Research article

What co-creation for what value? A study at a Brazilian university

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ABSTRACT

Measures adopted to face the pandemic, such as social distancing, have made universities intensify value co-creation efforts to enable students to maintain their learning. However, the result of these efforts, in terms of value generated for students, remains little explored in the literature. This study aims to analyze the relationship between co-creation capacities (CCs) and the types of values generated for their students. Quantitative research using structural equation modeling (SEM) was conducted. The sample consisted of 361 undergraduate and graduate students from a private, not-for-profit university in Rio Grande do Sul, Brazil. The results suggest that the capacity for relational interaction is associated with four types of value (functional, epistemic, social and image) and the capacity for ethical interaction is related only to the image value. The capacity for individualized interaction was not associated with any type of value. The research shed light on the relation between co-creation capacities and value generated in higher education institutions and helps university managers to explore and develop specific capabilities to generate certain types of value for students.

1. Introduction

Since late 2019, the coronavirus pandemic has led governments to adopt coping measures such as social distancing, leading to business closures and job losses (Sharma, 2021). Private universities faced accelerated dropout rates, with the unpredictability of enrollment and costs, generating significant financial pressures (Krishnamurthy, 2020). In this scenario, consumers in general, and students specifically, have become more active in the processes of co-production and co-creation of value, contributing to faster responses (Sharma, 2021). Aiming at building an education plan that would encompass common interests, universities became closer to the students, creating a more favorable environment for dialogue (Silva et al., 2020).

Value co-creation processes can renew teaching-learning experiences, the services offered, and the student's own life (Dollinger and Lodge, 2020). In addition to promoting adaptation to the pandemic context, value co-creation increases the likelihood that students will have a positive attitude towards the university, that they will be more satisfied with their teaching experience and more committed to the university's brand (Giner and Rillo, 2016), reinforcing its reputation (Foroudi et al., 2019). Students can integrate resources, such as feedback, opinions, competencies, and intellectual skills that, interconnected with institutional resources, stimulate the mutual generation of value (Dollinger et al., 2018).

On the part of the university, capacities for value co-creation (CCs) include the creation and strengthening of relationships with other companies and customers by promoting the development of new knowledge and skills of employees (Wilden et al., 2019).

In this context, community universities become an interesting object of study. In Brazil, “community” universities are formally established as private, not-for-profit universities that aim to develop the region in which they are located. Its community character implies an intense relationship of interdependence with its surroundings. They mainly need financial resources from students and companies in their geographical surroundings. For this, they must listen intensively to their audiences to generate the benefits necessary to meet regional demands.

In southern Brazil, Universidade Feevale, a community higher education institution, had its social commitment reiterated during the pandemic, maintaining effective actions with the community and offering services such as +36,000 Covid-19 diagnostic tests for municipalities and companies in the region; donation of +5800 personal protective equipment to hospitals, including fabric masks, face shield masks, and sheets. To support students, the institution migrated classes to the virtual environment on the same day as the governmental distancing decree, adapting educational dynamics. Administratively, the university lent notebooks through the library system, promoted discounts for the

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purchase of computer equipment and internet plans, and made the payment of tuition more flexible, among other actions.1

As these emergency actions, both educational and administrative, are developed together with students, the value co-creation capabilities that sustain them become fundamental. However, the literature that discusses the co-creation of value from the value-in-use perspective in higher education is scarce. So far, only two studies developed to verify this issue were found. Smaervid and Vеспестад (2020) qualitatively analyzed the educational environment in a developed country, Norway, using a broad theoretical perspective: the DART model by Prahalad and Ramaswamy (2004). Leem (2021), on the other hand, through a quantitative approach, analyzed the relationship between co-production, value-in-use, and benefits punctually concerning the use of digital technologies in the Korean educational environment during the pandemic. Empirically, both followed a specific approach, limited to the teacher-student relationship. This study starts from a broader empirical approach, including, but not limited to, the classroom. The purpose of this article is to analyze the relationship between co-creation capabilities (CCs) and the types of values generated for their students.

This research brings contributions both to the literature and to higher education institutions, especially in emerging countries. Theoretically, the study explores value co-creation more specifically, detailing the capabilities involved in the context of higher education, both inside and outside the classroom. Likewise, the value perceived by students is addressed in more detail. This greater detailing of the dependent and independent variables will indicate which value co-creation capabilities are related to what type of value is perceived by the students, enabling a more targeted managerial action. The study was conducted through quantitative research using the structural equation modeling (SEM) method (Hair et al., 2014).

Regarding managerial contributions to universities, especially those such as Feevale, the research expands the current knowledge base to generate strategies and practices to foster the development of value co-creation. From the identification of the relationship between CCs and generated value (GV) for students, university managers can explore and develop the necessary capacities to interact with students, expecting that certain types of perceived value will be generated.

From this introduction, the next sections of the work present the theoretical framework, discussing the main concepts of value co-creation, and CCs, also bringing the focus of these themes to the context of universities. Subsequently, the methodological procedures are highlighted, followed by the analysis and discussion of the results and, finally, by the final considerations of the research.

2. Service-Dominant Logic and value co-creation

The Service-Dominant Logic (SDL) began to be consolidated based on the need for a new dominant logic for marketing (Vargo and Lusch, 2004). One of its main concepts refers to “operand resources” and “operant resources”. Operant resources are intangible, dynamic, and infinite, unlike operand resources (raw materials, for example), which are finite and static. Operant resources generally consist of knowledge and skills, which act on other resources, enabling the creation of more operant resources (Lusch et al., 2007; Vargo and Lusch, 2004). Individuals and organizations exchange their competencies for other competencies they sources (Lusch et al., 2007; Vargo and Lusch, 2004). Individuals and organizations exchange their competencies for other competencies they sources (Lusch et al., 2007; Vargo and Lusch, 2004).

SDL assumes that there is interaction and union between the beneficiary and the service provider. Therefore, it embodies an emphasis on collaborative work between employees, managers, customers, suppliers, and other actors. Through the integration of resources, whether combining or aligning assets, the objective is to create mutual value, that is, to produce benefits for all involved. Thus, the purpose of SDL is the co-creation of value, that is, the generation of benefit, conceptualized in terms of feasibility or well-being for a focal actor, created from the interaction and contributions of several actors (Vargo et al., 2020).

An update of the concept of value co-creation is proposed by Ramaswamy and Ozcan (2018, p. 200): “the enactment of interactional creation across interactive system-environments (afforded by interactive platforms), entailing agencying engagements and structuring organizations”. Such interactive platforms are composed of heterogeneous relationships of artifacts (physical and digitized items, such as data in the form of text, numbers, images, audio, etc.), processes (digitized business processes and more conventional interactions), interfaces (physical and digitized by which one entity comes into contact with another) and people (individuals in their roles, such as customers, employees, or any other interested parties), who create diverse interactive system environments.

In the context of universities, value co-creation consists of the process of feedback, opinions, and other resources from students, such as their intellectual skills and abilities, integrated with institutional resources, which stimulate the generation of mutual value for the parties (Dollinger et al., 2018). Among the basic resources of students is a sense of responsibility, personality, intelligence, critical thinking, study habits, and communication skills. Furthermore, the level of learning they acquire from the service of the educational institution (EI) is intrinsically related to how they integrate these resources in the process of co-creation with the institution (Díaz-Méndez et al., 2017; Díaz-Méndez and Gummesson, 2012).

Students play an important role in the co-creation of the service that is provided to them, from their participation in classes, conducting activities and tasks, and participating in exams, among others, requiring students to have skills, motivation, and be engaged (Carvalho and Mota, 2010). Active participation by students in the value creation process increases the likelihood that they will have a positive attitude towards the university, be more satisfied with their teaching experience, and become more committed to the university’s brand. Consequently, HEIs can establish their reputation, obtaining important competitive advantages (Foroudi et al., 2019). This process translates into the creation of mutual value, in which both actors benefit (Giner and Rillo, 2016).

The practice of co-creating value with students take many forms in higher education. It can be observed, for example, in obtaining feedback through questionnaires, institutional assessments, or even from content created by students concerning the HEI through social networks or other means of communication (Dollinger et al., 2018). The co-creation of value in educational institutions, resulting from individual or collective actions (institution, teacher, and student), is directly related to the satisfaction and quality of life of the student (Silva et al., 2020) while contributing to student loyalty (Giner and Rillo, 2016).

HEI professionals should aim for students to be involved in co-creation processes, which go beyond the classroom, encompassing academic and non-academic aspects. In this sense, students can engage in decision-making processes that affect their experiences, including improving university services, from opportunities to collaborate with colleagues and staff (Maxwell-Stuart et al., 2018). It is worth noting that there are factors that can stimulate co-creation, such as individual considerations of the individual (motivations, previous experiences) and environmental considerations (contextual factors), as well as there are barriers to co-creation, such as the need for employee guidance, confusion of roles, lack of time, among others (Dollinger and Lodge, 2020).

Higher education is unique from other services in that its value is very unpredictable. A single student not only completes the experience but even years later when they use the experience to apply knowledge in a career. Although there are no concrete mechanisms to capture this entire value, HEIs may adopt a value co-creation approach by integrating students’ resources into their processes. Thus, it is imperative that HEIs deeply understand shared responsibility, emphasizing the importance of active student participation in defining the value of their own experiences (Dollinger et al., 2018).

1 See https://www.feevale.br/responsabilidadesocial/.
3. Value co-creation capacities

When value co-creation is adopted as the core of organizational strategy, the company needs a portfolio of strategic capabilities that foster service-oriented interactions. To the extent that this portfolio is developed effectively, organizations can outperform the competition in value co-creation processes, creating higher levels of perceived value, building trust, and arousing affective commitment among their customers (Karpen et al., 2012, 2015).

Wilden et al. (2019) demonstrated that the success of a professional services firm is related to its capabilities to drive customer relationships, which they term co-creation capabilities (CCs), and its ability to adapt to changing environments. CCs are made up of interconnected operating resources that include the ability of organizations to create and strengthen relationships with other companies and customers through the development of their employees.

Customer co-creation capacity is conceptualized as the set of organizational processes that foster communication with them (communication capacity) and enable this communication to be transformed into input for service innovation (transformation capacity). Communication capacity is more externally oriented (outside-in), while transformational capacity is more internally (inside-out) oriented (Mitrega et al., 2020).

To help operationalize these capabilities, Karpen et al. (2015) developed a conceptual framework called the Service-Dominant Orientation (SDO). The SDO involves higher-order co-creation capabilities that encourage the company to detect the necessary changes and adapt its processes and routines, to take advantage of opportunities. This structure is composed of six strategic interaction capabilities based on interconnected operating resources, which enable an organization to co-create value with the various actors in the service ecosystem, integrating resources in a mutually beneficial way. These interaction capabilities are Karpen et al. (2015):

- Individuated: understanding the processes of integrating resources, contexts, and desired outcomes of individual actors within the service system.
- Relational: increasing the connection of social and emotional bonds with the individual actors in the service system.
- Ethical: acting fairly and not opportunistically towards individual actors within the service system.
- Empowered: allowing individual actors within the service system to shape the nature and content of the exchange.
- Developmental: assisting the development of knowledge and skills of the individual actors themselves within the service system.
- Concerted: facilitating coordinated and integrated service processes with individual actors within the service system.

These six capabilities constitute the capacity for co-creation, and allow other organizational resources to be explored, transformed, amplified, and synchronized (Karpen et al., 2015). However, at the managerial level, it can be complex for managers to optimize them all at the same time since they face different organizational trajectories. In this way, investment in some capacities can be prioritized over others (Karpen et al., 2015). To ensure a deep connection with customers, understanding their needs, and creating a relationship based on trust, Wilden et al. (2019) suggest directing efforts in three interaction capacities: individuated, ethical and relational. These are, therefore, the capacities considered in the conceptual model of this study.

4. Value generated

The co-creation of value has made important strategic contributions to companies, both in the short term, facilitating the commercialization of their services, and in the long term, in maintaining a base of satisfied and loyal customers (Saba et al., 2020). Although value is created in a shared way, it is always exclusively and phenomenologically determined by the beneficiary (Vargo et al., 2020), being perceived by customers based on their judgment regarding the exchange, that is, between what they get (perceived benefits, performance, or quality) and what they deliver (Ngo and O’Cass, 2009). This implies that the company can only offer a value proposition, that is, offer a benefit or a perceived experience and communicate how it can benefit the customer.

In the university context, this process is highly complex, as the perception of value is inherent to the service, regardless of its monetary nature. Value is primarily related to learning, being determined by the student (Díaz-Méndez et al., 2017), and is not just limited to short-term satisfaction, but long-term. Therefore, it can vary according to the student’s age, personality, preferences for subjects, and ambitions (Díaz-Méndez and Gummesson, 2012), and it can take years for the student to determine the value that the education received (result) has or had for him or her (Carvalho and Mota, 2010). Therefore, the different attributes related to value are dynamic and temporal, and may become more or less relevant at different times, as in the case of freshman or final-year students, who are likely to have different perceptions and judgments (Woodall et al., 2014).

In this context, two studies proposed an analysis of the relationship between the co-creation of value and the value generated by the students. Smerkov and Vesperstad (2020) used Prahalad and Ramaswamy’s (2004) seminal framework Dialogue, Access, Risk and Transparency (DART) and collected focus group interview data over five years with international students at a Norwegian university. The objective was to identify how the relationship between co-creation of value, sharing of resources, and educational experiences in higher education occur. The authors understand that their contribution lies in the adoption of value co-creation, more specifically the DART framework, as a classroom strategy to promote positive and memorable teaching and learning experiences. Leem (2021) proposed a quantitative study with 160 Korean students, specifically in the context of the teacher-student relationship in a virtual environment, relating co-production of value, value in use, and benefit to the student. The benefit, in the case of this study, was limited to those directly arising from digital teaching-learning technologies (such as Zoom software). In both studies, value co-creation was analyzed in the context of teacher-student interaction, with technology as a mediator (Leem, 2021), and the value generated was limited to the perception of learning.

The definition of value generated for students adopted in this research will follow the approach of Ledden et al. (2011). According to the authors, value for students comprises two main components: what they deliver (sacrifices) and what they get (benefits). Sacrifices are related to what students are willing to do to obtain the benefits, including both monetary and non-monetary costs. Benefits can be utilitarian and hedonic, comprising intrinsic and extrinsic attributes (Ledden et al., 2011):
complex problems, and understanding different social contexts (Dollinger et al., 2018).
- Social value consists of the perceived usefulness of association with a specific demographic, cultural or social group (Ledden et al., 2011). It comprises two dimensions, one focused on the benefits received from socializing and studying with other colleagues (social value – students) and another related to the people important to the student, whose opinions matter (social value – others) (Ledden et al., 2011). Social benefits are related to life experience, the possibility of creating familiarity with different cultures, creating friendships, and obtaining social status. It also comprises the benefit of satisfying the ambitions of parents or significant others with the completion of the course (Dziewanowska, 2017; Woodall et al., 2014).
- Image value encompasses status, that is, the belief that employers and others have positive things to say about the university as a renowned HEI that enjoys a good reputation (Ledden et al., 2011).

The scarcity of studies that relate the value co-creation capabilities mentioned in the previous section (adopted here as independent constructs), with the generated value and its elements mentioned above (dependent constructs), results in the development of the conceptual scheme of an exploratory nature represented in Figure 1.

The following section discusses the method used to operationalize this conceptual schema.

5. Method

To achieve the objective of the study, descriptive research with a quantitative approach was conducted (Malhotra, 2019), through an ex-post-facto survey of undergraduate and graduate students, Lato and Stricto Sensu, regularly enrolled at Feevale University. According to the Article 1 of Resolution n. 510 of April 7th, 2016, edited by the Brazilian National Health Council, the Research Ethics Council or the National Health Council systems will not register or evaluate public opinion polls with unidentified participants, research based on aggregated databases without the possibility to identify its participants, or research that aims to deepen theoretically situations that emerge spontaneously and contingently in professional practice when revealing no data that can identify its participants. This research was, therefore, not submitted to the Research Ethics Committee.

The sample is considered non-probabilistic for convenience (Malhotra, 2019), as it depended on the availability of university students to respond to the survey. Variables were included to enable the characterization of the sample’s profile, such as age, gender, the course in which they are enrolled, level of education, time of admission to the university, and percentage of course completion.

The university’s CCs were operationalized by the three capabilities mentioned above: individuated, ethical and relational interaction (Karpen et al., 2015). Some adjustments to the measurement scales were necessary to adjust them to the university context. Furthermore, the statements written as reverse interpretation scales were converted to direct interpretation scales, to avoid misinterpretations (Barnette, 2000).

Figure 1. Conceptual model. Source: elaborated by the authors.
The measurement instrument related to the value generated for students consisted of the model proposed by Ledden et al. (2011), aiming to measure functional, emotional, epistemic, social, and image values (Hair et al., 2014). For both scales, a seven-point Likert scale was used, ranging from “strongly disagree” (1) to “strongly agree” (7).

The online measurement instrument was submitted through the SurveyMonkey platform to an in-person pre-test to identify the respondents’ understanding of the items, analyze the arrangement of questions, and eliminate potential problems. They were applied with two students: one at the beginning and the other at the end of the course. No changes were made to the questionnaire, as both respondents reported that the instrument was clear.

Data collection was mediated by university professors. In September 2021, an email was sent to 416 professors from a list received from the Human Resources sector, asking for their help in applying the questionnaire to undergraduate and/or graduate students. Data collection was completed in November 2021.

Data analysis was performed using first exploratory factor analysis (EFA) to simplify the model. Then, the validation of the measurement model was performed, through confirmatory factor analysis (CFA), and the estimation of the structural model, through structural equation modeling (SEM). These procedures were performed using SPSS Statistics v.26 and Amos v.22 software.

6. Analysis of results

A total of 429 completed questionnaires were obtained, representing 4.7% of the student population. Of these, 68 were excluded because they had been enrolled in the course for less than 2 semesters, considering that they had almost no experience in the university context or had interacted with university professors. This resulted in 361 questionnaires. The number of responses was considered adequate for SEM use.

Missing data represented a maximum of 10% in some variables, with no identified pattern for the control variables. Therefore, it was decided to use more restrictive statistical techniques, using the listwise option in SPSS and Amos, which eliminates cases with missing data (Hair et al., 2014). Eleven outliers were identified and removed using the Mahalanobis Distance, leaving 350 respondents.

Normality was tested using the Kolmogorov-Smirnov and Shapiro-Wilk methods. The results pointed to a non-normality of the data (p < 0.01). Therefore, to estimate the sample size, the maximum likelihood estimation (MLE) technique was used, which suggests a sample size of 200 responses, providing a solid basis for estimation, considering the complexity of the model (Hair et al., 2014).

The sample profile was characterized in terms of age, gender, educational level, and percentage of course completion. As for age, more than 70% of respondents are between 20 and 29 years old, followed by those between 30 and 39 years old. Regarding gender, there was a predominance of female students (69.2%), representing more than twice as many male respondents. Most respondents are linked to the undergraduate level (302 students or 90.1% of valid data). Regarding the percentage of course completion, the majority of respondents had more than 50% of the course completed (74.3%), possibly due to the filter question that excluded the linked respondents less than 2 semesters. While the university did not provide the demographics of their student population, these parameters may help to conduct sample comparisons with future studies.

6.1. Exploratory factor analysis

The EFA was used to reduce the number of measurement items and simplify the model, being conducted in two stages: one to identify the underlying constructs of value co-creation capabilities and another to identify those that relate to the generated value.

The EFA for CCs resulted in a KMO of 0.940 and a significant Bartlett’s test of sphericity (p < 0.01), demonstrating the adequacy of the EFA for the sample. The communalities were adequate (all > 0.5), with the lowest being equal to 0.698. The total variance explained was 82.277%, meeting the literature recommendation (Hair et al., 2014).

Table 1 presents the component matrix with the factor loadings for each variable, using the Varimax rotation method with Kaiser Normalization. The EFA resulted in the formation of three components with the items adherent to the original scale. It was observed that some items presented significant factor loadings in more than one component. However, for greater adherence to the theory, it was decided to keep these items on the scale.

The EFA for VG resulted in a KMO of 0.909 and a significant Bartlett’s test of sphericity (p < 0.01), demonstrating the adequacy of the EFA for the sample. The communalities were adequate (all > 0.5), with the lowest being equal to 0.507. The total variance explained was 72.456%, meeting the literature recommendation (Hair et al., 2014).

Although the EFA indicated the formation of three components under the Eigenvalue criterion greater than 1, it was observed that a fourth factor obtained an Eigenvalue of 0.925, that is, very close to the cut-off point. To bring greater adherence to the original scale, which contained five factors, it was decided to restrict the EFA to four factors. The new round even showed significant KMO and Bartlett’s test. The lowest communality was 0.657 and the average variance extracted resulted in 78.628%.

Table 2 presents the component matrix with the factor loadings, resulting in the Epistemic, Functional, Image, and Social Value components. Items referring to Emotional Value were confused between epistemic and functional value and were excluded.

The resulting matrix presented measurement items that were relatively adherent to the original scale.

6.2. Validation of the measurement model

The value co-creation and value generated constructs constituted the measurement model, as shown in Figure 2.

The values achieved by the fit indices of the measurement model (Hair et al., 2014) are presented in Table 3.

The measurement model presented an acceptable fit, indicating that the specified model reproduces the covariance matrix between the indicators. Convergent validity was estimated using the average variance extracted (AVE) and construct reliability (Hair et al., 2014). Table 4 presents the results of convergent validity. The measurement model

| Table 1. Matriz rotacionada CCs. |
|----------------------------------|
| Items (preceded with “In Fevale, they…”) | Component |
| ----------------------------------------- | --------- |
| EthicalCC3 Act transparently with me | .834 |
| EthicalCC1 Act fairly with me, regardless of the situation | .831 |
| EthicalCC4 Interact with me ethically | .772 |
| EthicalCC2 Leave me free to make the best decision | .746 |
| RelatCC2 Establish a close relationship with me | .829 |
| RelatCC3 Establish two-way communication with me | .829 |
| RelatCC1 They make me feel very comfortable during our contact | .452 |
| RelatCC4 Show real interest in getting involved in the services provided by the university | .656 |
| IndivCC4 Identify my personal expectations | .810 |
| IndivCC3 Understand what type of course/service/teaching method is best for me | .795 |
| IndivCC2 Are sensitive to my individual situation | .526 |
| IndivCC1 Understand my individual needs | .543 |
| Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization” |  |
Discriminant validity was assessed by comparing the AVE for two constructs with the square of the estimated correlation between these constructs. The AVE must be greater than the square of this estimate. The results of discriminant validity are detailed in Table 5. The model indicated adequate discriminant validity.

Through the CFA, it was verified that the measurement model is adequate, as it presented convergent validity, discriminant validity, and data adjustment indices, making it possible to test the theoretical propositions of the research through the structural model.

6.3. Estimation of the structural model

From the validation of the measurement model, the structural model was estimated. The structural model indicates how much the university’s CCs, more specifically the capacities of Individualized, Ethical, and Relational Interaction, influence each type of value generated for the students. Figure 3 represents the structural model.

| Table 2. Rotated matrix VG. |
|-----------------------------|
| Component                   |
| 1  | 2  | 3  | 4  |
| EpistVG1 My course content keeps me interested | .791 |
| EpistVG3 My course content contributes to the high value of my education | .744 |
| EmotVG2 I learn new things with my course | .727 |
| EmotVG3 My course gives me a sense of self-fulfillment | .702 |
| EmotVG1 I feel proud to be taking my course | .662 |
| EmotVG2 My course increases my self-confidence | .627 |
| FuncVG3 My degree is a good investment for my future | .821 |
| FuncVG1 My degree will allow me to earn a better salary | .815 |
| FuncVG2 My degree will allow me to achieve my career goals | .793 |
| ImageVG3 I believe Feevale has a good reputation | .886 |
| ImageVG2 I hear positive things about Feevale in the job market | .878 |
| ImageVG1 I believe my employers (current or future) have positive things to say about Feevale | .846 |
| SocialVG2 The support of my colleagues has been important to help me in the course | .881 |
| SocialVG3 Social interaction with classmates in my course makes my studies more interesting | .847 |
| SocialVG1 Working in a group has been a beneficial part of my course | .770 |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 5 iterations.

| Table 3. Fit indices of the measurement model. |
|-----------------------------------------------|
| Fit index | Recommended value | Estimated value |
| --------- | ------------------ |-----------------|
| $\chi^2/df$ | $\leq 5.00$ | 2.051 |
| RMSEA | $\leq 0.08$ | 0.063 |
| NFI | $\geq 0.90$ | 0.919 |
| CFI | $\geq 0.90$ | 0.956 |
| TLI | $\geq 0.90$ | 0.943 |

Source: Amos output. Based on Hair et al. (2014).
the positive evaluation of an experience (perceived result) at a specific capacity of specific interactions. In general, value is determined from the positive evaluation of an experience (perceived result) at a specific time or during a given exchange encounter (Caridi et al., 2019). In this way, it is imperative that HEIs deeply understand shared responsibility, emphasizing the importance of active student participation in defining the value of their own experiences (Dollinger et al., 2018). These results are understood in a complex empirical context concerning value creation, as the perception of value is inherent to the service, regardless of its monetary nature. In this study, three value co-creation capabilities and their relationship with four types of generated value were investigated, discussed below. The scarcity of other studies with which the results can be compared makes this discussion, in part, speculative about the possible causes of the relationships found.

The interaction capacity most related to value creation, that is, with the greatest amount of significant standardized estimates, was Relational. This ability involves proximity to the student so that he feels welcomed by the HEI and is significantly associated with all types of value investigated in this research: Epistemic, Social, Functional, and Image. Each of these associations is discussed below.

Regarding the Epistemic Value, the results suggest that a close relationship with the student contributes to their interest in the course content, to a perception of greater knowledge absorbed and, therefore, of greater value in the education received. This result was represented by the highest standardized estimate: 0.617. It is possible that this sense of well-being and proximity felt by the students in the university context is contributing to their receptiveness to the content studied in the classroom, their willingness to interact with other actors and, therefore, their perception of greater value in the education received. During the COVID-19 pandemic, when social distancing was in effect, this result might be understood in the context of the student’s other relational activities, such as professional, sports, social, etc. Fevale University’s efforts to mobilize its students during this period and keep them close, albeit virtually, can be contrasted with this context, enhancing the student’s perception of a closer relationship.

The university’s close relationship to students seems to be also influencing socialization in general in the academic environment, that is, not only between students and the university but among students. The relationship between the perception of Social Value, that is, that generated from the interaction with colleagues, and the capacity for relational interaction resulted in the second highest correlation estimate observed (0.599). It is possible that the interaction with Fevale’s employees and teachers also ends up stimulating the relationship between the students, favoring socialization in general. For example, the extension projects that aim to socially impact the region may approximate the students to the community. Active learning methodologies may also contribute to their in-class interaction. This result may also be linked to the time that the student remains on Campus, getting more in touch with the university’s services and with other students (Ledden et al., 2011).

The results also suggest that the feeling of acceptance reaches even more concrete dimensions of value, such as Functional Value, which involves understanding the diploma as a “good investment” and impacting “a better salary”. This relationship was significant with a standardized estimate of 0.446. It should be noted that these more concrete elements of value were not objectively operationalized in this research, but merely their subjective perception. Even so, this result becomes interesting to the extent that this perception is imbricated in what their reality means for these students. The ease of relationship with the university can make students more comfortable in exposing their ideas and, with that, developing professionally (Dziewanowska, 2017).

Not as intensely as the other types of value generated, the capacity for relational interaction was also associated with the university’s image or

### Table 4. Convergent validity.

| Construct | Average Variance Extracted (AVE) | Construct Reliability |
|-----------|---------------------------------|-----------------------|
| FuncVG    | 0.839                           | 0.878                 |
| SocialVG  | 0.845                           | 0.884                 |
| ImageVG   | 0.894                           | 0.923                 |
| EpistVG   | 0.850                           | 0.888                 |
| EthicalCC | 0.887                           | 0.937                 |
| RelatCC   | 0.828                           | 0.897                 |
| IndivCC   | 0.869                           | 0.926                 |

| Values recommended | >0.5 | ≥0.6 |
|--------------------|------|------|

Source: Amos output. Based on Hair et al. (2014).

Next, in Table 6, the fit indices achieved by the structural model are presented, considering the values suggested by the literature (Hair et al., 2014).

As verified, only the NFI did not meet the literature recommendations, by a small margin. The other indices met what was specified in the literature, and the structural model was considered valid for analysis. Next, the individual estimates of each parameter were examined against the corresponding theory (Hair et al., 2014). Table 7 presents these results.

The results showed significant relationships ($p < 0.01$) between some of the constructs and values generated (cells represented in gray, in Table 7), indicating that:

- The Capacity for Ethical Interaction positively and significantly influences the image value.
- The Relational Interaction Capacity positively and significantly influences functional, social, image, and epistemic values.
- Individuated Interaction Capacity does not significantly influence any of the surveyed values.

From the estimation of the structural model, the results are discussed in the following section, in light of the theory.

### 7. Discussion

The results suggest that the benefit, conceptualized in terms of feasibility or well-being for a focal actor, is created through the interface and contributions of various actors (Vargo et al., 2020), based on the capacities of specific interactions. In general, value is determined from the positive evaluation of an experience (perceived result) at a specific time or during a given exchange encounter (Caridi et al., 2019). In this way, it is imperative that HEIs deeply understand shared responsibility, emphasizing the importance of active student participation in defining the value of their own experiences (Dollinger et al., 2018). These results are understood in a complex empirical context concerning value creation, as the perception of value is inherent to the service, regardless of its monetary nature. In this study, three value co-creation capabilities and their relationship with four types of generated value were investigated, discussed below. The scarcity of other studies with which the results can be compared makes this discussion, in part, speculative about the possible causes of the relationships found.

The interaction capacity most related to value creation, that is, with the greatest amount of significant standardized estimates, was Relational. This ability involves proximity to the student so that he feels welcomed by the HEI and is significantly associated with all types of value investigated in this research: Epistemic, Social, Functional, and Image. Each of these associations is discussed below.

Regarding the Epistemic Value, the results suggest that a close relationship with the student contributes to their interest in the course content, to a perception of greater knowledge absorbed and, therefore, of greater value in the education received. This result was represented by the highest standardized estimate: 0.617. It is possible that this sense of well-being and proximity felt by the students in the university context is contributing to their receptiveness to the content studied in the classroom, their willingness to interact with other actors and, therefore, their perception of greater value in the education received. During the COVID-19 pandemic, when social distancing was in effect, this result might be understood in the context of the student’s other relational activities, such as professional, sports, social, etc. Fevale University’s efforts to mobilize its students during this period and keep them close, albeit virtually, can be contrasted with this context, enhancing the student’s perception of a closer relationship.

The university’s close relationship to students seems to be also influencing socialization in general in the academic environment, that is, not only between students and the university but among students. The relationship between the perception of Social Value, that is, that generated from the interaction with colleagues, and the capacity for relational interaction resulted in the second highest correlation estimate observed (0.599). It is possible that the interaction with Fevale’s employees and teachers also ends up stimulating the relationship between the students, favoring socialization in general. For example, the extension projects that aim to socially impact the region may approximate the students to the community. Active learning methodologies may also contribute to their in-class interaction. This result may also be linked to the time that the student remains on Campus, getting more in touch with the university’s services and with other students (Ledden et al., 2011).

The results also suggest that the feeling of acceptance reaches even more concrete dimensions of value, such as Functional Value, which involves understanding the diploma as a “good investment” and impacting “a better salary”. This relationship was significant with a standardized estimate of 0.446. It should be noted that these more concrete elements of value were not objectively operationalized in this research, but merely their subjective perception. Even so, this result becomes interesting to the extent that this perception is imbricated in what their reality means for these students. The ease of relationship with the university can make students more comfortable in exposing their ideas and, with that, developing professionally (Dziewanowska, 2017).

Not as intensely as the other types of value generated, the capacity for relational interaction was also associated with the university’s image or

### Table 5. Discriminant validity.

| AVE   | 0.839 | 0.845 | 0.894 | 0.850 | 0.887 | 0.828 | 0.869 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| FuncVG| 0.201 | 0.201 | 0.209 | 0.401 | 0.106 | 0.121 | 0.119 |
| SocialVG| 0.201 | 0.185 | 0.377 | 0.345 | 0.325 | 0.371 |       |
| ImageVG| 0.401 | 0.377 | 0.345 |       | 0.263 | 0.319 | 0.267 |
| EthicalCC| 0.106 | 0.092 | 0.440 | 0.263 |       | 0.601 | 0.724 |
| RelatCC| 0.121 | 0.147 | 0.325 | 0.319 | 0.601 |       | 0.635 |
| IndivCC| 0.119 | 0.099 | 0.371 | 0.267 | 0.724 | 0.635 |       |

Source: Amos output.
reputation, with a standardized estimate of 0.285. This weaker relationship, although significant, may be associated with the fact that Image Value is externally constructed and refers to the market’s opinion of the institution, rather than being constructed by the student (Ledden et al., 2011).

The Capacity for Ethical Interaction manifests the ability of the university to inspire confidence in its students, sustaining with them the understanding that the HEI will act in their best interest, and not at their expense. In the results of this research, the trust generated by the capacity for ethical interaction is associated with the reputation of the educational institution, that is, the Image Value (Carvalho and Mota, 2010). This reinforces the fact that value co-creation is facilitated as interactions occur in a less intimidating and deceptive way, resulting in mutual benefit (Karpen et al., 2015). This aspect is in line with the DART model (Dialogue, Access, Risk and Transparency), by Prahalad and Ramaswamy (2004), especially with the Transparency element, which is an essential requirement for the processes of interaction between student and university, generating trust. Easy access to information and transparency facilitates the exchange of resources in the educational context (Smarvik and Vespestad, 2020). The close relationship of the university with its social and economic environment, aiming to develop the region may also contribute to this result. This ability showed no significant relationship with Epistemic, Social, or Functional value.

The Capacity of Individualized Interaction allows the university to better anticipate and feel the individual circumstances and experiences desired by its students. Value co-creation is fostered by offering solutions that better adapt to the unique conditions of each student (Karpen et al., 2015), resulting in personalized, meaningful, and sensitive interactions with a specific individual (Grönroos and Voima, 2013; Prahalad and Ramaswamy, 2004). This type of interaction, however, was not related to either Functional, Social, Image, or Epistemic values. This result becomes interesting as the measurement items, both for Individualized Interaction Capacity and for the value dimensions refer to the individual. For example, individualized interaction refers to “my expectations”, “suitable for me”, “my individual situation”, etc. while value concerns “my education”, “my self-confidence”, “my goals”, etc. The lack of significant relationships in this regard may suggest that the generation of value in higher education may be transcending the individual, impacting the value generated in their social and professional environment. In other words, in the relationship with the university, the student may be expressing a demand to be met that does not refer to himself, but his
professional environment. It suggests that more than the concern with individual needs, it is important for the HEI to maintain a close and ethical relationship.

The final considerations of the research are presented below, including limitations and suggestions for future research.

8. Conclusion

This research analyzed the relationship between co-creation capabilities (CCs) and the types of values generated for their students. The understanding of this relationship occurred through the validation and estimation of a structural equation model.

The research results indicate that specific interaction capacities influence specific value dimensions generated to the students. While the capacities of Relational and Ethical Interaction significantly influence some types of VG for students, the capacity for Individualized Interaction, possibly due to the students' understanding that the university needs to meet collective interests, was not associated with the value generated for them.

Theoretically, this study contributes to providing a better understanding of the co-creation of value in the university-student relationship beyond the classroom, specifically configuring the relationship between types of interaction and dimensions of generated values. This approach enables an understanding that promotes strategic actions aimed at a closer and more transparent relationship with students. In addition, this study validates the measurement scale for interaction capacity in the university context, aiming to make its understanding clearer and more familiar to the respondents, avoiding measurement errors.

Regarding managerial contributions to universities, the research increases the existing knowledge base for the generation of strategies and practices to foster the development of value co-creation. From the identification of the relationship between CCs and VG for students, it will be possible for university managers and leaders to explore and develop the operating resources necessary for value generation (Díaz-Mendez et al., 2017). In this sense, considering the research results and the literature on the subject (Karpen et al., 2015), it is suggested that the university prioritize actions aimed at 1) Capacity for Ethical Interaction – through acting fairly and not opportunistic to its audiences, generating trust in its students, making them realize that the HEI will act in their best interest, and not at their expense; and 2) Capacity for Relational Interaction – seeking to expand the connection of social and emotional bonds with their students, through an environment conducive to building relationships and encouraging feelings of belonging and acceptance.

Some limitations of this study, however, should be considered. First, data collection took place during the pandemic of the new coronavirus (Covid-19), and in the period in question, employees were acting in alternative ways: remote, hybrid, or more rarely, face-to-face work. As for the format of the classes, they were taking place in a hybrid way or completely online. Therefore, this factor may have influenced the students' perception during the questionnaire responses. In the block that aimed to measure CCs, the focus of the questionnaire turned to interactions between students and employees, and although Feevale University has adopted measures to maintain the relationship with its audiences expanding service channels, there is a possibility that the online contact has influenced the responses. The emphasis of our results in the importance of the capacity for relational interaction may raise questions regarding online universities, where social distancing is embedded in the process. Within these environments, a close relation with the students may be conducted by very efficient virtual mechanisms and/or presentational interaction moments with the students.

Second, as the sample was non-probabilistic, as it depended on the availability of students to respond to the survey, it is not possible to generalize the empirical results to the population of students of the HEI surveyed. Finally, it is not possible to determine causality in the research, since causal relationships demand designs that are outside the scope of this study. Only the correlation between constructs was addressed.

For future research, we suggest that similar studies be conducted in the post-pandemic period to compare the results, seeking to identify the possible influences of social distancing. It would also be interesting to expand the scope of this research, covering public institutions to compare whether the relationships found are similar or not. Future studies may also address the empirical environment of online universities, inquiring on how they adopt virtual mechanisms for value co-creation. Finally, qualitative research can be directed to deepen the understanding of the processes underlying the relationship between co-creation capabilities and created value, seeking the complementarity of results and aiming to give greater analytical depth to these phenomena.

Declarations

Author contribution statement

Cintia Gabrielle Beier, MsC in Business Administration: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Serje Schmidt, Ph.D.: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Cristiane Froehlich, PhD: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

Maria Cristina Bohnenberger, PhD: Analyzed and interpreted the data; Wrote the paper.

| Path            | Estimation | Standard estimation | Standard error | Critical ratio | p-value |
|-----------------|------------|---------------------|----------------|----------------|---------|
| EthicalCC       | → FuncVG   | 0.012               | 0.012          | 0.135          | 0.088   | 0.930  |
|                 | → SocialVG | -0.048              | -0.041         | 0.163          | -0.293  | 0.769  |
|                 | → ImageVG  | 0.393               | 0.435          | 0.105          | 3.748   | ***    |
|                 | → EpistVG  | 0.075               | 0.090          | 0.105          | 0.715   | 0.475  |
| RelatCC         | → FuncVG   | 0.479               | 0.446          | 0.143          | 3.348   | ***    |
|                 | → SocialVG | 0.784               | 0.599          | 0.175          | 4.469   | ***    |
|                 | → ImageVG  | 0.290               | 0.285          | 0.109          | 2.666   | 0.008  |
|                 | → EpistVG  | 0.584               | 0.617          | 0.117          | 4.999   | ***    |
| IndivCC         | → FuncVG   | -0.037              | -0.034         | 0.160          | -0.229  | 0.819  |
|                 | → SocialVG | -0.183              | -0.141         | 0.193          | -0.948  | 0.343  |
|                 | → ImageVG  | 0.003               | 0.003          | 0.123          | 0.021   | 0.983  |
|                 | → EpistVG  | -0.062              | -0.066         | 0.125          | -0.499  | 0.618  |

Source: Amos output. Note: significant estimations in gray background.
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The authors do not have permission to share data.

Declaration of interest's statement

The authors declare the following conflict of interests: I, Serje Schmidt, am Associate Editor of Heliyon in the section Business and Economics.

Additional information

No additional information is available for this paper.

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