development (Maier, 2018).

Given the growing economic importance of technological innovation, top university innovation output and commercialization can promote greater innovation and facilitate regional economic advancements over time (Rincon & Kadi, 2004). A new product or service, a new process technology, a new organizational structure or administrative system, or new plans or programs relevant to organization members are just a few examples of the diverse outcomes that are covered by the umbrella of innovation (Damanpour, 1996).

Having historical precedents, universities are responsible to train further professionals, as a human capital, to feed the job market (Yeo, 2019). According to the author, when it comes to the usage of labor and capital, technological innovation could be accounted for and considered an inherent factor of economic growth.

Thus, one way to deal with innovation is by using ICTs. Nowadays, faculty has the power to significantly alter the training and educational process: modern communication technology enables lecturers to develop, gather, and expand their educational discoveries while also facilitating their creative work (Abdullayev, 2020). To enhance the teaching and learning processes of their pupils, educators should integrate technologies into their daily activities (Costa, Pozzebon & Lopes, 2020).

Internationalization as a transversal dimension of higher education and in turn cross-border features suffered from the effects of the pandemic moment and, to mitigate its effects, ICTs, specifically digital information and communication technologies (TDICs), began to be used to maintain international learning, intercultural events and for academic cooperation (Marcelino & Woicolesco, 2022). According to the authors, there are some tools that could support institution to foster institutional international process and expand borders: virtual internationalization (VI), distance internationalization, Collaborative Online International Learning (COIL), virtual mobility (VM), Virtual Exchange or Telecollaboration, and Massive Open Online Course (MOOCs).

In the light of TDICs and these tools, Hudzik (2011) points out a new world moment where old practices could not be maintained. This is called disruptive internationalization, which refers to the notion that it is not enough to "continue doing what was done," but rather that it is required to do it better and more proficiently (Stallivieri & Vianna, 2020). Concurrently, there are a number of important artifacts needed for the transition from physical to digital environments, but not all students and all colleges always have access to them. In order for governments and higher education institutions to meet the demands placed on big businesses in these challenging times, knowledge, creativity, and a commitment to society will make all the difference (Stallivieri, 2022b).

In this scenery, it is clear that there is a creative approach to study many cultures without crossing borders. Through online exchange programs, people from all around the world can connect and forge relationships and the VI arises, by new technologies that permit people around the globe to connect and interact (Stallivieri, 2022b). Thus, Bruhn (2016) present an adaption of the concept of internationalization created by Knight (2003) including VI, which results in:

Virtual internationalization at the national, sector, and institutional levels is defined as the process of incorporating an international, intercultural, or global dimension into the delivery, purpose or functions of higher education with the help of information and communications technology (ICT) (Bruhn, 2016, p. 2).

Therefore, VI, innovation and ICTs go together. The development of international and intercultural competences requires the creation of innovative opportunities in the context of internationalization (Marcelino & Woicolesco, 2022). HEIs should use these elements as strategy to increase

academic interdisciplinarity and keep evolving its activities, as discussed in the sequence.

2.4 Higher Education Institution Interdisciplinarity

The quality of interdisciplinary work, or work that draws from the application of several disciplines, is known as interdisciplinarity. The sociologist Louis Wirtz created the phrase, which became a recognized term for the first time in 1937 (De la Tejera Chillón, Sendón, Espinosa, De la Tejera & De la Tejera, 2019). According to the authors, interdisciplinarity allows for a thorough examination of the research topics and encourages the creation of innovative methodological approaches to problem-solving.

The term interdisciplinary could be analyzed as follows: "inter" accurately captures the phenomenon because it denotes cooperation, reciprocity, and togetherness in its initial part; discipline, the second part of the word, denotes guidelines, limitations, and structure (Raento, 2020). In the academic research atmosphere, interdisciplinary does not focus on developing a single lens that can include all of reality. It is instead about using a variety of lenses to comprehend the overlapping and interdependent elements of reality (Lang, Kumm, Wiener, Tully & Maduro, 2013).

Cooperation and reciprocity denote different people from divergent knowledge areas keeping contact in a virtual environment, through interdisciplinarity, fostering academic work continuity. Tabulawa (2017, p. 1) affirms that interdisciplinarity has assumed center stage in calls for reimagining higher education. One of the matters impacting education today is interdisciplinarity, which is reflected in the subject and discipline curriculum as well as in the many didactic methodologies (De la Tejera Chillón et al., 2019). For the authors (2019, p. 58), interdisciplinarity refers to the ability to combine various disciplines, that is, to interconnect and broaden in this way the advantages that each one offers.

Interdisciplinarity has become a widely accepted institutional goal among institutions over the past twenty years (Bolger, 2021). Particularly, an emphasis on sustainability in teaching and research appears to offer significant prospects for interdisciplinary and cross-university work (Benton-Short & Merrigan, 2016). This scenery was evidenced with the pandemic period caused by Covid-19, which suddenly forced the interruption of presential activities in all HEI around the world.

Institutions, at least those technologically unprepared, should reinvent innovating and using TICs to hold administrative and academic practices. VI was commonly a way institutions start working even without much knowledge about how it runs. Through it, interdisciplinarity represented the essential link to academic community cooperation.

3. Methodological Procedures

The methodological procedures for this study consisted of the relationship of three elements proposed to the internationalization process of HEI, that are VI, innovation and interdisciplinarity. Therefore, this theoretical-reflexive study was carried out, which represents a discussion on a particular subject that uses analogies and examine various theoretical and/or practical points of view (Gil, 2008; Silva, 2014).

For this research, authors stated on bibliographic material were founded using the keywords "Internationalization of Higher Education Institution", "Innovation", "Virtual Internationalization", "Interdisciplinarity", and "The Internationalization Cycle", combined or individually. The database was Google Scholar and the data collection occurred in the months of november and december, 2022.

To achieve that result, a descriptive and qualitative method was used, performing an in-depth interpretation and analysis of the information (Marconi & Lakatos, 2010). Based on this interpretation, this research used a content analysis by the link of each element (VI, innovation and interdisciplinarity) that are being considered pillars of internationalization with the stages of the cycle proposed by Knight (1994).

According to Bardin (2011), a descriptive approach is used in content analysis, in which the transcripts are read and then analyzed. The result of this analysis was the draw of a framework matching all elements. Through this framework it was possible to visualize globally the scenery that sustains the current HEI internationalization process.

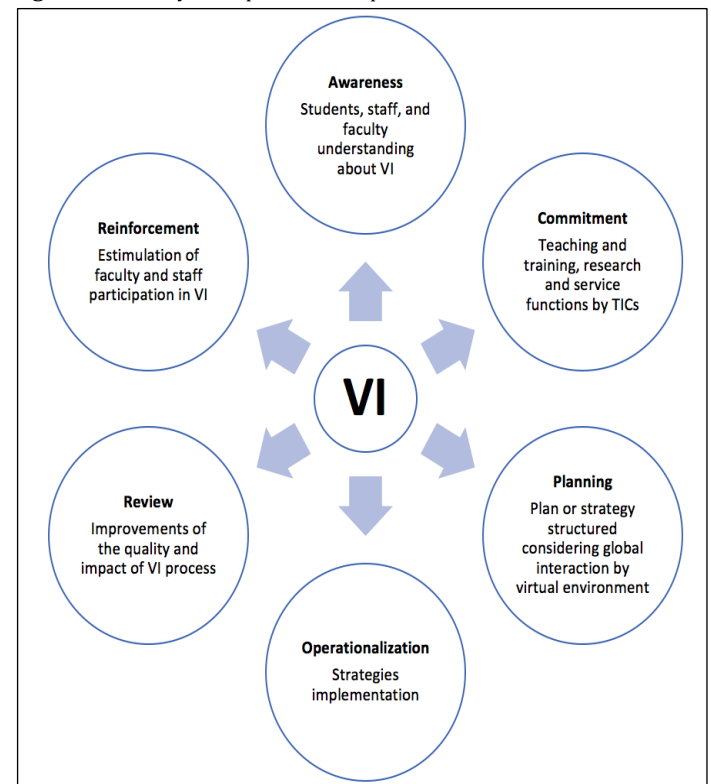
4. Framework: Innovation, VI, Interdisciplinarity and the Cycle of Knight

The recent pandemic situation blocked international physic mobility and forced HEI to use TICs to maintain the educational activities, such as digital platforms, fast internet connections and reasonable technology. In the international context, university access was blocked. Home Office was forcibly established, scientific researches and academic activities reinvented. Innovation appeared intrinsically in many actions, as using technologies and adapting home structures and routines to meet demands.

In this scenery, VI started without much knowledge for many people, as experiments by adaptation of existing technology (for many institutions). Innovation and interdisciplinarity were the emerging and necessary actions to support and maintain many institutional activities and demands. Simultaneously, the interest of international actors that promote cooperation and reciprocity helped to support this imperative situation.

Initially, it is relevant emphasize that each proposed pillar (innovation, VI and interdisciplinarity) might interact with more than one of those cycle steps or even all, although some of them demonstrate more similarity. Based on that, in the aftermath each cycle step will be linked with the pillars. VI could be considered a main pillar because of the interaction with all stages. Taking in account that VI represents a relevant tool of institutional internationalization (Marcelino & Woicolesco, 2022; Stallivieri, 2022b) and occurs by the result of new technologies that enable global connectivity and interaction (Stallivieri, 2022b), Figure 2 shows the relationship among VI and the cycle stages.

Figure 2. VI and cycle steps relationship



Source: Elaborated by the authors.

These connections clarified the necessity of knowledge of how VI works in each step. Different people from diverse parts of the globe should be benefited by virtual activities. Thus, actions that combine digital technologies in interaction contexts for work and study with people from other cultures and nations include virtual mobility, virtual exchanges, and telecollaboration (Marcelino & Woicolesco, 2022). The active participation of the institutional community (faculty, students, and staff) is essential during all stages of the VI process, from awareness to reinforcement.

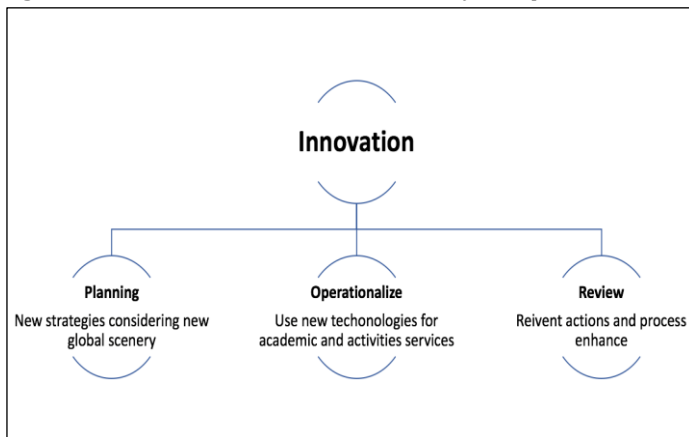
Beside this interaction, VI is a great opportunity for students to access universities that were not affordable for some interested. The physical

distance that used to be the traditional student mobility is now replaced for virtual participation. Therefore, fostering the development of internationalized ecosystems that promote social inclusion must be among the main objectives of Internationalization policies, according to Stallivieri (2020).

It is opportune to emphasize that physical mobility will keep existing as a traditional and relevant action for many researchers that want to maintain face to face experience. Alongside, VI becomes an efficient alternative to foster the expansion of the HEI internationalization. In this perspective, VI could be understood as a disruptive internationalization (Hudzik, 2011), in other words, the changing of old practices. Considering this new universe, VI interacts with all stages of the cycle of Knight because of the virtual environment and it reaches.

Regarding the second proposed pillar, which is innovation, it is possible to link it specially with three steps of the cycle. Figure 3 recreates this connection.

Figure 3. Relation between innovation and three cycle steps



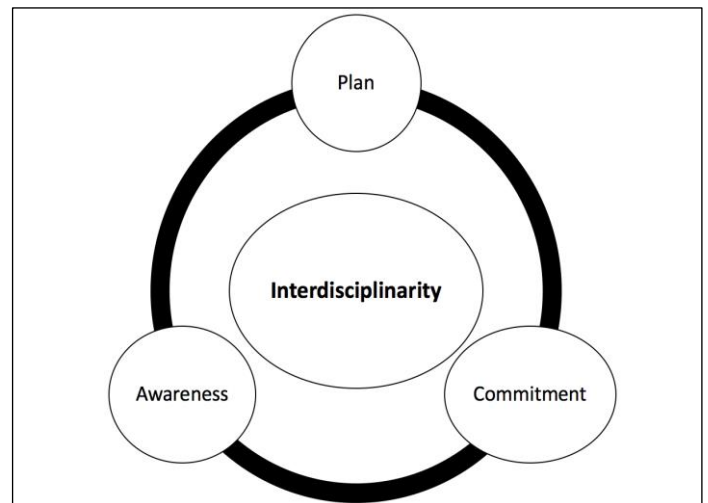
Source: Elaborated by the author.

The three related cycle steps demonstrate the presence of innovation in terms of strategies (planning), technology (operationalization), and process improvement (review). The innovation, by the use of new ICTs as fundamental academic community training tools as cited by Abdullayev (2020), mainly considering technological advancements and the velocity of sharing information (among universities, faculty and students), could be considered a relevant key of HEI internationalization's process. The way educators began to use new and integrate technologies happened faster in a short period of time (Costa, Pozzebon & Lopes, 2020). Faculty training and institutional adjustments (new and power equipments, digital platforms and virtual ambiances) becomes essential. Changing from face to face to virtual mobility, phenomena that change the way international HEI enables the inclusion of many students (Stallivieri, 2022) happened by the innovation of technology.

But not just in technology innovation is visualized, also in the elaboration of plan strategies to implement and develop institutional actions. HEI creativity and innovation are the differential to promote institutions in an international scenery and attracting more students. Finally, innovation is present in the review stage, where improvements occur and will reflect in the beginning of the cycle. It is possible to affirm that innovation and review is always linked in the internationalization process since enhancements impact directly the academic community, which influences the performance and quality of HEI (Gulua, 2020).

The last but not the least pillar is interdisciplinarity. Considering that it is intrinsically related to cooperation and reciprocity (Raento, 2020) and contributes to interlock discipline curriculum (De la Tejera Chillón et al., 2019), interdisciplinarity could be achieved also with three cycle stages. Figure 4 represents this relation.

Figure 4. Interdisciplinarity into some stages of the cycle of internationalization



Source: Elaborated by the authors.

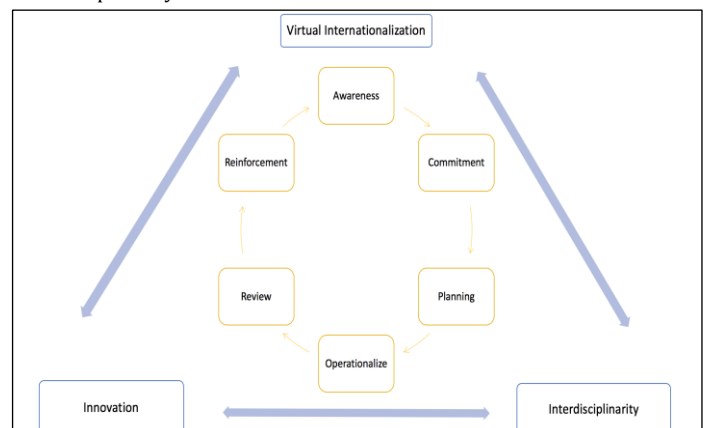
The first link happens with the initial and crucial step for any organization, planning. This stage concentrates on the institutional delineation of goals, structures and strategies to achieve its objectives. This significant stage should be supported for all university subjects. In this perspective, creating conscience about interdisciplinarity benefits might guide strategic decisions. Creativity and innovation, some elements that englobe interdisciplinarity, creates a necessary synergy (Haynes, 2017) to achieve international demands of HEI.

Second, awareness of the academic community indicates the necessity of conscientious and interdisciplinarity into this process. It is not possible to promote institutional internationalization without considering researchers' interactions (faculty and students) through international cooperation. More than that, interdisciplinarity should be consolidated in all HEI academic and administrative areas.

Thus, a global awareness is necessary to understand how powerfully different institutional actors need to work together to optimize international HEI goals. This is the third linked, commitment, of faculty, students and staff in every single activity that involves internationalization actions. Knight (1994) already highlighted the necessity of serious commitment to internationalization as a strong strategy to concretize HEI international dimension.

The World Conference on Higher Education (WCHE, 1998) also pointed out that training programs and study abroad should be given priority. But this movement just happens successfully when all academic communities for those participating universities (sending and receiving faculty and students) show commitment. Based on the specific analysis involving each pillar, it is possible to overlap the cycle of Knight. The result is a framework represented by Figure 5.

Figure 5. Alignment of the Cycle of Knight and Innovation, VI, and Interdisciplinarity



Source: Elaborated by the authors.

This framework clearly demonstrates a global interaction of elements. The internationalization process is complex and involves a continuum flow, as shown by the cycle of Knight (1994). The six cycle steps (awareness, commitment, planning, operationalization, review and reinforcement) are considered by the author essential for institutional internationalization. Simultaneously, the three pillars surround and connect these steps in a wide perspective, as described separated previously by figures, promoting an overview of the institution.

Based on this framework, it is possible to relate these steps with global inherit actions that are often unnoticed but considered essential. It is appropriate to highlight that VI represents an essential pillar to encompass and sustain international academic practices. Some considered tools, such as COIL, IaH, and MOOCs are usually used to foster internationalization of HEI around the globe (Marcelino & Woicolesco, 2022). It demonstrates that VI is a tendency with no return, as pointed out by Stallivieri (2022b) to reach satisfactory institutional goals, mainly considering financial/social conditions, and students accessibility/inclusion.

Finally, it is possible to conclude that this framework and the detailed analysis of pillars links (figures 2, 3, and 4) might provide HEIs a global idea of the complex process that involves internationalization. Moreover, the framework might help universities to indicate necessary steps and elements that should be implemented to improve the institutional internationalization results. For many HEI, the construction of some

strategies to foster international actions is a difficult issue to face, as pointed out by Knight (1994).

4. Final Considerations

This theoretical-reflexive study aimed to investigate how innovation, virtual internationalization and interdisciplinarity are used by HEI as elements to achieve institutional excellence. Through comparison with the internationalization cycle of Knight, it was possible to conclude that all elements work interconnected and in a flow and complex process. Into that, the actors (faculty, students, and staff) are considered elementary variables that should be included in all stages.

This study could be considered an initial reflection about the topic. For further research, this proposed framework might be applied in specific cases to verify how institutions are planning their strategies related to internationalization, especially considering the virtual environment as a potential alternative to HEI achieving academic excellence.

Based on this, further research could be carried out in HEIs to investigate the appliance of this framework, and verify, in practice, which steps and elements are necessary to achieve the institutional internationalization appropriately, mainly, considering the complexity of each institution.

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EDITORIAL DETAILS AND AUTHOR CONTRIBUTIONS

Detalhes Editoriais e Contribuições Autorais

Financial support:

Not informed by the authors.

Open Science:

Snoeijer, E., Stallivieri, L., Costa, A. M., & Melo, P. A. de. (2025). Innovation, virtual internationalization, and interdisciplinarity: The pillars of scientific entrepreneurship for the institutional excellence. *Brazilian Journal of Management and Innovation (Revista Brasileira De Gestão E Inovação)*, 12(2), 1–9. <https://doi.org/10.18226/23190639.v12n2.01>



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The authors declare that they have no conflicts of interest.

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Validation				
Visualization				
Writing – original draft				
Writing – review & editing				