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QUALITY OF LIFE IN UNIVERSITY GOVERNANCE OF THE SUSTAINABLE DEVELOPMENT GOALS

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***SUMMARY*:**

The connection between quality of life and university governance has been closely linked, but only in areas with a correlation between the two categories. Quality of life is considered an indicator of implementing sustainable development goals (SDGs) in universities. This study aimed to create a model to analyze these categories' relationships. A cross-sectional, psychometric, and confirmatory study was conducted with 100 students chosen for their affiliation with universities committed to implementing the SDGs. Four of the six dimensions of quality of life mentioned in the literature were verified. This work supports existing literature highlighting the categories' links and recommends expanding the sample to confirm the two remaining factors.

***Keywords**: Confirmatory Factor Analysis, Quality of Life, University Governance, Factor Model, SDGs.*

1. INTRODUCTION

The quality of university life refers to factors that influence the well-being of a higher education institution's students, teachers, and staff (Sayidah et al., 2019). This concept has evolved, integrating infrastructure, academic environment, psychosocial support, student participation, and, more recently, sustainability and inclusion.

1960s and 1970s: The idea of quality of university life began to emerge in student movements demanding better university conditions, more participation in decision-making, and changes in the academic and administrative structure (Guimarães et al., 2020). These movements highlighted the need for a university environment that focused not only on academic performance but also on mental health, equity, and the overall well-being of the university community.

1980s and 1990s: During this period, studies on college quality of life began to adopt more structured approaches (Gallagher, 2001). Models were introduced that assessed academic performance, psychosocial well-being, student satisfaction, and equity in resource access. At the same time, the expansion of universities globally brought with it new concerns about equity, quality, and universal access to higher education.

In the first decades of the 21st century, the notion of quality of university life has continued to develop to include components related to mental health, the balance between personal and academic life, active participation in community life, safety on campus, and access to equitable academic opportunities (Shattock, 2012). Furthermore, with globalization and the diversification of the student population, the issues of inclusion, diversity, and sustainability have become central.

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The theory of university quality of life combines multidimensional approaches that take into account several essential factors:

Physical and mental well-being: This includes health, nutrition, exercise, access to medical services, and psychosocial support (Lobonț et al., 2024). Mental well-being has become a critical issue in universities, with an increasing focus on preventing stress and anxiety among students and staff.

Infrastructure and resources: Adequate facilities, libraries, laboratories, modern classrooms, and recreational spaces are essential to improving the university experience and students' well-being (Trakman, 2008).

Academic and social environment: An environment that promotes inclusion, equity, and active participation is essential to improving the quality of university life (Zaman, 2015). This includes positive relationships between students and teachers and a dynamic and cooperative learning environment (Sandoval-Vázquez et al., 2024).

Participation and governance: Student participation in institutional decision-making and access to extracurricular activities increase their satisfaction and sense of belonging (Brown, 2001). A democratic approach to university governance is critical to fostering an inclusive community.

Equity and social justice: Equity in access to higher education, scholarship opportunities, the reduction of economic barriers, and the promotion of an inclusive environment determine the quality of university life (Quyen, 2014).

Sustainability and social responsibility: Recently, sustainability has been recognized as an essential component of quality of life at universities, aligned with the Sustainable Development Goals (SDGs). This includes promoting environmentally responsible practices, reducing the ecological footprint, and educating students about climate change and environmental justice (Bleiklie & Kogan, 2007).

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, offer a global framework to improve the quality of life and achieve equitable and sustainable development (Blackman & Kennedy, 2009). In the university context, several of the 17 SDGs are directly related to the quality of university life:

SDG 3 on health and well-being: This goal is directly related to efforts to improve the physical and mental health of students, teachers, and staff (McLennan & Ngoma, 2004). Universities have increased the creation of psychological support programs, health services, and physical activity promotion.

SDG 4 on quality education: This central objective ensures inclusive and equitable education (Helliwell et al., 2018). For the quality of university life, this implies improving the accessibility, relevance, and quality of teaching, ensuring that all students have access to educational opportunities without discrimination.

SDG 5 on gender equality: Promoting gender equality in universities is essential to improve the quality of life of all those involved (Barzelis et al., 2012). Anti-discrimination and anti-harassment policies, along with the promotion of gender equality, play an essential role in this context.

SDG 10 on reducing inequalities: In the university field, this objective promotes equal access to higher education, eliminates economic, social, or cultural barriers, and ensures that disadvantaged groups can access quality education (Pham, 2012).

SDG 11 on sustainable cities and communities: Universities are critical players in creating sustainable communities and promoting urban sustainability (Bateson & Taylor, 2004). This includes reducing the environmental impact of campuses, improving green infrastructure, and promoting sustainable practices in university operations.

SDG 13 on climate action: Universities play a crucial role in climate change education and awareness (Planas et al., 2013). University actions towards sustainability and carbon emission reduction are part of the quality of life on campus, involving students in responsible practices.

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The SDG framework has pushed universities to integrate sustainability and well-being into their agendas, positively impacting university life quality (Debnath & Shankar, 2014). Implementing sustainable policies, promoting equality, equitable access to resources, and creating environments supporting physical and mental well-being are vital to improving the university environment.

The quality of university life has evolved from an issue related only to infrastructure and academic performance to a more holistic approach that includes well-being, equity, participation, sustainability, and social responsibility, framed in the Sustainable Development Goals (SDGs) (see Table 1).

Table 1. Comparison between the dimensions of quality of life

Dimension of University Quality of Life	Description	Related SDGs	Connection with the SDGs
Physical and Mental Wellbeing	Health, nutrition, physical activity, and psychosocial support services.	SDG 3: Good Health and Well-being	Universities should promote a healthy environment that includes mental health services, emotional support, and the promotion of healthy lifestyle habits.
Infrastructure and Resources	Adequate facilities: libraries, classrooms, laboratories, recreational areas, accessibility.	SDG 4: Quality Education SDG 9: Industry, Innovation and Infrastructure	The quality of university resources and infrastructure is essential to providing quality and innovative education, which aligns with the SDGs related to technological development and innovation.
Academic and Social Environment	Teacher-student relationship, inclusion, student participation, learning environment.	SDG 4: Quality Education SDG 10: Reduced Inequalities	Creating an inclusive and participatory environment fosters academic and social development, ensures equity in education, and includes all sectors of the university community.
Participation and Governance	Student participation in decision-making, democratic and transparent structure.	SDG 16: Peace, Justice, and Strong Institutions	Participatory governance in universities reinforces transparency and inclusive decision-making and fosters peace and justice within the educational community.
Equity and Social Justice	Equal access to educational opportunities and reduced economic, social, or cultural barriers.	SDG 5: Gender Equality SDG 10: Reduced Inequalities	Ensuring gender equality and reducing inequalities is critical to improving equity and social justice within educational institutions and promoting an inclusive and equitable environment for all.

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Sustainability and Social Responsibility	Responsible environmental practices, reducing the ecological footprint, and promoting sustainability.	SDG 11: Sustainable Cities and Communities SDG 13: Climate Action SDG 12: Responsible Consumption and Production	Universities are vital for promoting sustainable development and climate action through education, research, and implementing sustainable practices.
Innovative Research and Knowledge	We promote research to solve global and local problems, including sustainability issues.	SDG 9: Industry, Innovation and Infrastructure SDG 4: Quality Education SDG 17: Partnerships to Achieve the Goals	Promote sustainability research and collaborate with international and local partners to innovate solutions contributing to sustainable development and global challenges.
Climate and Environmental Awareness	We are raising awareness and education on climate change and sustainable practices on campus.	SDG 13: Climate Action SDG 15: Life on Land	Universities play a fundamental role in climate action education, training students and teachers about environmental impact and encouraging active participation in environmental initiatives.
Community Connection and Social Responsibility	Community engagement, volunteer programs, and social responsibility practices.	SDG 11: Sustainable Cities and Communities SDG 17: Partnerships to Achieve the Goals	Promoting social responsibility and engagement with the local community helps create more sustainable and supportive communities, fulfilling social and economic development commitments.

However, the dimensions of quality of life have not been associated with university governance as a management system for the SDGs (Christensen, 2011). Therefore, the objective of this work was to confirm the factorial structure of an instrument that measures the dimensions of the quality of university life regarding the implementation of the SDGs in governance.

Are there significant differences between the theoretical structure of quality of life and the empirical structure of university governance in the context of implementing the SDGs?

The premise on which this work is based warns that the quality of university life results from implementing governance based on the SDGs (Leslie, 1975). Therefore, differences are expected since each governance is built according to a system of priorities in which the parties involved agree on the capacities the system allows them to use to implement the SDG guidelines.

2. METHOD

Design. A cross-sectional, psychometric, and confirmatory study was conducted with a sample of 100 students selected based on their affiliation with institutions committed to the implementation of the SDGs:

Instrument. The Quality-of-Life Scale was used (Annex A). It includes the following dimensions: 1) Physical and Mental Well-being, 2) Infrastructure and Resources, 3) Educational and Social Environment, 4) Participation and Governance, 5) Sustainability and Social Responsibility, 6) Equity and Social Justice. Reliability reached alphas and omegas higher than the minimum required of 0.70 with respective values of 0.769 and 0.798. Adequacy reached a value of 0.654, and sphericity was significant. Validity ranged between 0.435 and 0.675, explaining 65% of the variance.

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Procedure. Respondents were invited to a focus group to discuss the instrument's concepts and evaluate its items using the Delphi technique. They were surveyed at their university facilities. Before the studies, they were informed about the objectives and responsibilities of the study.

Analysis. The data were captured in Excel and processed in Google Colab (Annex B). The reliability, adequacy, validity, adjustment, and residual coefficients were estimated to contrast the hypothesis regarding the theoretical and empirical structure differences. Values close to unity were assumed as evidence of non-rejection of the null hypothesis.

3. RESULTS

The covariances analysis indicates whether other indicators impact the observable structure (Fig. 1). Zero values suggest that additional indicators are included in the observed model.

	ir1	ir2	ir3	ese1	ese2	ese3	pg1	pg2	pg3	ssr1	ssr2	ssr3
ir1	0											
ir2	0	0										
ir3	.11	.07	0									
ese1	.1	.04	0	0								
ese2	.18	.1	.14	.08	0							
ese3	.01	.03	.03	.06	.01	0						
pg1	.11	.04	.16	.09	.1	.16	0					
pg2	.03	.02	.04	.02	.01	0	.01	0				
pg3	.06	.04	.05	.06	.01	0	.03	.02	0			
ssr1	.06	.01	.01	.02	.01	.01	.02	.01	.48	0		
ssr2	.08	.02	.01	.04	.02	.03	.01	.03	.31	.02	0	
ssr3	.13	0	.05	.04	.1	0	.02	.04	.42	0	.01	0

Figure 1. Covariances between indicators

The analysis of the factor structure indicates the relationships between the variables and the measurement errors concerning the first-order factors and a second-order factor that the literature identifies as quality of life (Fig. 2). The results suggest that quality of life is structured into four factors related to 1) infrastructure and resources, 2) Social and Environmental Education, 3) Participation and Governance, 4) Sustainability and Social Responsibility, all with their respective 12 indicators.

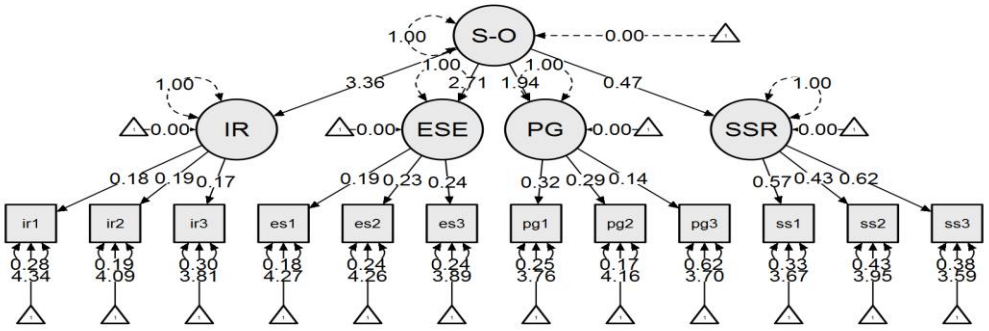

Figure 2. Confirmatory factor model of quality of life in university governance of the SDGs

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The fit and residual values [x2 = 411.332 (50 gl) p > 0.001; GFI = 0.979; RMSEA = 0.000; SRMR = 0.091], as well as the R^2 percentages of explained variance (IR = 0.919; ESE = 0.880; PG = 0.791) suggest the non-rejection of the null hypothesis regarding the differences between the theoretical structure concerning the observed empirical structure.

4. DISCUSSION

This work contributes to the state of the art by establishing a confirmatory factor model for four of the six theoretical dimensions constituting the quality of life in a university governance scenario related to the Sustainable Development Goals (SDGs).

The literature examining the quality of life and university governance encompasses various facets of governance and its influence on the well-being of individuals within academic institutions (Bingab et al., 2018). The link between social capital and government performance in American cities underscores the significance of social connections in enhancing the quality of government services. The connection between students' utilization of campus green spaces and perceptions of quality of life underscores the influence of environmental factors on student well-being. The correlation between e-governance and quality of life on a global scale highlights the importance of digital platforms in enhancing municipal services and citizen engagement.

The effects of massive college enrollment on non-academic activities, including student quality of life, underscore the impact of student population size on college operations (Delbecq et al., 2013). The quality of life of medical students highlights the importance of well-being in the context of medical education. The role of governance quality in influencing the impact of public health spending on health outcomes emphasizes the importance of effective governance in health care systems.

University governance and quality of life at work emphasize the importance of a balanced approach to governance in higher education institutions (Ramzy et al., 2019). The relationship between governance and quality of life in smart cities highlights the importance of sustainable development goals in urban governance. The literature review indicates a growing interest in understanding the intersection of governance, quality of life, and well-being in various contexts, including educational institutions and urban environments. These studies underscore the importance of effective governance practices to improve the quality of life of individuals and communities (Crespo et al., 2022).

In line with the literature reviewed, this paper found that the quality of life derived from university governance of the SDGs includes dimensions related to 1) infrastructure and resources, 2) Social and Environmental Education, 3) Participation and Governance, and 4) Sustainability and Social Responsibility. In this sense, the area of opportunity lies in confirming two factors related to Physical and Mental Well-being, as well as Equity and Social Justice. It is recommended that the sample size be extended to confirm the theoretical structure of quality of life in university governance of the SDGs.

5. CONCLUSION

This study aims to create a confirmatory model of factors contributing to the quality of life in university governance related to the Sustainable Development Goals (SDGs). The results confirm four of the six factors mentioned in the reviewed literature. This work supports the existing understanding of the close connection between quality of life, university governance, and the SDGs, emphasizing the importance of this framework. The study suggests that including the four confirmed factors and the two factors that still need to be confirmed is crucial.

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ANNEX A

Instrument to Measure the Dimensions of the Quality of University Life in the Context of University Governance for the Implementation of the SDGs
Sections of the Instrument

1. General Information:
- Date:
- Name of the Evaluator:
- Name of Participant (optional):

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- Faculty or School:
- Category (Student, Teacher, Administrative):
- Years in the institution:

I. Physical and Mental Well-being (SDG 3: Good Health and Well-being)
Objective: To evaluate the physical and mental well-being level and access to health services on the university campus.

1. How do you rate access to health services (physical and mental) at the university?
- ☐ Excellent
- ☐ Good
- ☐ Regular
- ☐ Poor

2. Are there health promotion programs (nutrition, sports, stress prevention)?
- ☐ Yes, many
- ☐ Some
- ☐ Few
- ☐ None

3. Have you had access to psychosocial support services (psychologists, counselors) at university?
- ☐ Yes
- ☐ No

4. Do you think the university fosters a healthy and balanced environment?
- ☐ Totally agree
- ☐ Agreed
- ☐ Disagree
- ☐ Totally disagree

II. Infrastructure and Resources (SDG 9: Industry, Innovation and Infrastructure)
Objective: To measure the quality of university infrastructure and its relationship with student and teacher well-being.

1. How do you rate the quality of the physical facilities (classrooms, libraries, laboratories)?
- ☐ Excellent
- ☐ Good
- ☐ Regular
- ☐ Poor

2. Are the facilities accessible to people with disabilities?
- ☐ Fully accessible
- ☐ Partially accessible
- ☐ Not accessible

3. Is access to technological resources (computers, internet, software) adequate for your academic needs?
- ☐ Yes, completely
- ☐ Sometimes it is insufficient
- ☐ No, it is insufficient

4. How do you evaluate the availability of the campus's recreation and rest areas?
- ☐ Excellent
- ☐ Good

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- ☐ Regular
- ☐ Poor

III. Academic and Social Environment (SDG 4: Quality Education; SDG 10: Reduced Inequalities)
Objective: To evaluate the academic environment, relationships between teachers and students, and social inclusion.

1. Do you feel that the academic environment is inclusive and respectful of diversity?
- ☐ Totally agree
- ☐ Agreed
- ☐ Disagree
- ☐ Totally disagree

2. Do teachers promote an environment of collaboration and participation?
- ☐ Always
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

3. Are there sufficient opportunities to participate in extracurricular activities (cultural, sports, scientific)?
- ☐ Yes, many
- ☐ Some
- ☐ Few
- ☐ None

4. Does the university support social inclusion and gender equality programs?
- ☐ Totally agree
- ☐ Agreed
- ☐ Disagree
- ☐ Totally disagree

IV. Participation and Governance (SDG 16: Peace, Justice, and Strong Institutions)
Objective: To measure the level of participation of students and other actors in university decision-making and governance.

1. Do you feel that you have the opportunity to participate in important university decisions (through councils, committees, associations)?
- ☐ Yes, completely
- ☐ Sometimes
- ☐ Rarely
- ☐ No

2. Is university governance transparent in its decisions?
- ☐ Totally agree
- ☐ Agreed
- ☐ Disagree
- ☐ Totally disagree

3. Does the university promote active participation of students in decision-making?
- ☐ Always
- ☐ Sometimes
- ☐ Rarely

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- ☐ Never

4. Are the participation mechanisms (assemblies, consultations) accessible and functional?
- ☐ Totally agree
- ☐ Agreed
- ☐ Disagree
- ☐ Totally disagree

V. Sustainability and Social Responsibility (SDG 12: Responsible Consumption and Production; SDG 13: Climate Action)
Objective: To evaluate the university's commitment to environmental sustainability and social responsibility.

1. Do you know the university's sustainability and environmental care policies?
- ☐ Yes, I am well informed
- ☐ Somewhat informed
- ☐ Little informed
- ☐ I have no knowledge

2. Does the university have initiatives to reduce its ecological footprint (recycling, renewable energy, waste reduction)?
- ☐ Yes, many
- ☐ Some
- ☐ Few
- ☐ None

3. Are there programs that promote action against climate change in which you can participate?
- ☐ Yes, several
- ☐ Some
- ☐ Few
- ☐ None

4. Do you think the university acts responsibly towards the community and the local environment?
- ☐ Totally agree
- ☐ Agreed
- ☐ Disagree
- ☐ Totally disagree

VI. Equity and Social Justice (SDG 5: Gender Equality; SDG 10: Reduced Inequalities)
Objective: To evaluate equal opportunities and equity in access to university resources.

1. Do you think the university offers everyone the same access and academic success opportunities, regardless of origin, gender, or social status?
- ☐ Totally agree
- ☐ Agreed
- ☐ Disagree
- ☐ Totally disagree

2. Have you witnessed or experienced any form of discrimination on campus?
- ☐ Never
- ☐ Sometimes
- ☐ Frequently

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3. Does the university have explicit policies to combat discrimination and promote equality?
- ☐ Yes
- ☐ I am not sure
- ☐ No

4. Does the university offer low-income students financial support (scholarships, grants)?
- ☐ Yes, much support
- ☐ Some support
- ☐ Little support
- ☐ No support

ANNEX B

```
# Install necessary libraries
!pip install factor_analyzer --quiet
!pip install odfpy --quiet # To read .ods files

# Import the libraries
import pandas as pd
from factor_analyzer import FactorAnalyzer, ConfirmatoryFactorAnalyzer, ModelSpecificationParser
import matplotlib.pyplot as plt
import seaborn as sns

# Load the .ods file
file_path = '/mnt/data/SEM CFA CV .ods'
data = pd.read_excel(file_path, engine="odf")

# We visualize the first rows of the file to understand the structure
data.head()

# Check for missing data
print(data.isnull().sum())

# We remove rows with null values if they exist (optional)
data = data.dropna()

# Data Overview
print(data.describe())

# Correlation of variables
sns.heatmap(data.corr(), annot=True, cmap='coolwarm')
plt.title("Correlation map of the variables")
plt.show()

# Confirmatory factor analysis (CFA)
# We define the model specification (adjust according to the number of factors and their indicators)

# Example: Suppose you have a model with three factors.
model_dict = {
"Factor1": ["Var1", "Var2", "Var3"], # Factor1 indicators
"Factor2": ["Var4", "Var5", "Var6"], # Factor2 indicators
"Factor3": ["Var7", "Var8", "Var9"] # Factor3 indicators
}

# We convert the dictionary into a model specification for AFC
model_spec = ModelSpecificationParser.parse_model_specification_from_dict(model_dict)
```


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# We performed confirmatory factor analysis
cfa = ConfirmatoryFactorAnalyzer(model_spec, disp=False)
cfa.fit(data)

# Print AFC results
print("\nFactor loadings:\n", pd.DataFrame(cfa.loadings_, index=model_dict.keys(), columns=data.columns))
print("\nEstimated errors:\n", cfa.uniquenesses_)
print("\nChi-square of model:", cfa.chi_square_)
print("\nDegrees of freedom:", cfa.df_)
print("\nP value:", cfa.p_value_)
print("\nRMSEA:", cfa.rmsea_)

# Visualization of factor loadings
loadings = pd.DataFrame(cfa.loadings_, index=model_dict.keys(), columns=data.columns)
sns.heatmap(loadings, annot=True, cmap='Blues')
plt.title("Factor loadings (AFC)")
plt.show()
```


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