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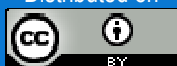
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Digital transformation of higher education institutions: a framework for strategic decision-making

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ABSTRACT

Introduction: Digital Transformation (DT) was accelerated by the COVID-19 pandemic, since it has intensified the use of digital platforms as a way to avoid crowding of people in physical environments. DT is present in different markets as more population groups have access to the internet. It has been changing consumer preferences and, consequently, consumer decision-making. One of the markets is that of Higher Education Institutions (HEIs), which adopt strategic changes to continue reaching the audiences that emerge from online platforms. **Objective:** We applied the Resource-Based View to identify the strategic resources that Brazilian HEIs have used to promote their digital transformation to the e-learning format. **Methodology:** Therefore, we proposed a framework using the Design Science Research method. To validate the framework, three stages of interviews were carried out with individuals directly involved with DT, HEI professors, HEI managers and EdTech's professionals. **Results/Conclusion:** Our results validated a framework with eight attributes: Effectiveness of Courses, Quality Educational Programs, Training of Professors for e-learning, Appropriate Management System, Active Sales Process, Engagement of Professionals, Technology, Agile Development, and Entrepreneurial Culture.

KEYWORDS

Digital transformation. Resource-based view. Higher education institutions. Design science research.

Transformação digital de instituições de ensino superior: um framework para a tomada de decisão estratégica

RESUMO

Introdução: A Transformação Digital (TD) foi acelerada pela pandemia de COVID-19 que tem intensificado o uso de plataformas digitais como maneira de evitar a aglomeração de pessoas em ambientes físicos. A TD tem dominado diferentes mercados na medida em que mais grupos da população têm acesso à internet. Dessa forma, ela vem modificando as preferências de consumo e, conseqüentemente, as tomadas de decisão do consumidor. Um desses mercados é das Instituições de Ensino Superior (IES) que adotam modificações estratégicas para continuar alcançando os públicos que surgem a partir dessas plataformas online. **Objetivo:** Nós utilizamos a perspectiva da Visão Baseada em Recursos a fim de identificar os recursos estratégicos que as IES brasileiras têm utilizado para promover sua TD para o formato *e-learning*. **Metodologia:** Para tanto, propomos um *framework* utilizando o método *Design Science Research*. Para validação do *framework*, foram realizadas três etapas de entrevistas com indivíduos envolvidos diretamente com TD, professores, gestores de IES e profissionais de *Edtechs*. **Resultados/Conclusão:** Nossos resultados validaram um *framework* com oito atributos: Efetividade dos Cursos, Programas Educacionais de Qualidade, Capacitação dos Professores para *e-learning*, Sistema de Gestão Adequado, Processo de Vendas Ativo, Engajamento dos Profissionais, Tecnologia, Desenvolvimento Ágil e Cultura Empreendedora.

PALAVRAS-CHAVE

Transformação digital. Visão baseada em recursos. Instituições de ensino superior. *Design science research*.

Transformación digital de instituciones de educación superior: un framework para la toma de decisiones estratégicas

RESUMEN

Introducción: La Transformación Digital (TD) fue acelerada por la pandemia de COVID-19 que viene intensificando el uso de plataformas digitales como manera de barrar la aglomeración de personas en ambientes físicos. La TD viene dominando diferentes mercados en la medida en que más grupos de la población tienen acceso a internet. De esa forma, ella viene modificando las preferencias de consumo y, conseqüentemente, las tomas de decisión del consumidor. Uno de esos mercados es de la Instituciones de Enseñanza Superior (IESs) que adoptan cambios estratégicos para continuar alcanzando los públicos que surgen a partir de esas plataformas online. **Objetivo:** Utilizamos la perspectiva de la Visión Basada en Recursos para identificar los recursos estratégicos que las IESs brasileñas vienen utilizando para promover su transformación digital para el formato *e-learning*. **Metodología:** Para tanto, desarrollamos un *framework* utilizando el método *Design Science Research*. Para validación del *framework*, se realizaron tres etapas de entrevistas con individuos involucrados directamente con la TD, profesores de IESs, gestores de IESs y profesionales de *Edtechs*. **Resultados/Conclusión:** Nuestros resultados validaron un *framework* con ocho atributos: Efectividad de los Cursos, Programas Educativos de Calidad, Capacitación de los Profesores para *e-learning*, Sistema de Gestión Adecuado, Proceso de Ventas Activo, Compromiso de los Profesionales, Tecnología, Desarrollo Ágil y Cultura Empreendedora.

PALABRAS CLAVE

Transformación digital. Resource-based view. Instituciones de educación superior. *Design science research*.

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1 Introduction

Governments, organizations, companies and ecosystems are urged to address worldwide economic, environmental, societal and health-related challenges while simultaneously rethinking their competitiveness (SNEADER; STERNFELS, 2020). In this context, Higher Education institutions (HEIs) push educators continuously towards innovation (LYTRAS *et al.*, 2018). In recent years, Brazilian HEIs have overcome several challenges in their management, especially in the competitive environment within the educational market. In this panorama, it is possible to state that the influence of Digital Transformation (DT) in the education scenario – combined with the pace of adaptation of traditionally conservative HEIs – is paving the way for private companies to invest in the creation of new HEIs. These HEIs started educational ventures founded in new models of teaching, betting on structures and dynamics designed for the students of the future and even of the present – mostly known as digital natives. Together with DT, Edtechs emerged, which are companies designed to develop and provide technologies and services for educational institutions.

The entry of these new players – many of them with a primary focus on e-learning – intensified competition in the market. However, the management challenges faced by HEIs do not seem to stem only from the growing offer of courses in the e-learning format and their digital platforms. Technological tools enhance students' learning experiences, engagement, retention, and performance (REESE; ROSENMANN; MCGARTY, 2015), thus facilitating social connectivity and team-based learning (MUSTEEN *et al.*, 2018). There is a growing and increasingly complex range of software programs, cases, and tools to be used by teachers and professors (SELWYN, 2016), with no prescriptive rules through which any form of innovative practice can be successfully implemented.

To formulate successful strategies for HEIs, both internal aspects of institutions, focusing on organizational potential and resources, and aspects external to the organization of the competitive environment must be observed. Therefore, we used the Resource-Based View to understand the internal environment of HEIs in this research (BARNEY, 1991; PENROSE, 1959; RUMELT, 1984). We adopted this perspective as it adds up internal aspects of organizations while assisting in understanding issues such as physical resources, relationships between teams, history and reputation, assets and conditions of the machines and available technologies. At the same time, DT has modified the relationships between individuals, consumption habits, and the organization of people within society as a whole (FITZGERALD *et al.*, 2013; ROGERS, 2017; WESTERMAN *et al.*, 2011). Thus, it can be said that, just as DT has changed behaviors and cultures, its tools and possibilities have presented new mechanisms and management models used in organizations such as HEIs. In this sense, the repercussions of these changes also directly affect social relationships within the corporate environment, changing norms and limits for living together, as well as how managers behave in the face of new scenarios.

The two concepts can be complementary, since RBV starts in the internal environment of organizations, from the strategic resources found there, and continues with the view of external competitiveness, which has great influence from DT. The approximation of these two perspectives aims to enrich the research on the strategic paths of HEIs, including how DT has affected the market dispute and identifying which procedures are most appropriate for the management of the institutions' resources. Although the DT has been approached by some researchers (e.g., SILVA; FRÖHLICH, 2019), who claim that is an area that deserves attention for HEIs to remain in an increasingly competitive scenario, little is known on how digital technology and human capabilities may renew organizations' and ecosystems' competitiveness (i.e.. the effect of DT). The studies of DT on HEIs are initially about the offer of e-learning. However, several resources derived from technologies can be considered drivers of the DT of HEIs, such as the emergence of online evidence, the issuance of digital diplomas, the development of applications by HEIs for various purposes, among other technological-based creations (WHITAKER; NEW; IRELAND, 2016). Therefore, it is important to emphasize that the advantage in the use of digital technologies is not in the technologies themselves, but in how institutions integrate advances and transform the operation of their businesses (KANE *et al*, 2015).

Our research focuses on the scenario involving the urgency of adapting HEIs to this new context surrounded by potential antagonists, which possibly implies decision-making processes to face competition as well as changes in their positioning in teaching models and negotiation strategy. Therefore, this research aims to develop a framework with constructs to create strategies for HEIs in the e-learning format. To this end, the Design Science Research (DSR) method was chosen, as it is a methodology aimed at solving real problems, which seeks to build and evaluate an artifact in a prescriptive manner (DRESCH; LACERDA; ANTUNES JUNIOR, 2015).

2 Resource-Based View (RBV)

Until the early 1990s, competitive analysis of the external environment prevailed. Following this line, a negative correlation was considered between the industry's competitiveness and the company's performance. This relationship fostered the development of opportunities and the mitigation of risks in the external environment through the interaction between internal resources and the company's competences (PORTER, 1985). In this sense, RBV can be defined as a strategic view at the competitive advantage due to the resources and skills of an organization. Thus, RBV is based on the idea that the conquest, selection and correct disposition of these resources together along with the development of unique potential characteristics, or that are difficult to imitate, generate differentiation in the market and, consequently, result in an advantage over their competitors (CRUBELLATE; PASCUCI; GRAVE, 2008).

Based on the concept of RBV, it is understood that companies do not react in the same way to external variables. This justifies obtaining different results, which also derive from the optimization of organizational resources and competencies that are transformed into competitive

advantages. In this sense, companies diversify their products simply because they derive their advantages from market imperfections. Thus, organizations can be defined as a set of competencies and capacities tied to what the author names as a range of resources (PRAHALAD; HAMEL, 1990; PENROSE 1959). Therefore, resources are all capacities, organizational processes, assets, competencies, information, and knowledge controlled by an organization that allows it to develop and implement strategies to improve its efficiency and effectiveness (BARNEY, 1991). Therefore, for Barney (1991, p. 101), resources are the strengths that a company can use to design and implement its strategies.

The RBV has two basic premises. First, the firms in a given industry are heterogeneous regarding their strategic resources. Second, these funds are not fully transferable between firms. Therefore, RBV examines the implications of these premises in the analysis of sources of sustainable competitive advantage, also impacting the recognition of opportunities by organizations according to the characteristics of these resources (MARITAN; PETERAF, 2011; WERNERFELT, 1984). In this case, the competitive advantage lies precisely in the identification and exploitation of these resources considered as *valuable, rare, inimitable, and irreplaceable* (BARNEY, 1991), although, in the following years, the characteristic called “non-replaceable” was entitled as “organizable” (BARNEY; HESTERLY, 2008).

Just as the source of profitability of the organization generates different opinions in the academy, the source of resources of the company is also a reason for divergence. According to the logic of Barney (1991), the company acquires the resources and can only have returns above normal if the cost of obtaining a given resource is lower than the economic value of that resource in the implementation of a market strategy (MARITAN; PETERAF, 2011). This situation is only possible if the company is lucky, or more likely, has better information. On the other hand, Dierickx and Cool (1989) believe in the process of accumulation instead of the acquisition of resources. This view applies mainly to non-marketable and non-negotiable resources, which are generally company-specific and therefore need to be internally developed (e.g., trust). Complementing these perspectives, Wernerfelt (1984) sets a counterpoint to that discussion. According to the author, the cost of acquiring a new resource and the value that the company can create from it depends on the resources already owned. In other words, the asymmetry of companies' resources leads to higher-than-normal profitability. For example, first movers can further expand their portfolio and acquire new resources or create a resource position barrier (BARNEY, 2011).

3 Digital Transformation

Since digital technologies are available in almost every sector (ALCÁCER; CANTWELL; PISCITELLO, 2016), digital-native organizations pressure traditional organizations to transition to new business logics and value propositions, e.g., the Internet of Things, digitized business processes, including artificial intelligence (AI), robotic automation, cloud computing, big data analytics and additive manufacturing (HANNIBAL; KNIGHT, 2018; STRANGE; ZUCHELLA, 2017). Technology is necessary for DT but is hardly sufficient

without organizational changes (KAPOOR; LEE, 2013). In this sense, DT can be defined as a process for the use of digital innovation to achieve something new, different and better, generating value for companies and society through the sum of knowledges, such as Information Technology, Computing, Connectivity and Communication (ALBERTIN; DE MOURA ALBERTIN, 2021; VIAL, 2019).

The most diverse industries have sought DT, especially those focused on the progression of new digital technologies – which allows organizations to enjoy benefits that include, among other factors, consumer satisfaction and efficiency gains (CARAFFINI; SOUZA; BEHR, 2018). The industries with automatized processes, such as manufacturing, chemical plants, health and aviation, aim to promote well-being by avoiding workers to perform traditional repetitive or life-risking tasks while being replaced by robots (MADAKAM; HOLMUKHE; JAISWAL, 2019). Organizations that manage digital technologies with greater proficiency and more efficiency can benefit from greater engagement and a better customer experience. In addition, good management of digital technologies improves operations and, possibly, can generate new business models and even create new marketing lines (FITZGERALD *et al.*, 2013). In this sense, DT goes beyond the use of the most advanced technologies and also interferes with the use of available resources to deliver greater added value as a whole, thus improving the performance of the organization in all business stages and ensuring better results for the organization.

New jobs are being created with automation and they demand highly qualified and specialized professionals (LIMA; BRIDI, 2019). Technology tracing to the fourth industrial revolution, or digital revolution, sharpens the challenges of the new digital economy, platform economy, or sharing economy (FLEMING, 2017; GANDINI, 2019). In this line, Westerman *et al.* (2011) argue that obtaining this digital advantage is only possible if the organization adopts the available technological innovations. But the author points out that, in addition to adopting innovations, the organization must know how to enjoy the benefits of its use. In short, DT is not restricted only to the adoption of technologies, but it requires the organization to change the way it works in the internal environment and the market. This is a major challenge, especially concerning management and people (WESTERMAN *et al.*, 2011). In this line, DT requires the implementation and adaptation to resources in the value chain, which includes knowledge in the areas of technology and data analysis, in addition to efficient integration of teams with different work styles and fast project management (SANCHEZ; ZUNTINI, 2018).

DT is directly involved in the practices necessary for business and thus allows organizations to adapt to the way stakeholders use digital technologies. Therefore, organizations inserted in the digital context can respond effectively to market trends, ensuring their competitive advantage. Therefore, DT includes the implementation of technologies to the global review of the business, evaluating constructs such as interpersonal skills, management, and operations that are part of it (CARAFFINI; SOUZA; BEHR, 2018). To digitally transform an organization, one must think not only of “what to do,” but also of “how to do it.” Based on this understanding, organizations adopt a view that enables the transformation of their processes, with the engagement of professionals and with a convincing governance structure, so that the

organization can take advantage of the existing strategic resources (WESTERMAN *et al.*, 2011).

More broadly, the development of these new features also makes organizations qualify and be updated to promote their brands in the digital environment (WESTERMAN *et al.*, 2011). In this construct, the way the public interacts with companies through digital media, according to Rogers (2017), increasingly influences and changes the reputation of brands due to the sharing of information and experiences – and this interaction makes organizations rethink the way they work. In this line, Schallmo, Williams and Boardman (2017) consider that, on the one hand, interaction with the consumer audience requires improvement; on the other, this interaction provides organizations with personalized data that were previously inaccessible, which facilitates the identification of potential actions to improve the development of products, communications and interactions and make them more *customer-centric*. As a result of this evolution, institutions are better able to improve their reputation through an active digital presence and, thus, increase their profit.

3.1 Strategic resources for the digital transformation of HEIs

Resources are difficult to be imitated and replaced. In addition, it takes years to be built or obtained due to the complexity that permeated its development (HITT; IRELAND; HOSKISSON, 2011) – a scenario that can be applied to traditional HEIs, which carry a solid institutional brand, credibility about teaching, and the systems and tools brought by DT can be added, which is impossible to be imitated by new teaching businesses – this subject is addressed later in this paper. In this construct, the sustainability of a company's competitive advantage is directly proportional to its ability to compose and isolate these resources that differentiate it in the market dispute, not allowing the competitors to imitate it (RUMELT, 1984). In the case of HEIs, it is necessary to take into account the demand for certain education areas to define the courses offered, the structure that an HEI has to meet the basic quality requirements (IGARASHI *et al.*, 2008) within the technological and digital context currently required, and the ability to adapt old structures to the models offered by institutions with a competitive advantage in this market, both due to more up-to-date management practices and more functional learning methods for the student. When analyzing these points, it can be said that the selection of the strategy must consider the best exploitation of the resources and the capacities of each HEI.

HEIS that invest in the creation of strategies for the offer of e-learning should optimize their existing capabilities and resources and leverage them, aiming at their maximization. However, Barney (1991) points out that, if many competitors dominate a resource or capacity, they are unlikely to generate a competitive advantage for companies operating in the market, precisely because they are not exclusive. In this perspective, the resources considered valuable are not rare and result in a situation of competitive equilibrium, and not of advantage. In short, a resource can become a source of competitive advantage only when it is controlled by a small number of competitors (BARNEY, 1991), which is not the case for the number of e-learning courses offered, for example. However, when considering the sum of the resources defined by the RBV with the resources that can be deployed by DT, traditional HEIs, although present in the educational market that only grows, can play an advantageous role regarding the competitors

when combining valuable and rare resources – given its history in collective knowledge – and the functionalities provided by DT.

These combined resources, along with the historical value and digital updating, can create one of the greatest barriers for imitation than those resources developed individually. As part of the process, these resources can be aligned, in the best possible way, with market demands and trends. At the same time, this combined structure must be maintained, which involves constantly directing the focus of people and resources to keep up with changes in the competitive environment (FINNEY; LUEG; CAMPBELL, 2008).

Considering the management of the combination of these resources to traditional HEIs, when adapting to the market shaped by DT (MELQUES; CANDIDO JUNIOR; MACHADO, 2019), they seem to have the ability to generate competitive advantages that are difficult to achieve, especially in one aspect mentioned by Barney (1991): pioneering spirit. This characteristic is impossible to be imitated, since organizations that arose years later, although updated in the market, will never be able to go back to the past and reconstruct the solidity of the pioneering companies, which were created in a different historical context. Therefore, institutions that have made their way into the educational market can take advantage of this resource, as they can establish a better relationship with suppliers and business partners and, therefore, develop greater market share, benefiting from gains of scale. Consequently, organizations pioneering certain resources also tend to rely on the preference of their audience – in this case, HEI students. Therefore, even if new companies explore the educational market, the fact that an HEI is a pioneer makes the cost of imitation and credibility by competitors higher (BARNEY; HESTERLY, 2008).

Considering that the main product offered by an HEI is educational programs (courses), the first strategic resource for a university is the ability to offer educational programs with consistent and effective teaching content. A quality educational program depends on the availability of employees, professors, and professionals who have the necessary capacity to transmit the knowledge offered by the courses. In this construct, the nature and foundation of sustainable competitive advantage in an HEI may be the quality of its programs (MELLO; DUTRA; OLIVEIRA, 2001). Other points raised as responsible for granting quality to an educational program are the effectiveness of the courses, the relevance of the contents made available, accessibility to all types of material and activity, the topicality of the subjects covered and the acceptability of the program in the market (MOORE; KEARSLEY, 2008).

When observing the growth of the market for HEIs, Walter, Tontini and Domingues (2005), emphasize that, despite being a government-regulated sector, in recent years, the market has acquired characteristics of business competitiveness. In this sense, the willingness to participate in the e-learning market, in practice, makes HEIs have new needs for pedagogical skills, such as the faculty's familiarity with new technologies and the ability to organize content on different platforms. However, as Mill and Pimentel (2010, p. 16, our translation) argue, “the proper use of innovative technologies in pedagogical practice is due to the change of mentality about the constitutive elements of Education (management, teaching, discourse and

technologies)”. The authors state that, without changing the mentality of the professors, especially concerning digital elements, learning in the context of e-learning becomes more difficult.

While analyzing in-depth this issue, Mercado (1999) states that the training of professors is fundamental for the successful adoption of new technologies in teaching. Similarly, Mill, Ribeiro and Oliveira (2014) consider the process of teacher training for e-learning an important factor regarding the quality of e-learning. This makes the difference in the market and institutional results of HEIs in the process of adapting to the most recent technologies. In this sense, the work of training professors for the e-learning can be seen as a strategic resource for HEIs. Nassif and Hanashiro (2002) corroborate this position by stating that the qualification of teachers and professors to work on digital platforms has been revealed as a watchword, emphasizing the need to review their already used skills and develop new ones to keep up to date with the information demand of new scenarios from DT, integrating the process of change taking place in the educational sector.

According to Walter, Tontini and Domingues (2005), the lack of speed of some HEIs to initiate efficient action plans in this direction and the internal bureaucracy related to management collaborate for ineffective performances and results. On the other hand, some institutions have already realized this and are taking steps to adopt new strategic positions in search of advances in the management area. In this sense, it is necessary to incorporate the functioning of a management system and appropriate marketing strategies within the HEIs. Therefore, student recruitment processes should be seen as part of the management and marketing strategies of all HEIs. In the current context of the Higher Education market, attracting students to the courses offered has been essential for the maintenance, survival and expansion of HEIs, as well as the graduation courses themselves – and their respective professional areas.

This theoretical review enabled a broad view of the construction of the framework. Therefore, from this panorama, the constructs, if approached together, may serve as a foundation for managers of HEIs, thus being the main structure of the initially proposed version of the framework (F0) (Frame 1).

Frame 1. Framework Zero (F0)

Approach	Constructs	Description
Resource-Based View	Quality educational programs	Refers to the institution's ability to offer quality courses
	Training of professors for e-learning	It refers to the institution's ability to prepare professionals to work in the e-learning format
	Appropriate management system	It concerns the institution's ability to make decisions in a timely manner
	Active Sales Process	It refers to the structuring of an active prospecting process of students by using several tools
Digital transformation	Engagement of Professionals	It refers to the involvement of professionals in digital transformation
	Technology	It refers to the implementation, organization and adaptation of technological innovations available and appropriate to the institution, aiming at generating digital advantage
	Agile development	It concerns the institution's product development process through tests and feedback

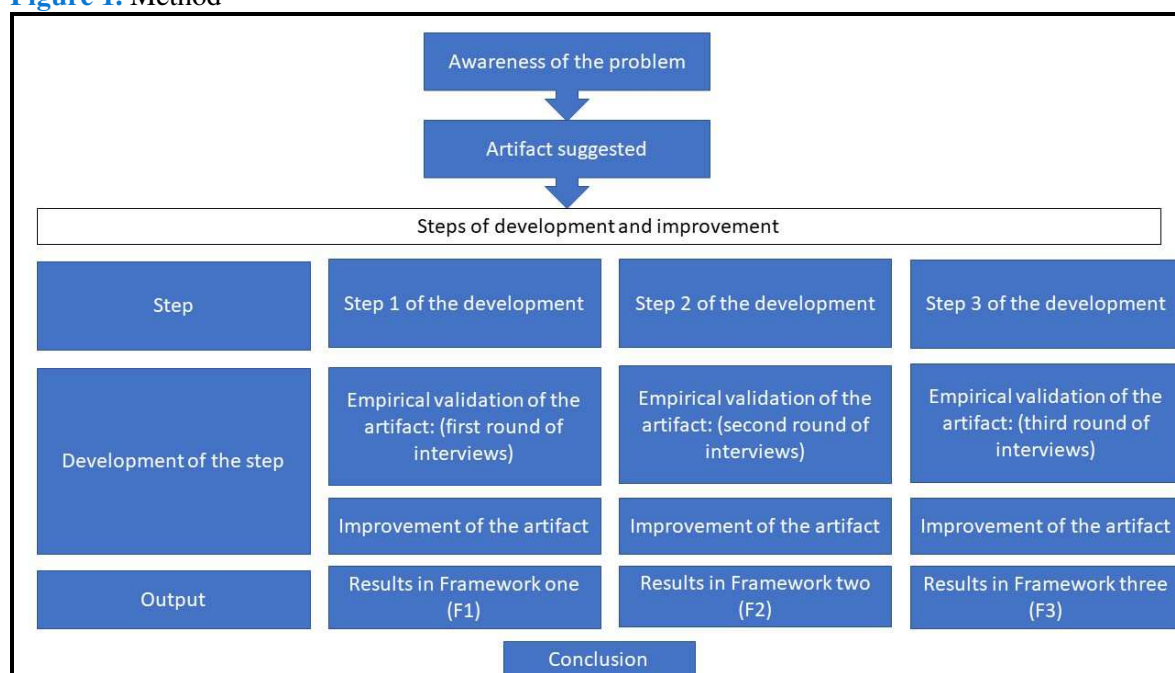
Source: Created by the authors, 2021.

4 Methodological Path

The present study was based on Design Science Research (DRESCH; LACERDA; ANTUNES JUNIOR, 2015) since our objective was to develop a framework with the constructs to create strategies for HEIs in the e-learning format. In this sense, according to Dresch, Lacerda and Antunes Júnior (2015), it is a pragmatic investigation for solutions to various research problems and, consequently, for the improvement of theories.

The method proposed by Manson (2006) was adopted for this study because it is an evolution of the method proposed by Takeda, Veerkamp and Yoshikawa (1990). For a better understanding, the design of the method adopted for the present study can be found in Figure 1, detailed below:

Figure 1. Method



Source: Adapted from Takeda, Veerkamp and Yoshikawa (1990).

According to Manson (2006), the method is supported by the following steps: (1) awareness of the problem; (2) initial proposal with traces of the problem, topics of interaction with the artifact to be built and metrics and criteria for evaluation. At this stage, the researcher tends to create the first attempt at an artifact – fundamentally based on the proper foundation. In the development phase (3) the techniques and actions used to create the artifact are defined, as well as how to perform the test – which can generate one or more artifacts. In the course of the evaluation (4), which must be based on the criteria previously defined, the researcher must register what worked and what must be modified. After the testing phase, the conclusion stage (5) is reached, which must contain the records of all the learnings in the process, in addition to the contribution to the class of problems defined at the beginning of the research.

First, the awareness of the problem starts from the gaps in the management of HEIs, which are increasingly challenged to adapt to the new scenario of DT, which is more technological and competitive. Based on this perception of the education scenario in Brazil, there is a need to propose a strategic redirection in HEIs, aiming at adapting to a new, more complex and competitive scenario. These increasingly rapid digital changes and updates cause traditional HEIs to adapt to the digital landscape through appropriate management strategies, which are not limited to the simple availability of classes over the internet (MADAKAM; HOLMUKHE; JAISWAL, 2019). Therefore, for traditional HEIs to successfully enter this context, this study proposes an expanded view of the resources and capacities essential for these institutions to mold themselves to this new market, which is not sustained only by technological solutions aimed at e-learning.

Second, the initial proposal starts from a literature review that supported the theoretical foundation. At first, an index survey was carried out on the topic DT. In this approach, it was

decided to standardize the search by using the terms "resource-based view" together with the expression "university". Joining both terminologies and their concepts, the search for a view involving the business context was prioritized to segment the research involving the HEI scenario.

Third, to test whether the first version of the framework artifact or method (Framework zero – F0) would assist in solving the problem, the following objectives were established: a) The assumption must raise awareness of the problem; b) The artifact needs to reproduce the constructs initially identified, based on the literature review involving the ideas brought by the RBV and DT approaches; c) Attest the usefulness of the artifact for the specific problem, considering the objectives of the study and the interest groups to be interviewed. We used the artifact developed by Matt, Hess and Benlian (2015) as a starting point for the first approach on constructs linked to RBV. Since then, the present approach has been expanded based on the insertion of other constructs related to DT.

Fourth, after the development of the artifact was completed, it was evaluated to obtain the reliability of the research (VENABLE; PRIES-HEJE; BASKERVILLE, 2012; DRESCH; LACERDA; ANTUNES JUNIOR, 2015). To this end, rounds of interviews were carried out with professionals in the areas related to this research, such as HEIs and Edtechs. For an artifact to be considered as an efficient solution, its evaluation needs to demonstrate its usefulness in solving real problems (TREMBLAY; HEVNER; BERNDT, 2010). In the case of this research, the functionality of the proposed solutions should be validated as a set of tools that clearly and coherently guide the development of strategies for HEIs. In addition, the evaluation of the solutions must also present information that provides a better understanding of the problem, as well as feedbacks that assist in using the artifact and extracting its maximum potential (HEVNER *et al.*, 2004).

The evaluation of artifacts can consider a diversity of parameters (HEVNER *et al.*, 2004). For this reason, we established criteria that presented an intrinsic relationship with the objectives of our research. The criteria adopted were relevance, flexibility, completeness, and applicability (HEVNER *et al.*, 2004; VENABLE; PRIES-HEJE; BASKERVILLE, 2012). A semi-structured interview script was developed to collect singular information that can solve real problems through previously defined criteria (STAKE, 2011). When evaluating, the interviewees were divided into three different interest groups (Frame 2), with three participants in each group (identified as I1, I2, I3, etc.). The selection was for respondents with experience in the criteria of each group.

Frame 2. Groups and validation steps

Subjects interviewed		
Group 1	Group 2	Group 3
HEI Professors or Professionals	Edtechs Professionals	Managers of Educational Institutions
Experiences of the subjects		
Experience in strategic projects within Brazilian HEIs	Experience in companies in the segment of Edtechs in providing technological solutions for Brazilian HEIs	High management experience of Brazilian HEIs
Validation step		
Framework Zero (F0)	Framework One (F1)	Framework Two (F2)

Source: Created by the authors, 2021.

Fifth, among the methods and techniques for the evaluation of available artifacts, it was decided to apply the analytical and descriptive evaluation of the different versions of the framework. The analytical modality allowed the validation of the different versions of the artifact by crossing the data. At the end of each round of interviews and supported by theory, the descriptive evaluation allowed to support the adjustments suggested by the interviewees. Finally, these procedures were performed after transcribing the interviews and observing the empirical evidence to validate the adjustments indicated by the respondents.

4 Results and Discussion

4.1 4.2 Evaluation of the Framework (F0)

The evaluation of the framework zero (F0) was carried out in the first round of interviews, from an in-depth analysis made by professors and professionals of HEIs. Both constructs from the view of RBV and those from DT were considered relevant by the majority of respondents. This perception about the usefulness of the listed aspects was evidenced in interviewee 3's statement: "The aspects of the framework a priori are very relevant and the union of these two approaches seems to make a lot of sense". However, I2 questioned the item Educational Quality Programs, noting the need to better define the concept of quality:

"[...] I don't doubt that this item [quality] is important, but it was not clear this ability to take quality courses for their research. I see that the perception of quality varies a lot. Quality for whom? (...)Capes, the market or the student? The perception of quality, in my view, specifically in this construct, must reflect the opinion of the bodies that carry out the evaluations. (I2)

The relevance of the questions of I2 reaffirms that the quality of a teaching program can include several definitions, depending on the perspective adopted (IGARASHI *et al.*, 2008). HEIs value aspects related to the concept attributed to the course by the official bodies that evaluate them, such as the National Institute of Educational Studies and Research (Inep) and the Coordination for the Improvement of Higher Education Personnel (Capes). On the other hand, the professors relate the assessment to the infrastructure provided by HEI. In turn, the students

understand quality as a factor linked to HEI's ability to offer training and bring solutions to the market demands. In this sense, the teaching quality criterion is not absolute, but relative to whoever evaluates it, considering several requirements, such as program data, faculty, program proposal, research lines, projects, curricular grids, disciplines offered, and course final papers, intellectual production, etc.

In order to contemplate the perception of quality that the market has about a given course, the construct Effectiveness of Courses was included, which includes the institution's ability to provide courses that meet the demands arising from the markets. During the constant selection processes, the labor market evaluates the quality of an HEIs through its students or graduates who constantly undergo job selections, observing the level of knowledge acquired by the candidate in their academic activity (MELLO; DUTRA; OLIVEIRA, 2001).

Considering the flexibility of the artifact in the F0 version, from the perspective of the degree of importance of the constructs involving RBV, interviewees 1 and 2 commented that the Quality Educational Programs construct, together with the construct of Training of professors for e-learning, have greater importance. I1 states that "without a doubt, the 'quality' factor is the most relevant because it directly impacts the image of the university, but it is not enough to have quality if the professors are unable to teach classes in a digital format, so I think that training is also important". Interviewee 2, in addition to highlighting the relevance of quality, also states that the professors must be trained for e-learning, which is exposed in this speech: "In addition to the quality, well specified, I see the preparation of professors as fundamental". For Westerman *et al.* (2001), for example, in addition to using technology, DT involves rethinking and promoting changes in how the organization operates, with people management being a challenge. In this sense, we changed the description of the aspect Educational Quality Programs. They originally referred to HEI's ability to offer quality courses and, based on empirical evidence, started to refer to HEI's ability to offer training courses of quality recognized by official bodies that evaluated the courses offered in higher education.

When observing the usefulness of the DT constructs, I2 states that Appropriate Management Systems, Active Sales Processes and Engagement of Professionals must be aligned with the technological scenario to guarantee their success: "[...] I think the digital transformation needs to be global, from the technical-administrative to the Dean office." As examples are the observations of Caraffini, Souza and Behr (2018) when they state that DT covers the implementation of digital technologies to the review of management, business, people and operational efficiency.

When asked if any of the constructs would be dispensable, the interviewees were unanimous in stating that none of the items presented should be removed. However, interviewee 2, during this same questioning, could not evaluate Agile Development because he did not understand how this process would work within an HEI. In this sense, it was decided to maintain this construct for the next stage of validation.

Interviewee 3 suggested the inclusion of the item Entrepreneurial Culture, considering its relevance to successfully implement a strategy from the perspective of DT. The entrepreneurial culture emphasizes the emergence of new opportunities, the means to capitalize on them and the creation of an adequate structure to take advantage of them, following the statement of I3:

4.2 Evaluation of the Framework (F1)

This step followed the same steps as the previous round of interviews, modifying only the interviewees. In this evaluation phase, the questions were answered by professionals of Edtechs who work or have worked in projects aimed at HEIs or in partnership with them. Thus, the first version of the framework (F1) was submitted for analysis by these professionals.

Regarding the usefulness of F1 constructs, the three interviewees in this stage attested to the relevance of the items presented, as stated by I4: “All aspects are relevant; some more, some less, but they undeniably make a difference to the overview of the framework”. However, I5 emphasizes that the construct Training of Professors for Distance Learning is not as relevant as the others:

I think that the aspects are quite relevant and could be used for this study. When observed individually, I believe that the aspect of the Training of Professors [for distance learning] doesn't have that much relevance. I believe that, nowadays, the tools are very simple, and most people are used with the options [of tools] that are similar daily. (I5)

I6 corroborates this statement, noting that the Engagement of Professionals and the Training of Professors for Distance Learning are interconnected and derive from each other. However, in the event of having to choose between the two, he chooses engagement as a more relevant point, as does interviewee 5. In this regard, interviewee 6 is adamant:

The Engagement of Professionals is important and, automatically, also includes the preparation and commitment of teachers. For me, the Training of Professors [for distance learning] could be withdrawn because the engagement results in the preparation of professors according to their interest in improving themselves, which makes the Engagement of Professionals a much more relevant aspect. (I6)

Based on the empirical data presented, it was decided to remove from the framework the construct Professional Training for e-learning. Our decision considered the interviewees' arguments, as we understand that teaching classes is similar in both e-learning and face-to-face modalities.

Once the analysis was concluded from the perspective of the framework's usefulness, we proceeded to the analysis on the flexibility of the artifact. When asked about the degree of importance of the constructs, the interviewees presented different answers. Interviewee 4 stated that: “The cultural aspects are more important, for example, development through feedbacks, engagement and entrepreneurial culture”. Interviewee 6, on the other hand, states that Entrepreneurial Culture and Engagement of Professionals are the constructs with the highest

degree of importance. For him, the scenario of traditional HEIs lacks balance when it comes to engagement, and the degree of involvement of professionals in academic projects differs from one area to another. This inconstancy, according to the interviewee, causes difficulties for the application of equitable strategies in the management of the institution as a whole since collaborations are irregular and inconstant. This statement corroborates that of Melques, Candido Junior and Machado (2019) who believe that HEIs should rethink their academic and administrative models, both due to new digital technologies and the new egress profile when enters the labor market.

After analyzing Flexibility, the Completeness evaluation criterion was then developed. Interviewee 4, when asked if any construct would be essential, stated that: “The Entrepreneurial Culture aspect is the main one, in the sense that the institution needs to know how to take risks”. At this point, interviewee 5 agrees and adds that the Entrepreneurial Culture, if well inserted in the context of HEIs, can add creativity to the institution's projects. However, respondent I5 points out that the construct Professional Training for Distance Learning is unnecessary. Considering these notes, the constructs of Entrepreneurial Culture and Engagement of Professionals were removed from the center of the framework, so that they are listed as more generic and broad constructs, which must be present in the organization as a whole. These two constructs then began to orbit the framework to be seen as principles for the good development of the objective.

After the analysis of the Completeness criterion and given the absence of suggestions for new constructs, we proceeded to the analysis of the Organization's Adequacy. At this point, respondents considered that the framework is properly aligned and can be used by universities. Interviewee 4, in turn, confirmed the usefulness and adequacy of the framework by stating that “this work indicates a practical and accessible language, which can be easily used in educational institutions”. Interviewee 5 stated that the framework could be incorporated into HEIs as “a kind of playbook for universities”.

After the second round of interviews, the empirical evidence associated with the theoretical support resulted in adjustments to the framework (Frame 3).

Frame 3. Adaptations in Version F1

Adaptations in Version F1		
Construct	Action	Evidence
Training of Professors for Distance Learning	Excluded from the framework	I5: [...] I believe that the 'Capacitation' construct can be removed, as I said before ...
Entrepreneurial culture	Taken from the center of the framework to the orbit of the framework.	I4: these cultural aspects are very important.
Engagement of Professionals	Taken from the center of the framework to the orbit of the framework.	I5: when there is a culture of entrepreneurship and when there is no fear of making mistakes, we see a creativity that, in my opinion, is the key for universities.

Source: Created by the authors, 2021.

4.3 Evaluation of the Framework Two (F2)

In this round, empirical evidence was discussed by three professionals who work or have worked as managers of Brazilian HEIs. As in the previous steps, the process was started by evaluating the usefulness of the framework in version F2 to identify the relevance of the constructs with the adjustments incorporated in the previous version. Due to the new formatting of the framework, the assessment of the usefulness of the constructs started at this stage, with the constructs Entrepreneurial Culture and Professionals Engagement, which had relevance attested by the three interviewees. When commenting specifically on the Entrepreneurial Culture construct, interviewee 9 draws attention to this construct be important for HEIs in a recession scenario:

The Entrepreneurial Culture or 'entrepreneurial orientation' is very important within HEIs because it makes it possible to take advantage of new business opportunities that would probably have due attention on our side during the boom years. I believe that this orientation towards entrepreneurship can help HEIs a lot in this period [of crisis]. (I9)

Another construct that was also considered relevant was the Quality Educational Programs, which is explained by interviewee 7 when stating that "the quality of the courses, whether perceived by the market or by the rankings, needs to be central to any HEI". Interviewee 9 confirms that HEIs should focus on the quality of their services: "What I have observed is that there are several universities that try to be 'cool', focus a lot of energy on secondary activities and end up leaving aside the concern with the quality of the service they are providing". Considering these statements, the Effectiveness Constructs of Quality Educational Courses and Programs were repositioned in the framework. The change has the objective of showing the degree of importance pointed out by the empirical evidence and the theoretical foundation.

There was no evidence from the interviewees that any of the constructs would be unnecessary. When asked about this point, interviewee 9 stated: "I believe that all constructs are relevant, as they complement each other to reach the proposed objective". Finally, the three interviewees at this stage considered the framework to be functional and simple to understand. They also indicated it as a useful tool to meet the research objective. According to interviewee 7, the framework allows university managers to obtain the best direction that the organization can follow:

Certainly, as it is a simple and easy-to-understand artifact, it can be used by all levels. It is an artifact that is easy to interpret and brings together relevant aspects. In general, I think the framework can go a long way in elucidating some ideas that seem to be unclear within HEIs. (I7)

Finally, the new empirical evidence collected at this stage and described during the section were summarized and presented in Frame 4.

Frame 4. Summary of the Adaptations (F2)

Adaptations in Version F2		
Construct	Action	Evidence
Entrepreneurial culture	Description amended from “refers to the combination of various initiatives or forms of entrepreneurship, such as the entrepreneurial profile, entrepreneurial management, intrapreneurship and collective entrepreneurship, etc.”	To "refers to the combination of various initiatives or forms of entrepreneurship, such as the entrepreneurial profile, entrepreneurial management, intrapreneurship and collective entrepreneurship, as well as the ability to identify new business opportunities and new revenues."
Effectiveness of the courses	Modified positioning	Modified to a central role in the framework
Quality educational programs	Modified positioning	Modified to a central role in the Framework

Source: Created by the authors, 2021.

Based on the empirical evidence obtained from the interviews and supported by the theoretical foundation, the constructs of the final version of the framework were organized (Frame 5).

Frame 5. Constructs and Descriptions of the Final Framework (FF)

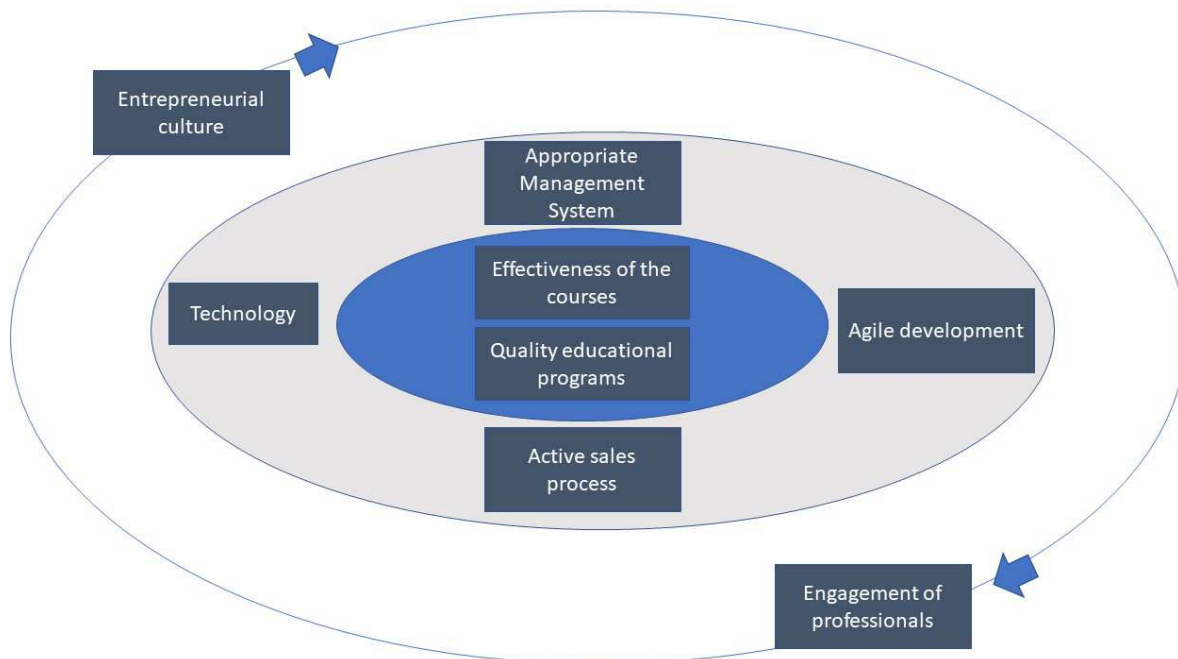
Constructs	Description
Effectiveness of the courses	It refers to the institution's ability to offer courses that prepare students for the demands of the markets.
Quality educational programs	It refers to the ability of HEIs to offer training that has quality recognized by official bodies that carry out the course evaluations.
Training of professors for Distance Learning	It refers to the institution's ability to prepare professionals to work in the Distance Learning format
Appropriate management system	It refers to the institution's ability to make decisions in a timely manner.
Active Sales Process	It refers to the structuring of an active prospecting process of students by using several tools.
Engagement of Professionals	It refers to the involvement of professionals in the direction of digital transformation.
Technology	It refers to the implementation, organization and adaptation of technological innovations available and appropriate to the institution, aiming at generating digital advantage.
Fast development	It concerns the institution's product development process.
Entrepreneurial culture	To: It "refers to the combination of various initiatives or forms of entrepreneurship, such as the entrepreneurial profile, entrepreneurial management, intrapreneurship and collective entrepreneurship, as well as the ability to identify new business opportunities and new revenues".

Source: Created by the authors, 2021.

The adaptations proposed throughout this section and in the F2 version of the framework resulted in the final framework (FF) (Figure 2). Considering the empirical evidence gathered in the analysis and validation of framework two (F2), it was observed that the proposed artifact can subsidize HEIs in the creation of strategies. This ability was attested by the view of HEI managers, who are considered potential users of the artifact. In this sense, it was possible to demonstrate, through the contributions of the interviewees throughout the process, the

functionality, flexibility, completeness and suitability to the practice of the organizations of the artifact. Based on qualitative collections and theoretical crossings, it is possible to state that the framework works as a way to support HEI managers in the creation of strategies, both in the internal and external environment of organizations.

Figure 2. Final Framework (FF)



Source: Created by the authors, 2021.

The Final Framework includes eight constructs from both approaches used in this study: the Resource-Based View and Digital Transformation. Based on the empirical evidence collected in the evaluation phases, this last version was organized in a circular format, in which the constructs were distributed according to the relevance assigned to them by the interviewees. Considering the degree of relevance obtained in the analyzes, at the center of the framework were placed the constructs Effectiveness of the courses and Quality Educational Programs, identified by the interviewees as the most relevant for the functionality of the framework.

The central constructs were consecutively followed by the Appropriate Management System, Technology, Agile Development and Active Sales Process constructs, which were positioned just above the center. In addition to the constructs, around the framework, two constructs were considered to be more comprehensive. Because they have a greater relationship with the organization itself, they were positioned orbiting around the framework, since they have less influence regarding its objective.

4.4 Concluding Remarks

Digital technologies have transformed the world economy and global businesses. The context also points out that the growing market dispute requires HEIs to make changes in their management structures and strategies. This scenario of changes has made some traditional HEIs concentrate their efforts and analyze themselves, assuming that only actions to reduce costs, reorganize structures and digitization of classes are sufficient for the survival and perpetuity of their business. This thinking, concentrated only on internal processes, is based on the principle that the HEI tradition, combined with factors such as price and suitable brand, is enough to beat the recent competitors.

However, the market transformations that the Education sector in Brazil has been going through, added to a significant economic crisis, which has further increased competitiveness when it comes to e-learning, suggest the need for a change in the strategies of HEIs. In this construct, some scenarios require more urgent remodeling, such as digital transformation, which has accelerated the search for solutions so that HEIs remain economically sustainable and competitive in their market.

Our study aimed to fill the existing gaps in the use of approaches on DT and RBV in the universe of HEIs, as we highlight the relevance of identifying the strategic resources to support HEIs in the development of DT. In addition, we propose a framework that can be used by HEIs in the creation of their strategies, the artifact being validated by the Design Science Research method.

The successful use of the identified constructs requires a significant change in the way of thinking and acting within the institutions. According to the results of the study, it is necessary to analyze the way institutions think about their actions and even their role in a context of transformation in the educational market. Thus, the result of this study can directly contribute to establishing guidelines for the creation of strategies within the HEIs.

This paper presented research limitations, such as the size of data collection, due to the restrictions to face COVID-19. Another important limitation to be highlighted was the lack of validation of the final framework. However, because the Final Framework evolved from previous versions, it is believed that this factor, in particular, did not have a significant impact on the results. At the same time, opportunities for future research arise. First, case studies can be carried out in order to validate the usefulness of the framework constructs in HEIs that are part of a certain niche with different management and competition characteristics. Thus, it will be possible to evaluate the universality of the framework and propose changes according to the segmentation of the teaching market itself. Also, when taking into account the particularities of each HEI, a comparative case study can be carried out with different institutions to identify which constructs are put into practice in the market.

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