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Original Article

Scale of competencies for sustainability at the organizational scope

Escala de competências para a sustentabilidade no âmbito organizacional

Valéria Garlet [I], Thiago Antônio Beuron[II], Lucas Veiga Ávila [I], Laércio André Gassen Balsan [I], Lúcia Rejane da Rosa Gama Madruga [I], Elda Rodrigues Steinhorst Kraetzig [I]

[I] Universidade Federal de Santa Maria, Santa Maria, RS, Brazil
[II] Universidade Federal do Pampa, Santana do Livramento, RS, Brazil

ABSTRACT

Objective: The objective of the study is to propose an instrument to evaluate the Competencies for Sustainability in Organizations.

Originality/Value: The importance of sustainability is clearly evidenced in the proposition of the Sustainable Development Goals (SDGs). The skills for sustainability portray the commitment to sustainability. Understanding and effectively evaluating this set of skills is important to face the problems of society and the planet in terms of the environment, economy, and culture, among others, through conscious and sustainable decision making. For there to be a more sustainable world, it is necessary to understand that all obligors are agents of change endowed with skills that drive them to act and to change. What are the competencies needed for sustainability? By making available an instrument that aims to identify competencies that promote sustainability, it is intended to expand the scientific discussion on relevant issues that can influence society and help in the construction of a more sustainable future.

Design/methodology/approach: The items were compiled on the instrument based on the literature. After analyzing the content of the items, analyzing the specialists, semantic analysis, and pretesting the preliminary version of the instrument was applied to a sample of 509 respondents.

Results: A factor analysis was carried out that revealed two factors: strategic planning for sustainability and valuing sustainability. Together, the two factors explained 61.15% of the total variance of the construct. The 10 items have constitutive and operational consistency, and the results demonstrated the construct's validity with good reliability indexes, good factorial load, and good model adjustment indexes.

Keywords: Competencies; Sustainability; Scale; Sustainable Development Goals; Skills for sustainability

RESUMO

Objetivo: O objetivo do estudo é propor um instrumento para avaliar as Competências para Sustentabilidade nas Organizações.
Originalidade/Valor: A importância da sustentabilidade fica claramente evidenciada na proposição dos Objetivos de Desenvolvimento Sustentável (ODS). As competências para a sustentabilidade retratam o compromisso com a sustentabilidade. Entender e avaliar de forma eficaz esse conjunto de competências é importante para enfrentar os problemas da sociedade e do planeta em termos de meio ambiente, economia, cultura, entre outros, por meio de uma tomada de decisão consciente e sustentável. Para que haja um mundo mais sustentável, é preciso entender que todos os indivíduos são agentes de mudança dotados de competências que os impulsionam a agir e a mudar. Quais são as competências necessárias para a sustentabilidade? Ao disponibilizar um instrumento que visa identificar as competências que promovem a sustentabilidade pretende-se ampliar a discussão acadêmica sobre questões relevantes que podem exercer influência na sociedade e ajudar na construção de um futuro mais sustentável.
Design/metodologia/abordagem: Os itens foram compilados no instrumento com base na literatura. Após análise de conteúdo dos itens, análise dos especialistas, análise semântica e pré-teste a versão preliminar do instrumento foi aplicada a uma amostra de 509 respondentes.
Resultados: Realizou-se análise fatorial que revelou dois fatores: planejamento estratégico para a sustentabilidade e valorização da sustentabilidade. Juntos, os dois fatores explicaram 61,15 % da variância total do construto. Os 10 itens apresentam consistência constitutiva e operacional sendo que os resultados demonstraram validade de construto com bons índices de fidedignidade, boa carga fatorial e bons índices de ajustes do modelo.

Palavras-Chave: Competências; Sustentabilidade; Escala; Objetivos de Desenvolvimento Sustentável; Competências para a sustentabilidade

1 INTRODUCTION

The increasingly frequent manipulation of the planet's health requires urgent attention, disclosure, awareness, and changing attitudes. It is no longer possible to think that the responsibility lies only with the government, organizations, or the most developed countries. The situation is clear: each person compulsorily must preserve the environment and make society sustainable in the most diverse instances. Themes related to environmental problems are not restricted to local, regional, or national issues, but take on a transnational scope, requiring a global vision concerned with local actions in search of global environmental citizenship (Vega, 2006).

In this sense, the conception and (trans)formation of agents in favor of sustainability occurs through the development of capabilities and attributes capable of generating positive actions and consequences that bring benefits for a better

future for the planet and society. Leal Filho (2011) highlights that the discussion about sustainable development is no longer new, however, despite the abundance of texts, it is still clear that international agreements to address sustainability issues are not implemented in their entirety.

This importance of sustainability is clearly evidenced in the proposition of the Sustainable Development Goals (SDGs), in Agenda 2030, by the United Nations in 2015, pointing out the urgency of thinking from the perspective of people, the Planet, prosperity, peace, and the global partnership for sustainable development. The 2030 agenda is composed of 17 SDGs that aim to: a commitment to building a better environment for people, through the reduction of hunger, poverty, and inequalities; care for the environment, conscious consumption, sustainable management; economic, social, and technological development, respect for nature; search for peace, justice, and social inclusion; collaboration of countries and people in the implementation of the 2030 Agenda and the achievement of the 17 SDGs: eradicating poverty; zero hunger and sustainable agriculture; health and wellness; quality education; gender equality; clean water and sanitation; clean and affordable energy; decent work and economic growth; industry, innovation, and infrastructure; reduction of inequalities; sustainable cities and communities; responsible consumption and production; action against global climate change; life in the water; terrestrial life; peace, justice, and effective institutions; partnerships and means of implementation (UN, 2015).

The competencies for sustainability guarantee people's leadership roles and attitudes of transformation in organizations and society, allowing economic, social, and environmental development (Rosa, 2021). Elias (2021) studied the skills needed to achieve the SDGs. The diagnosis was based on theoretical constructs and possible actions: knowledge and skill - training, qualification, and specific qualification courses for SDG; attitude - infrastructure and availability of resources, the clear purpose of the university; encouragement from top management, and more proactive people management; socio-emotional skills - awareness programs and courses on the importance of the SDGs.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) emphasizes that it is necessary to develop skills that enable people to reflect on their actions, on the social, cultural, economic, and environmental impacts of the present and the future, at a local and global level, in order to deal with the challenges posed by the need to implement the SDG. People also need to be empowered to act sustainably in highly complex contexts, choosing directions to be followed, participating in sociopolitical processes, and helping to build societies focused on sustainability. The competencies for sustainability are transversal and seek the transformation that is necessary for sustainability (UNESCO, 2017). Competencies aimed at organizational sustainability must be based on the three pillars, considering an organization with a systemic view that is concerned with the economic, social, and environmental dimensions (Sierdovski et al., 2017).

Therefore, the need to develop competencies for sustainability is perceptible: "normally, people do not have or do not lack competence in absolute terms, but they command it to a variable degree, so that competencies can be put into process continuous and can be developed through exercise and education" (Corral, 2009, p.14). Furthermore, "the alliance between sustainable management practices and the competence models adopted by organizations tend to result in beneficial procedures for society, economy and the environment" (Munck, Souza & Zagui, 2011, p. 57). Competencies for sustainability comprise a process in which information is transmitted and knowledge is generated. In this way, organizations need to improve their activities to ensure that internal information is transmitted properly and that training in the scope of sustainability is developed in the organization (Teixeira, Stefano & Kuhl, 2019).

In the same sense, Nadal et al. (2020) point out that practicing sustainability involves challenges, and changes in routines, social norms, and behaviors with a view to building skills for sustainability. In addition, it is important to focus on measuring sustainability so that quality of life and social well-being are also considered.

Sustainability competencies portray capabilities, values, feelings, and practices that reflect commitment and responsibility concerning sustainability. Understanding and effectively evaluating this set of skills is important to face the challenges of society and the planet in terms of the environment, economy, culture, politics, and ethics, among others, through conscious decision-making and following the principles of sustainability. When analyzing scientific production on the topic Kuzma, Doliveira, and Silva (2017) proposed a systematic review of competencies for organizational sustainability, addressing different studies that suggest the need for managing competencies, aligning individual aspirations with business goals, and objectives linked to organizational sustainability.

By understanding that more sustainable organizations require skills for this context and that the individuals in these organizations are agents of change, positive or negative, the question that guides this study arises: What skills are necessary for sustainability in organizations? This question led to a long review of previous studies and literature on the topic with the aim of providing an instrument that aims to identify competencies that promote organizational sustainability.

By providing an instrument that aims to identify skills that promote sustainability, it is intended to broaden the academic discussion on relevant issues that can influence society and help build a more sustainable future. The sections that follow seek to present the theoretical aspects, followed by the method applied in this study, results and analysis, and finally the final considerations and references used for the construction of the research.

2 COMPETENCIES FOR SUSTAINABILITY

Education for Sustainable Development aims to promote the skills needed to face problems such as poverty, destructive consumption, environmental degradation, urban deterioration, violation of human rights, and social conflicts (UNESCO, 2015). Among these skills are the ability to reflect on scenarios, critical thinking, and shared

decision-making. A more sustainable future is achieved through the learning of knowledge, the taking of attitudes, and the appropriation of sustainable values. Lima, Maciel, and Tashima (2017) emphasize that education is one of the main ways, perhaps the main way, to guarantee the perpetuity and breadth of the sustainability project for the Planet.

Thus, competency management expands the potential of the people who make up the organization and enables alignment between individual and organizational objectives. In addition, "the articulation between sustainable management practices and the competence models adopted by organizations tend to result in beneficial procedures for society, the economy and the environment" (Kuzma et al., 2017, p.429). To understand the concepts used in this article, "competencies represent a dynamic combination of cognitive and meta-cognitive skills, knowledge and understanding, interpersonal, intellectual and practical skills, and ethical values" (Corral, 2009, p. 13).

Organizations must define and develop individual and organizational competencies with a focus on the sustainability of their business, considering the impact of their activities both on society and on the environment, based on the tripod of sustainability and the competencies to achieve it (Stefano & Alberton, 2018).

According to Perrenoud (1999, p.7), competence is "an ability to act effectively in a certain type of situation, supported by knowledge, but not limited to it", that is, using an already predominant knowledge, but also of potential knowledge and, based on that, to develop an effective way of acting in specific situations.

The challenges for sustainability are linked to a set of actors who have different experiences, perspectives and preferences. To face these challenges, a critical competence of negotiation between these stakeholders (politicians, entrepreneurs, artists, leaders...) is necessary: interpersonal competence, that is, "the ability to understand, compare and critically evaluate different positions, perspectives and preferences (epistemological pluralism)" (Withycombe & Redman, 2011).

To encompass competencies, skills, and attributes, Thomas and Day (2014) use the word "capacities" for sustainability. According to the authors, the word "competencies" can be associated with the professional context, while the term "attribute" is related to the university context. The concept of capabilities encompasses several dimensions: fundamental components (information, culture, and values); competencies (behaviors, skills, and motivations); and capabilities (collective skill sets and competencies) (O'rafferty, Curtis & O'connor, 2014). For Stefano and Alberton (2018, p.117), "individual skills are the set of knowledge that involves mobilizing, integrating, transferring knowledge, resources, skills that add economic value to the organization and social value to the individual, aimed at organizational sustainability".

Brunstein and Rodrigues (2011) emphasize that there is a elationship between human competencies and performance levels to achieve positive economic results. However, the notion of what it means to be "competent" ended up incorporating themes such as sustainability and ethics due to the demands of social, political, environmental, and economic life. Corporate actors are not only concerned with economic productivity but also with sustainability in human actions. Bickell (2013) proposes that sustainability requires, at a minimum, three fundamental competencies: flexible mindset (values, motivation, awareness of sustainability principles, communication, collaboration at work, thinking for the future, leadership), strategic capacity (change management, innovation), and technical capacity to build a sustainable environment.

The management of competencies that allow the organization to be aligned with sustainability still lacks development and improvement, and harmony between individual and organizational objectives so that all encompass the search for organizational sustainability: "competence cannot be exercised without the mobilization of a range of resources: the organization's resources, but also the subject's own resources" (Zarifian, 2003, p.80). The search for sustainable development and sustainability is one of the organization's objectives; knowledge and the development of specific organizational skills are necessary for this objective to be achieved (Souza & Munck, 2017). Weissböck

and Stefano (2016) point out the need for organizational and individual skills to be aligned to contribute to competitiveness and the transmission of knowledge between the organization's actors. To this end, competencies connect people and organizations through social commitments in which each person performs a level of responsibility. Human beings are agents of change, and organizations are the setting for revolutions to take place. All this can be legitimized in an efficient competency model that can be applied (Munck, Borim-De-Souza & Zagui, 2011).

Carvalho, Stefano, and Munck (2014) presented that systemic vision, decision-making, and communication are factors that make up the competencies for sustainability in organizations. Studying competencies aims to increase competitiveness in companies, align individual and organizational purposes, and resume the "appreciation of the relationship between organization and individual, as it emphasizes the importance of the competent human being in the effectiveness of the numerous processes inserted in a business routine" (Munck, Souza & Zagui, 2011, p.56). Munck, Galleli and Corrêa (2016, p.60) define that organizational competence for sustainability is "a collective and procedural action, based on the mobilization of resources, in permanent construction, recognized as of high quality and that adds value to the organization, to the individuals and society". If competence for organizational sustainability is developed, there will also be a strong alignment between the organization's resources, competencies and knowledge regarding economic, social and environmental aspects, contributing to high levels of organizational sustainability (Cella-de -Oliveira & Takahashi, 2014).

Lozano et al. (2017) synthesized twelve competencies for sustainability: systems thinking; interdisciplinary work; anticipatory thinking; justice, responsibility, and ethics; critical and analytical thinking; interpersonal relationships and collaboration; empathy and change of perspective; communication and media use; strategic action; personal involvement; evaluation; and tolerance for ambiguities and uncertainties.

Eizaguirre, García-Feijo, and Laka (2019) suggest some generic competencies for the concept of sustainability, such as commitment to environmental conservation,

concern for equal opportunities and gender, social responsibility and citizenship, ethical reasoning, commitment to safety, appreciation and respect for diversity and multiculturalism, commitment to the sociocultural environment, focus on a healthy lifestyle, respect for others, patriotism and preservation of one's own values and cultures.

Evans (2019) proposes the basic competencies for sustainability: interpersonal and communication competence (facilitating and motivating learning, thinking, and action towards sustainability), creative and strategic competence (developing and evaluating transformative interventions in favor of sustainability), normative and critical competence (developing and communicating sustainability-oriented principles and objectives), systems competence (analyzing complex systems in multiple domains – cultural, environmental, economic, political – on a local and global scale taking into account the past, the present and the future), and interdisciplinary competence (drawing on multiple frameworks to create sustainability-oriented thoughts and actions).

Anderson (2015) studied competencies for sustainability in higher education at Portland State University based on the Community Environmental Services sector that provides students with opportunities to work in the community with waste treatment, recycling, waste, and materials management. It is an informal learning model that promotes the development of skills necessary for sustainability. The students participating in the research described the competencies for sustainability proposed by Wiek, Withycombe, and Redman (2011), authors who are the basis for the elaboration of the Scale of Competencies for Sustainability:

- *Systems thinking competence*: ability to analyze complex systems in different areas (environment, society, economy, among others) at local and global scales, proposing solutions to problems related to sustainability;

- *Anticipatory competence*: ability to analyze, evaluate, and structure the future taking into account sustainability, unintended consequences, and intergenerational equity;

- *Normative competence*: ability to transmit and apply values and goals for sustainability, through the assessment of the problem and the creation of a sustainable vision to solve it;

- *Strategic competence*: designing interventions with the power of transformation towards sustainability based on relationships, policies, power structures, the transmission of purely technical issues in terms of easy understanding and meeting deadlines;

- *Interpersonal competence*: ability to motivate and facilitate the collaboration and cooperation of people in search of sustainability.

A study that portrays competencies for educators focused on sustainability is by Vare et al. (2019). The authors highlight twelve competencies for those working in sustainability education: understanding systems to understand the global challenges of climate change and uncertainties; creative and innovative thinking about the future to help shape it and meet the challenges it will present; citizen participation in discussions, decision-making and the transformation process in favor of sustainability; attention, knowledge, information, understanding and perception of the world; empathy to create learning environments and build good connections and good emotions; engagement, autonomy, personal growth and community development; transdisciplinarity for collaboration by a diverse group of multidisciplinary teams; innovation in the educational context to promote more effective learning; action to help students understand that they can make a difference; have a critical position to not only analyze problems, but build them, check sources of information, make inferences and improve reasoning; responsibility in building meaningful work and a commitment to the real world; decision so that society is able to seek balance through changes in individual and collective behavior, with caution and understanding the complexity of situations.

One of the works that originated this research is about a study, also in the university context, with 549 public servants. When approaching competencies for sustainability,

the analysis of the responses revealed that there is a predominant tendency to have competencies that focus on the individual level, such as thinking prospectively, taking advantage of economic opportunities to improve livelihoods and quality of life, thinking in a creative and critical, always wanting to learn, seeking collaborative learning, being empathetic, motivating oneself and others, and seeking peace in the world. When addressing collective competencies, such as creating networks of cooperation and partnerships for sustainable development and establishing partnerships to promote sustainable development, it was noticed that there is a much lower commitment to seeking alliances with other people or institutions (Garlet, 2017). As Ruas (2005, p. 42) has already highlighted, there is a "clear predominance of the individual perspective of competence in relation to the collective".

Regarding the relationship between sustainability and quality of life, Bôlla and Milioli (2019) show that there are worldwide indicators and research that refer to the correlation between environmental factors and human health, and that health risks come from water pollution, in the air and on the ground, health risks and implications for mental health and quality of life. The authors also comment that sustainable development is characterized by the balance between economy, ecology, and people's quality of life, and that sustainability seeks to communicate to human beings that they are beings that exist in nature together with other beings, being interdependent, and that each one has an important role in maintaining the dynamic balance of the Planet by ensuring that there are adequate living conditions, health and quality of life (Bôlla & Milioli, 2019).

Dourado (2018) analyzed the relationships between the sustainability content of Management and Business courses and their incorporation into the professional activities of graduates. The author revealed a set of sustainable competencies aimed at the Triple Bottom Line and the SDGs: environmental obligations and shareholder value, eco-efficiency, environmental education and training, social impacts of investments, human and minority rights, business ethics, stakeholder capitalism, intergenerational equity , ecological tax reform, and environmental economics and accounting.

Bernaldo and Fernández-Sánchez (2021) identified eight competencies for sustainability: critical thinking, problem solving, decision-making, working in multidisciplinary teams, adapting to change, responsibility, time management and communication skills.

The competencies for sustainability of 45 master's programs associated with sustainability were also studied. The survey results reveal that the competencies that are frequently suggested - systems thinking, anticipatory competencies, strategies, interpersonal, and normative - were mentioned in the contents of the education for sustainability curricula. In addition to these, three other competencies were highlighted in the research: different ways of thinking, methodological plurality, and competencies for autonomy (Salovaara, Soini & Pietikäinen, 2020).

Another model of professional sustainability competencies is composed of two groups: research competencies in sustainability (ability to analyze and understand sustainability issues) and intervention competencies in sustainability (ability to develop solutions and adopt changes in favor of sustainability). The authors also propose the integrated learning competence composed of subject knowledge and lived experiences. There are six sustainability intervention competencies: interpersonal collaboration competence, capacity building competence, intrapreneurial competence, strategic competence, political competence, and implementation competence (Venn, Perez & Vandenbussche, 2022).

3 METHOD

With a view to propose the Competency Scale for Sustainability, part of the items included in the initial version were adapted from the scientific literature (Garlet, 2017; Kuzma et al., 2017; Beuron, 2016; Pinto & Batinga, 2016; Corral-Verdugo et al., 2015; Loureiro, 2015; Gombert-Courvoisier et al., 2014; Wals, 2014; Afonso, 2013; Silveira et al., 2013; Akatu, 2013; Segalàs, Mulder, & Ferrer-Balas, 2012; Munck et al., 2012; Rieckmann, 2012; Wiek, Withycombe, & Redman, 2011; Eboli & Mancini, 2011;

Wals & Kieft, 2010; Segalàs et al., 2009; Segalàs, 2008; Unesco, 2005; Boyatzis , 1982) and others were developed by experts.

Initially, by the adaptation of the items, operational and constitutive adequacy, the preliminary version of the instrument consisted of 51 items. These were submitted to a semantic analysis through three brainstorming sessions, which according to Pasquali (1999) is the most effective way to assess the understanding of the items. The sessions were composed of four individuals and lasted approximately one hour and thirty minutes each. During all sessions, they were presented by the researcher item by item of the instrument, at which time, brainstorming participants were asked to reproduce their understanding of each item. If disagreements arose on an item, a way to adapt it so that it could be understood by everyone was discussed in the large group. If it was not possible to adapt the item or if the adaptation eliminated the theoretical validity of the item, it was excluded.

During this stage, the need to present the concept of sustainability with the instrument was identified. In many cases, even having higher education, respondents did not have a real understanding of the concept, believing that the term referred only to environmental issues. Then, all items were again reviewed by the researchers to verify that they still maintained their apparent validity. The instrument was sent by email to 8 experts so that important issues such as biases, details in expressions, and inappropriate words could be verified.

After the experts' analysis, the instrument was pre-tested with 15 individuals. At the end of this entire process, it was found that there was no need to change the instrument anymore, and it was composed of 49 items. To measure agreement with the items, a five-point Likert scale was used, where the attribution of number 1 represents "Totally Disagree" and number 5, "Totally Agree". At the end of the instrument, questions were added asking the participants for some demographic data, such as gender, age, marital status, level of education, religion, and monthly family income.

As for the collection procedures and ethical care, invitations were sent by e-mail to the entire academic community of the university (staff and students), adopting the survey method. The instrument was applied at a Federal University that has approximately 12,935 undergraduate students, 1,546 graduate students, 930 professors and 913 technical administrators.

The email contained a free and informed consent form, explanations about data anonymity, research objectives, and procedures. Individuals who agreed to participate in the research answered the instrument by accessing a specific link, whose address referred to the questionnaire made available through the Google Docs tool.

As for data analysis procedures, Microsoft Excel, SPSS 21.0 and AMOS software were used. First, exploratory statistical analysis and exploratory factor analysis (EFA) were performed. The procedures adopted followed the recommendations of Tabachnick & Fidell (2001) and Hair et al. (2009). Matrix factorability was evaluated using the Kaiser-Meyer-Olson (KMO) index and the Bartlett sphericity test. To define the number of factors that could be extracted, principal components analysis was used. This analysis followed the criterion of scree plot arrangement and eigenvalues whose retention of the factor presupposes an eigenvalue greater than 1.0. The principal axes method was used to extract and rotate the factors, keeping only items that had factor loadings and commonalities equal to or greater than 0.5. To assess the reliability and precision of the scale, Cronbach's Alpha coefficient was used.

Then, the resulting EFA model was analyzed using a confirmatory factor analysis (CFA). For the CFA, the "goodness" indicators were used, which allow assessing the goodness of fit of the proposed model (Hair et al., 2009). As an example, the χ^2/g.l. ratio, the Goodness-of-Fit index (GFI), the Adjusted Goodness-of-Fit index (AGFI), the Root-Mean-square Error of Approximation (RMSEA), Normed Fit index (NFI), Tucker Lewis index (TLI), Root Mean Square (RMR) and the Comparative Fit index were considered. (CFI). The variance extracted from the model and its composite reliability were also verified (Hair et al., 2009).

4 RESULTS AND ANALYSIS

The total sample consisted of 509 respondents. Of these, 53.8% were university students, 26.9% were technical administrators in education and 19.3% were professors, 61.3% were female and 46.6% were married. As for education, 28.5% had higher education and 25% had secondary education.

Through the analysis of the main components, it was found that the data of the present study fulfilled the assumptions required to carry out the factor analysis: the correlation matrix showed sufficient covariance to allow the search for factors, the KMO was high (0.96) and Bartlett's sphericity test was significant.

The AFE revealed a solution of two factors, which are responsible for explaining 60% of the accumulated variance. All scale items had factor loadings above 0.59 and commonalities above 0.53.

The first factor brought together 5 items that make up the dimension "**Strategic planning for sustainability**", whose contents are associated with sustainable planning and decisions. The second factor was also composed of 5 items, all prepared for the "**Valuing sustainability**" dimension, which indicates the valuation or preference for more sustainable products, experiences, or practices.

The analyses to assess the internal consistency of the two sets of items belonging to each of the factors were performed using the calculation of Cronbach's Alpha indices, detailed in Table 1.

The next step involved performing the CFA to assess the latent dimensions of the construct. From the results obtained through the AFE, a bifactorial model of the **Competencies for Sustainability** construct was elaborated, integrated by two latent variables: **Strategic planning for sustainability** (consisting of 5 items) and **Valuing sustainability** (consisting of 5 items), grouping a total of 10 items pointed out by the AFE.

Table 1 – Items on the Competence Scale for Sustainability, factor loadings, reliability and commonality

	Component		
	F1	**F2**	**h^2**
I try to plan, in my day to day, innovative ways to achieve sustainability	0,85		0,66
I can accomplish planning that takes into account sustainability/concern for future generations	0,81		0,59
I seek to act to guarantee a better future for the planet	0,78		0,70
I take advantage of opportunities to improve my livelihood and quality of life	0,77		0,53
I try to make decisions that take sustainability into account	0,69		0,57
I value companies that have a socio-environmental concern		0,88	0,69
There are emotions and experiences that are worth more than material possessions.		0,87	0,58
I value healthier products and choices		0,76	0,66
I reflect on the values of sustainable development		0,66	0,69
I value collective change for sustainability		0,59	0,58
Eigenval	5,04	1,24	
Explained variance (%)	50,39	12,43	
Cronbach's Alpha	0,83	0,85	
Omega	0,842	0,855	
Number of items	5	5	
Notes: Extraction Method: Principal Component Analysis. Rotation Method: oblimin with Kaiser Normalization.			

F1 = Strategic planning for Sustainability

F2 = Valuing sustainability

Source: Research data

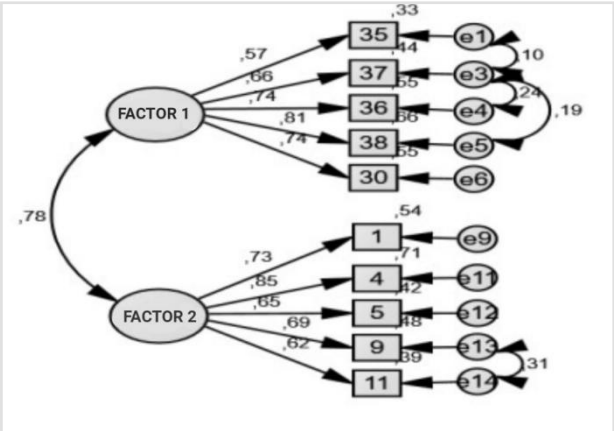
For confirmatory analyses, according to the methodological design for the model test, parameter 1 was indicated for the items with the highest factor loading of each of the two latent variables. The two parameterized items were "9 - I try to plan, in my day-to-day, innovative ways to achieve sustainability" and "37 - I value companies that have socio-environmental concerns".

Based on the results, it was observed that Factor 1 - Strategic planning for sustainability - showed a positive correlation with Factor 2 - Valuing sustainability (0.78).

The results of the adjustments of the initial model indicated values that approached the acceptable levels, but indicated the need for some adjustments in the

model, aiming at the improvement of the obtained indices. All the adjustments made created a parameter associating errors of the correlated items, as shown in Figure 1.

Figure 1 – Reespecified model



Source: Research data

After the modifications, the results of the indixes improved. The GFI exceeded the minimum acceptable level reaching a value of 0.99, the CFI had a value of 0.98 and the NFI had a value of 0.98. The TLI was 0.98 and the RMR was 0.01. As for the RMSEA, it reached a value of 0.03 (below 0.08, as described as acceptable). The x2/GL obtained was 1.57. The variance extracted from the model was 0.53 and the composite reliability of 0.91. Based on these elements, the structure was confirmed.

5 FINAL CONSIDERATIONS

This study aimed to propose an instrument for assessing Sustainability Competencies in the organizational context. In this sense, an instrument with scientifically tested results is presented, considering the literature and technical validation guidelines. The results demonstrate that the dimensions and their respective items present good factor loading, good reliability indixes, and excellent model fit indixes to allow the verification of validity evidence.

The research proved to be easy to fill and with good clarity, thus facilitating its application. Recognizing the theoretical and method limitations, the characteristics of

the proposed scale allow the instrument to be applied individually or collectively, not requiring a time limit for responses. The instrument has a short application time, thus increasing the participation of respondents and reducing costs. It can be applied in different environments such as schools, organizations, urban environments, or via the web.

To identify which competency configuration is most characteristic of an individual, an average of each factor must be calculated. For this, initially, the sum of the scores obtained in each item of the factor is performed and then, the general score of the factor is divided by the number of items that compose it. Once the individual average of the factors has been calculated, these can be ordered from the highest to the lowest average. The highest characterize the predominant configurations. In addition, the overall mean of the complete construct can also be used to perform comparisons with other variables.

This research aims to contribute with a Scale that allows the measurement of Competencies for Sustainability, which represents a fundamental role in achieving sustainability, since it allows the study of relationships with other behavioral variables, from which it will be possible to identify the most competent individuals. and aimed at sustainability, in addition to identifying relationships with other predecessor constructs and variables. Studies are suggested that can apply and verify the reliability of this instrument in other samples and that also allow associating the Competence for Sustainability with other behavioral variables in studies engaged in the survival of the Planet's natural resources, economically viable, socially fair, and culturally diverse practices. In addition, it is also a limitation that the competence scale is based on competence-based self-perception of performance.

REFERENCES

Afonso, M. H. F. (2013). *Mensuração da predisposição ao comportamento sustentável por meio da teoria da resposta ao item* (Dissertação de mestrado). Universidade Federal de Santa Catarina, Florianópolis, SC, Brasil.

AKATU. (2013). *Pesquisa AKATU 2012*: *Rumo à sociedade do bem-estar: Percepção da responsabilidade social empresarial pelo consumidor brasileiro.* Recuperado de https://www.akatu.org.br/wp-content/uploads/2017/04/PESQUISAAKATU.pdf

Anderson, E. L. (2015). *Developing Key Sustainability Competencies through Real-World Learning Experiences*: *Evaluating Community Environmental Services*. (Dissertation). Portland State University. Portland, Estados Unidos.

Bernaldo, M. O.; Fernández-Sánchez, G. (2021). International service-learning as a driver for sustainability competencies development. *Handbook on Teaching and Learning for Sustainable Development*. Eds. FILHO LEAL, W.; SALVIA, A. L.; FRANKENBERGER. F. Edward Elgar, USA, p. 10-28.

Beuron, T. A. (2016). *Contribuições para um modelo de universidade verde*: *Competências e comportamentos para a sustentabilidade.* (Tese de doutorado). Universidade Federal de Santa Maria, Santa Maria, RS, Brasil.

Bickell, S. (2013). *Defining a profession*: *Core competencies for sustainability.* The College of State Management: CEM. Recuperado em https://www.ucem.ac.uk/wp-content/uploads/2016/01/sustainability_competencies_op-010713-web.pdf.

Bôlla, K. D. S., & Milioli, G. (2019). A questão ambiental no CRAS: promoção de qualidade de vida e sustentabilidade. *Psicologia: Ciência e Profissão*. 39, 1-15.

Carvalho, A. C. V., Stefano, S. R., & Munck, L. (2014). Competências voltadas à sustentabilidade organizacional na gestão intermediária de uma indústria alimentícia. *Revista Economia & Gestão*. 14(35), 54-79.

Corral, J. S. (2009). *Engineering education for a sustainable future*. Barcelona: Universitat Politécnica de Catalunya.

Corral-Verdugo, V.,Tapia-Fonllem, C., & Ortiz-Valdez, A. (2015). On the relationship between character strengths and sustainable behavior. *Environment and Behavior*, 47(8), 877–901.

Dourado, J. R. S. (2018). *Competências da sustentabilidade na atuação profissional dos egressos do Centro Paula Souza* - um estudo de caso. Tese (Doutorado). 184f. Pontíficia Universidade Católica de São Paulo.

Éboli, M., & Mancini, S. (2011). Sustentabilidade, educação corporativa e competências: desafio das empresas para perpetuidade do negócio. In M. A. Silveira (Org). *Gestão da sustentabilidade organizacional: inovação, aprendizagem e capital humano.* Campinas: SP: Centro de Tecnologia da Informação Renato Archer.

Eizaguirre, A., García-Feijo, M., & Laka, J. P. (2019). Defining sustainability core competencies in business and management studies based on multinational stakeholders' perceptions. *Sustainability*, 11(2303), 1-21.

Elias, R. B. (2021). *Diagnóstico da qualificação dos servidores federais para o desenvolvimento das competências ao cumprimento dos Objetivos de Desenvolvimento Sustentável.* Dissertação (Mestrado). 99f. Universidade Federal de Uberlândia.

Evans, T. L. (2019). Competencies and pedagogies for sustainability education: a roadmap for sustainability studies program development in colleges and universities. *Sustainability*, 11(5526), 1-36.

Garlet. V. (2017). *Competências e comportamentos pró-universidade verde dos servidores em uma Instituição Federal de Ensino Superior*. (Dissertação de mestrado). Universidade Federal de Santa Maria, Santa Maria, RS, Brasil.

Gombert-Courvoisier, S. et al. (2014). Higher education for sustainable consumption: case report on the human ecology master' s course. *Journal of Cleaner Production*, 62, 82-88.

Kuzma, E. L., Doliveira, S. L. D, & Silva, A. Q. (2017). Competências para a sustentabilidade organizacional: uma revisão sistemática. *Cadernos do Ebape*, 15(3), 428-444.

Leal Filho, W. (2011). Applied sustainable developement: a way forward in promoting sustainable development in higher education institutions. In Leal Filho, W. (Ed). *Environmental education, communication and sustainability.* Frankfurt: Peter Lang.

Lima, A. H. M., Maciel, J. C., & Tashima, L. C. N. (2017). Educação para o desenvolvimento sustentável: ecopolítica (d)e educação na sociedade de controle. *Revista Atlante*: *Cuadernos de Educación y Desarrollo*.

Loureiro, S. M. (2015). *Competências para a sustentabilidade/desenvolvimento sustentável*: um modelo para a educação em engenharia no Brasil (Tese de doutorado). Universidade Federal de Santa Catarina, Florianópolis, SC, Brasil.

Lozano, R., et al. (2017). Connecting competences and pedagogical approaches for sustainable development in higher education: a literature review and framework proposal. *Sustainability*, 9(11), 1-15.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2009). *Análise multivariada de dados*. Porto Alegre: Bookman.

Munck, L., Galleli, B., & Correa, H. L. (2016). Gestão da sustentabilidade ambiental: a perspectiva das competências. *Pretexto*. 17(3), 54-74.

Munck, L., Souza, R. B., & Zagui, C. (2011). A gestão por competências e sua relação com ações de sustentabilidade. *Pretexto*, 12(4), 55–79.

Nadal, K., Massuga, F., Soares, S., Doliveira, S. L. D., & Silva, A. Q. (2020). Sustentabilidade e mensuração da qualidade de vida e bem-estar social: uma revisão sistemática. *Desarollo Local Sostenible*, 13(36), 57-83.

O'Rafferty, S., Curtis, H., & O'Connor, F. (2014). Mainstreaming sustainability in design education – a capacity building framework, *International Journal of Sustainability in Higher Education*, 15(2), 169-187.

Organização Das Nações Unidas. ONU (2015). *Transformando nosso mundo*: a agenda 2030 para o desenvolvimento sustentável. Recuperado de https://nacoesunidas.org/wp-content/uploads/2015/10/agenda2030-pt-br.pdf.

PasqualI, L. (1999). *Instrumentos Psicológicos:* manual prático de elaboração. Brasília: LabPAM, 1999.

Perrenoud, P. (1999). *Construir as competências desde a escola*. Porto Alegre, Artmed, 1999.

Pinto, M. R., & Batinga, G. L. (2016). Consumo consciente no contexto do consumismo moderno: algumas reflexões. *Revista Gestão.Org*, 14(1), 30-43.

Rieckmann, M. (2012). Future-oriented higher education: which key competencies should be fostered through university teaching and learning? *Future*, 44, 127-135.

Rosa, J. C. (2021). *Liderança e sustentabilidade*: uma análise acerca das competências de estudantes pertencentes às empresas juniores do Rio Grande do Sul. Dissertação (Mestrado).85f. Universidade Federal do Pampa.

Ruas, R. (2005). Gestão por competências: uma contribuição à estratégia das organizações. In Ruas, R., Antonello, C. S, & Boff, L. H. *Aprendizagem organizacional e competências.* (pp. 34-54). Porto Alegre: Bookman.

Salovaara, J. J.; SOINI, K.; Pietikäinen, J. (2020). Sustainability science in education: analysis of master's programmes' curricula. *Sustainability Science*. V. 15, p. 901-915.

Segalàs, J. (2008). Educating Engineers for Sustainability. Why? What? How? *Sostenible?*, 10, 117-132.

Segalàs, J., Mulder, K. F., & Ferrer-Balas, D. (2012). What do EESD "Experts" think sustainability is? which pedagogy is suitable to learn it?: results from interviews and cmaps analysis gathered at EESD 2008. *International Journal of Sustainability in Higher Education.* 13(3), 293-304.

Segalàs, J., Ferrer-Balas, D., Svanström, M. & Mulder, K. F. (2009). What has to be learnt for sustainability? A comparison of bachelor engineering education competences at three European universities. In.: *Sustain Sci*, 4(17), 17-27.

Sierdovski, M. et al. (2017). Avaliação das competências individuais voltadas para a sustentabilidade: Um estudo de caso em uma empresa de tecnologia. *Revista Espacios*. V. 38, n. 21.

Silveira, M. A., et al. (2013). Aprendizagem organizacional para sustentabilidade organizacional: desenvolvimento de competências em fabricantes de equipamentos eletromédicos. *Anais do XXXIII Encontro Nacional de Engenharia de Produção.* Salvador, BA, Brasil.

Souza, R. B., & Munck, L. (2017). Competências e Sustentabilidade Organizacional: Uma aproximação (im)possível? *Anais do XIX Encontro Internacional sobre Gestão Ambiental e Meio Ambiente – ENGEMA*, São Paulo, SP, Brasil.

Stefano, S. R., & Alberton, A. (2018). Alinhamento entre estratégia da organização e competências para sustentabilidade: proposição de um modelo para análise. *Revista Capital Científico,* 16(4), 117-130.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics.* California: Allyn & Bacon.

Texeira, G., Stefano, S. R., & Kuhl, M. R. (2019). Competências para sustentabilidade: análise em uma instituição financeira. *Soc. Dev*., 8 (11), 1 -24.

Thomas, I., & Day, T. (2014). Sustainability capabilities, graduate capabilities, and Australian universities. *International Journal of Sustainability in Higher Education*, 15 (2), 208-227.

UnitedNationsEducational,ScientificandCulturalOrganization(UNESCO),(2005).*Unitednationsdecade of education for sustainable development 2005-2014*: Draft International Implementation Scheme. Recuperado de http://unesdoc.unesco.org/images/0013/001399/139937e. pdf.

United Nations Educational, Scientific and Cultural Organization (UNESCO), (2015). *Education for Sustainable Development (ESD***)**. Recuperado de http://www.unesco.org/new/en/ education/themes/leading-the-international-agenda/education-for-sustainable-development/publications/.

United Nations Educational, Scientific and Cultural Organization (UNESCO), (2017). *Educação para os Objetivos de Desenvolvimento Sustentável*: objetivos de aprendizagem. Recuperado de https://ods.imvf.org/wp-content/uploads/2018/12/Recursos-ods-objetivos-aprendizagem.pdf.

Vare, P., Arro, G., Hamer, A., Del Gobbo, G., Vries, G., Farioli, F., Kadji-Beltran, C., Kangur, M., Mayer, M., Millican, R., Nijdam, C., Réti, M., & Zachariou, A. (2019). Devising a competence-based training program for educators of sustainable development: lessons learned. *Sustainability*, 11 (1890), 2-21.

Vega, R. P. (2006). Ciudadanía ambiental global: un recorte analítico para el estudio de la sociedad civil transnacional. *Espiral*, México, v. XII, nº. 35, p. 149-172, enero/abril.

Venn, R.; Perez, P.; Vandenbussche, V. (2022). Competencies of Sustainability Professionals: An Empirical Study on Key Competencies for Sustainability. *Sustainability*. V. 14, n. 4916.

Wals, A. E. J. (2014). Sustainability in higher education in the context of the UMDESD: a review of learning and institutionalization processes, *Journal of Cleaner Production*, 62, p. 8-15.

Wals, A. R. J., & Kieft, G. (2010). Education for sustainable development: research overview. Stockholm: *SIDA Review*.

Weissböck, G. P., & Stefano, S. R. (2016). Competências individuais voltadas à sustentabilidade nas organizações. *Revista Competitividade e Sustentabilidade*. 3 (2), 35-48.

Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: a reference framework for academic program development. Sustainability Science, 6, 203–218.

Zarifian, P. (2003). *O modelo da competência:* trajetória histórica, desafios atuais e propostas. São Paulo: Editora SENAC.

Authors

1 – Valéria Garlet

Institution: Federal University of Santa Maria (UFSM)
Santa Maria, Rio Grande do Sul, Brasil
Doctor of Administration from Federal University of Santa Maria (UFSM)
Orcid: 0000-0001-9606-6001
E-mail: valeriagarlet@yahoo.com.br

2 – Thiago Antonio Beuron Corrêa de Barros

Institution: Federal University of Pampa (UNIPAMPA)
Santana do Livramento, Rio Grande do Sul, Brasil
Doctor of Administration from Federal University of Santa Maria (UFSM)
Orcid: 0000-0002-7254-9145
E-mail: tbeuron@gmail.com

3 – Lucas Veiga Ávila

Institution: Federal University of Santa Maria (UFSM).
Santa Maria, Rio Grande do Sul, Brasil
Doctor of Administration from Federal University of Santa Maria (UFSM)
Orcid: 0000-0003-1502-258X
E-mail: lucas.avila@ufsm.br

4 – Laércio André Gassen Balsan

Institution: Federal University of Santa Maria (UFSM)
Santa Maria, Rio Grande do Sul, Brasil
Doctor of Administration from Federal University of Santa Maria (UFSM)
Orcid: 0000-0003-4837-4741
E-mail: laerciobalsan@yahoo.com.br

5 – Lúcia Rejane da Rosa Gama Madruga

Institution: Federal University of Santa Maria (UFSM)
Santa Maria, Rio Grande do Sul, Brasil
Doctor of Agribusiness from Federal University of Rio Grande (UFRGS)
Orcid: 0000-0001-8571-8203
E-mail: luciagama827@gmail.com

6 – Elda Rodrigues Steinhorst Kraetzig

Institution: Federal University of Santa Maria (UFSM)
Santa Maria, Rio Grande do Sul, Brasil
Master of Production Engineering from Federal University of Santa Maria (UFSM)
Orcid: 0000-0002-1810-0945
E-mail: elda.steinhorst@acad.ufsm.br

CONTRIBUTION OF AUTHORS

Contribution	[Author 1]	[Author 2]	[Author 3]	[Author 4]	[Author 5]	[Author 6]
1. Definition of research problem	√				√	
2. Development of hypotheses or research questions (empirical studies)	√	√	√	√	√	
3. Development of theoretical propositions (theoretical work)	√	√			√	√
4. Theoretical foundation / Literature review	√	√				√
5. Definition of methodological procedures	√	√	√	√	√	
6. Data collection						
7. Statistical analysis		√	√	√		
8. Analysis and interpretation of data		√	√	√		
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10. Manuscript writing	√	√	√	√	√	√
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