

Organizational sustainability in public institutions of higher education. A theoretical – empirical approach

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ABSTRACT

Objective: Based on two approaches, the triple bottom line (TBL) and the quadruple bottom line (QBL), this paper aims to (1) identify the components that make up the construct of Organizational Sustainability (OS) in a public institution of higher education (PIHE) and (2) validate those components. **Method:** A questionnaire called organizational sustainability diagnostic (OSD) was constructed and applied to 239 volunteer subjects, faculty and staff members of a PIHE. Data analysis included qualitative and quantitative test of content and construct validity, and exploratory factor analysis. **Results:** (1) the construct OS is consistent with the QBL variables (environmental sustainability, social sustainability, financial sustainability and institutional sustainability), and (2) the OSD is a valid and reliable instrument for diagnosing OS in PIHEs. These results require further empirical evidence. A research agenda is proposed to extend the study to other PIHEs, and create tools to assess the construct OS using historical data.

Keywords

Organizational sustainability, public institutions of higher education, triple bottom line, quadruple bottom line.

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I20, I23, Q56

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1. Introduction

Public institutions of higher education (PIHE) face an environment that requires quality, modernity and efficiency without neglecting their primary functions: prepare the human and intellectual capital required by society, conduct cutting-edge research and extend the resulting knowledge to the community¹.

In this scenario, Robinson² and Poldony³ argue that an institutional framework is needed to help to create favorable conditions for operation and performance of agents of a university system: teachers, students and administrators. An alternative to this could be the Organizational Sustainability (OS); the core of this research.

The OS comes from a compelling new paradigm: sustainable development whose meaning and content change depending on who uses it. What an ecologist accepts by sustainable development and sustainability is different from the accepted by economist, anthropologist or politician^{4,5}.

In essence, there is no consensus on the variables that must be included in the basis construct for the study of sustainability in organizations. To advance the understanding of the phenomenon, this study looks for an answer to the question: which variables comprise the construct OS in a PIHE? In order to answer this, an instrument of primary data collection, called the organizational sustainability diagnostic (OSD) was built. A second research question arises: the OSD is a valid and reliable instrument to diagnose OS in PIHEs?

Most of the criticism for social phenomena measurements is focused on use of invalid instruments, that is, without well-founded theoretical basis⁶. In response to this, the construction of OSD was based on (1) sustainable development paradigm theoretical framework, and its background in the natural, economic and administrative sciences, and (2) previous studies on sustainability in organizations and in institutions of higher education (IHEs).

This article is composed as follows: in the first section; the background of OS on the QBL and TBL and the research hypotheses are posed. The second section is devoted to the method. The results and discussion are presented in the third section, finally conclusions, limitations and future research agenda are exposed.

2. Theoretical framework and hypotheses

Sustainability in organizations is a complex phenomenon, it cannot be analyzed in a simplistic and linear way, so this study uses abduction of TBL components, which considered economic, social and environmental dimension of sustainability⁷.

TBL abduction is supported by Barbieri et. al.⁸, they argue that components of sustainable development are equivalent to components of sustainability in organizations. Although TBL is a holistic approach to sustainability, it lacks guidelines for putting it into practice⁴. This needs the inclusion of the institutional component, with regulations and regulatory structures that contribute to the operation of sustainability. This raises the QBL that consists of social sustainability, environmental sustainability, economic sustainability and institutional sustainability^{9,10}.

The QBL of OS is supported by institutional theory (IT) and Resources Dependency Theory (RDT). In accordance with IT, organization's survival and legitimacy requires institutional and moral fortitude^{11,12}, so they must incorporate social, environmental and financial interests of present and future stakeholders¹³.

Social sustainability reflects the organization's involvement in social issues, and refers the ability to build healthier, more equitable, diverse, connected and democratic community, providing good quality of life for present and future generations^{14,15}. Social sustainability requires society cohesion, exclusion and discrimination aversion, citizen

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participation in public affairs and poverty reduction¹⁶. Social sustainability is an anthropocentric issue claiming the right to a decent life for present (intragenerational justice) and future (intergenerational justice) human communities¹⁷. Intragenerational justice implies inclusion of disadvantaged groups in making decisions that affect social, ecological and economic issues, intergenerational justice considers the costs of development on the demand for future generations¹⁶.

Environmental sustainability includes impacts for biotic and non-biotic natural resources use, and emission of pollutants generated by organization operation¹⁸. Environmental sustainability refers to rational use of biophysical resources, including care of air, soil and water quality, and conservation of biodiversity⁹. The purpose of these actions is to maintain natural capital as a resource and as a dumping ground for waste generated¹⁹. Environmental sustainability is pursued not for its intrinsic importance, but to improve the welfare and prevent harm to human, making clear once again the anthropocentric nature of sustainability²⁰.

In this paper the term economic sustainability is replaced by financial sustainability, because the organizations analyze their performance from financial indicators^{21,22}. Financial sustainability refers ability to manage financial capital to generate wealth and prosperity for public interest, which should be shared between current and future generations²³. Organizational sustainability requires preservation and increase of financial capital, and financial self-sufficiency¹¹. Good financial performance and spills of benefits to stakeholders help to improve the reputation and legitimacy of the organization²¹.

Institutional sustainability is the fourth component and it refers to the systems, formal and informal processes, and structures that manage human, material and financial resources to support the goals of sustainability in organizations²². Institutional sustainability is supported by RDT, this theory posits that organizations are not self-sufficient, to grow and survive depend on the human, natural and financial resources taken from the environment. The organization seeks to reduce this dependency handling transactions with its stakeholders and ensuring access to scarce and valuable resources²⁴. The relationships between the organization and stakeholders are regulated by institutional structures managed by boards. Thus, the survival of the organization is contingent upon the ability of its boards to control these structures and reduce dependence²⁵.

The QBL has been adopted for the study of sustainability in different kinds of organizations, including IHEs. Table 1 summarizes the variables proposed in the literature. The last column shows the variables proposed in this paper for the OSD construction.

Table 1. Sustainability components

Model	Sustainable development*	Sustainability in organizations**	Sustainability in IHEs***	Organizational sustainability (proposal)
Triple base line	Social	Social	Social	Social sustainability
	Environmental	Environmental		
	Economics	Physical-biological Economics Financial	Environmental	Environmental sustainability
Quadruple base line			Economics	Financial sustainability
				Philosophical-Political
	Institutional	Policy	Planning	Institutional sustainability
			Academic Research	

Source: Prepared based on * UNCSD, 1992⁷; UNCSD, 2001⁹; ** Ekington, 1997²⁶; Achkar, 2005¹⁸; Firestone, Hadders, & Cavalieri, 2009²⁷, ***Gutiérrez & Martínez, 2009²⁸; Garza & Medina, 2010²⁹; Wigmore & Ruiz, 2010³⁰

From the above emerges the following hypothesis: H_0 : OS components in PIHE are consistent with the components of the QLB.

3.Method

3.1. Construction and validation of OSD

In order to design the OSD, qualitative and quantitative techniques were applied (figure 1). An initial questionnaire (159 items) was evaluated by three experts groups, who judged the content validity based on items representativeness and relationship with the theoretical foundations of organizational sustainability. From this evaluation, a questionnaire of 78 items (called OSD-78) was obtained, in accordance with expert's opinion; these items measure what they claim to measure. This questionnaire was applied in a survey; data obtained were used in quantitative construct validity and internal consistency test.



Figure 1. Construction and validation process of OSD

3.2.Population, analysis unit and data collection

The OSD-78 was applied in a PIHE. Analysis units were: academic, directors and staff from 50 academic areas (nine high school campuses, 21 faculties and 20 research centers and institutes) belonging to a Mexican public university.

Online survey was conducted from July 10 to September 8, 2012. One drawback of online surveys is the low response rate, which may be less than 20%, this is offset by bulk mail³¹. In care of this, 4,401 invitations for participation were sent by email. In the message, the purpose of the survey was explained, the anonymity was emphasized and the league website annexed to access the online questionnaire. As an incentive to those who complete the questionnaire, respondents participated in a raffle for five portable solar chargers.

The non-probabilistic sample comprised 239 subjects (academic, administrative workers and directors), from 41 of the 50 existing academic areas in PIHEs taken as study laboratory. Respondent's ages ranged from 23 to 79 years, with a mean of 41 and mode of 50 years. 52.7% were men, 38.1% were full-time faculty, 37.7% were part-time academics, 20.1% were administrative staff, and 4.2% directors; 75 % with postgraduate studies (43.9% master's degree, 24.7% PhD and 6.3% with specialization studies).

4.Results and discussion

To extract the underlying factors from data matrix, an exploratory factor analysis (EFA) was performed using principal components extraction with Varimax orthogonal rotation. The suitability of the data matrix to apply a factor analysis was checked with Kaiser-Meyer-Olkin test of adequacy ($KMO = 0.927$) and the Bartlett test of sphericity ($p < 0.000$).

Initial extraction yielded 17 components; the explained variance was 68% (table 2). According Morales³² criterion, components 1, 2 are solidly defined with six items that load weights greater than 0.5. Components 3, 4, 5, 6, 7, 8, 11 are well defined with at least three items that loads weights greater than 0.5. The components 9, 10, 12, 14 have only two items (minimum number to discuss things in common) with weights greater than 0.5; components 13, 15, 16, 17 have only one item, insufficient to analyze their relationship with other components.

First EFA results in 33 removed items: 25 items with factor loads lower than 0.5 (1, 5, 7, 10, 15, 18, 24, 25, 29, 30, 35, 41, 44, 45, 46, 47, 52, 53, 58, 62, 63, 65, 66, 67, 69); and eight items belonging to weakly defined factors with only two items (39, 40, 54, 55, 56, 57, 64, 68,).

A second EFA was conducted for the remained 45 items, confirming the requirements of the correlation matrix ($KMO= 0.922$ and Bartlett test of sphericity $p \leq .000$). Eleven factors were obtained, explained variance increased to 69.91%. Items 2, 4, 20, 37 loaded lower than 0.5, and items 3, 48 belonged to factors with only one, so were deleted. The resulting OSD, hereinafter referred OSD-39, is composed of 39 items grouped into 9 components named according their content (table 3).

Reliability was assessed using Cronbach's alpha (table 3). According to Hogan³³, acceptable reliability coefficient depends on the purpose and type of decision derived from the test. Decisions affecting an individual require acceptable and desirable reliability coefficients (0.90 to 0.95), a test for other research purposes accept a moderate reliability of 0.70 to 0.80. For García³⁴ minimum acceptable value is 0.50. All resulting components showed high alpha coefficients. These indices shows a high degree of consistency in the responses of the participants, the items covary strongly with each other and contribute to gauge what measures the questionnaire. This homogeneity is achieved only if the group of reactive measures the same construct or content domain³⁵.

The OSD – 39, meets the requirements of validity and internal consistency for the diagnosis of OS in PIHEs. So far, the results support the hypotheses proposed in this research, since the components of the OS in a PIHE are consistent with the components of the QBL.

Table 2. Principal components extracted (varimax rotation, n=239)

Item	Component and percentage of explained variance									Item	Component and percentage of explained variance						
	1 11.76	2 6.66	3 5.8%	4 5.68	5 5.18	6 4.00	7 3.98	8 3.73	9 3.03		10 3.01	11 2.75	12 2.67	13 2.46	14 2.12	15 2.03	16 1.98
%	%	%	%	%	%	%	%	%	%		%	%	%	%	%	%	%
74	.874			.27	.738					54	.733						
76	.857			.28	.693					53	.721						
75	.843			.26	.620					56		.696					
77	.827			.50		.767				17		.641					
73	.786			.51		.754				16		.547					
72	.767			.49		.698				40			.704				
78	.765			.61			.641			39			.632				
71	.677			.59			.615			48			.647				
70	.604			.60			.595			47			.648				
32		.732		.21				.771		56			.577				
31		.700		.22				.748		57				672			
43		.548		.19				.568		52					622		
42		.527		.23				.533		37						.888	
33		.519		.20				.514									
34		.513		.12				.729									
08				.730	.11				.605								
09				.694	.13				.601								
36				.533	.14				.510								
38				.529	.64				.764								
04				.517	.68				.706								

Table 3. Components and items of the OSD-39

QBL variable	OSD-39 component	Percentage of explained variance	Cronbach's alpha	Items	Quantity
Institutional sustainability	Strategies and functions for sustainability	16.602	0.952	70, 71, 72, 73, 74, 75, 76, 77, 78	9
Social sustainability	Quality of life in the organization	9.066	0.876	31, 32, 33, 34,42, 43	6
Social sustainability	Healthy campus	6.856	0.752	8,9,36,38	4
Social sustainability	Equity and diversity	6.425	0.800	19, 21,22,23	4
Financial sustainability	Availability of financial and material resources	5.897	0.857	49, 50,51	3
Environmental sustainability	Rs activities (reduce, reuse, recycle)	5.659	0.766	11, 12 ,13,14	4

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Social sustainability	Bonding	5.626	0.896	26, 27,28	3
Environmental sustainability	Missions and waste management	4.203	0.703	6, 16, 17	3
Institutional sustainability	Governance	3.450	0.843	59,50,61	3

5. Conclusions

This research supports theoretically and empirically the construct OS based on QBL. The theoretical background support the QBL as superior to TBL. QBL integrates institutional sustainability as the variable that manages the organizational actions to achieve OS, and from the DRT perspective, institutional sustainability legitimizes organization in society³⁶. In addition, institutional sustainability is the second contributor to the construct variance, suggesting its influence in achieving organizational sustainability in PIHEs.

Empirical evidence shows OSD-39 based on QBL is a valid and reliable instrument, the errors obtained in the application are more related to the conditions in information collection, but not with instrument deficiencies. OSD-39 is an extensive questionnaire, but it's a good alternative to other instruments compounded with a number of even more items.

The limitations of this study relate to (1) the lack of evidence to support or exclude alternative explanations for the main findings, and (2) limitations of the research design, which took only one organization to collect data; so, results are applicable only to the of study subject.

The lack of background and empirical evidence to support or refute these results, open a research agenda that addresses the following:

- The OS is an organizational variable, so future research should extend to reach other organizations. This research may be expanded to include other PIHEs similar to that taken as a research laboratory.
- The OS by definition is observable in the long term, future research may arrogate to create tools to assess the construct OS from historical data and secondary sources.

Finally, more than thirty years after the discussion on the paradigm of sustainable development entered to the scientific scene, we still find that there is no consensus on how to implement it. Understandably, a construct derived from this paradigm, such as the OS, present more questions than answers. The OS provides extensive research opportunities for scholars interested in an issue that goes beyond fashion or convenience; OS legitimizes the actions of organizations to present and future generations.

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Caption list

Table 1. Sustainability components

Table 2. Principal components extracted (varimax rotation, n=239)

Table 3. Components and items of the OSD-39

Figure 1. Construction and validation process of OSD

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