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A review on the radiological protection materiality in environmental sustainability reports

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ABSTRACT

Materiality should be used as a strategic business tool, with implications beyond social, economic, and environmental responsibility in sustainability reporting. Organizations can benefit by incorporate materiality into their existing economic processes, creating a broader approach and ensuring strategies with significant social and environmental topics. This provides stakeholder engagement; prioritizes financial resources for sustainability; develops new business; identifies climate change issues; among others. In this context, aim this study was to present a review the materiality related to radiologic protection in organizational sustainability reports. The results show that radiologic protection is considered in several topics in the organizational sustainability reports evaluated, represented from issues occupational health and safety, environmental assessment suppliers, environmental compliance, local communities, and waste management. It was concluded that, in preparing the materiality matrix, it is necessary to have the methods defined advance to grant them to be reproduced and periodically reviewed. This will allow to demonstrate the sustainability evolution and its alignment with the organizations' strategies.

Keywords: **materiality, Global Report Initiative, radiologic protection.**

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1. INTRODUCTION

Materiality can be described as the analysis of the relevant requirements to be approached by organizations in relation to sustainability and social responsibility. It is an effective methodology to give credibility to an organization's strategic actions by identifying, estimating, and prioritizing resources to treat environmental, social, and governance (ESG) liabilities that affect the organization and its stakeholders. The use of market references for sustainability reporting, such as the global reporting initiative (GRI), helps organizations to understand and communicate the impact identified in their materiality studies. GRI guiding the establishment indicators for ESG sustainability programs, so that the data and the way's organizations deal with their material issues can be reported with objectivity and clarity [1]. Exposure public data and ways managing material issues are practices adopted by organizations to inform their interested parties (stakeholders), in a transparent way, the results of economic, environmental, and social impact, and their contribution the meeting sustainable development objectives [1].

Sustainable development the diversity topics and they're major or minor applicability in each organization requires studies/analysis to identify what is relevant or as defined by IIRC (The International Integrated Reporting Council) "that which can substantially affect an organization's ability to create value in short, medium or long-term" [2]. GRI establishes principles for defining quality for the report, adequacy quality of information, how it should be reported, standard presentation and indicators for different organizations. Superficial materiality studies carried out only to meet requirements of sustainability benchmarks can generate incomplete, inconsistent, and misaligned sustainability programs with the stakeholder interests. Therefore, quality of information obtained from stakeholders is of paramount importance to enable organizations to make consistent and sensible assessments of the measures that should be adopted [1] for both occupational health and safety.

GRI-403 is the specific standard for the 400 series for occupational health and safety [3] that covers social topics, healthy and safe working conditions, moreover, they are sustainable development goals "Agenda 2030, for sustainable development". GRI standards are divided into two groups and four series [1] being first group formed by Universal Standards (100 series) and second group by specific standards with economic (200 series), environmental (300 series), and social (400 series) topics. Government and stakeholder regulate handling, production, possession

and use ionizing sources [4]. In addition, transportation, storage, disposal radioactive materials, activities that involve radiation exposure are regulated by specific norms and resolutions [4]. For this case, the topics provided by GRI these subjects can be viewed in GRI-306 - Waste [5]. GRI-306 deals quantity, type, and quality waste generated by organization and especially negative risks associated these materials. GRI-307 - Environmental compliance [6], deals organization's compliance with environmental laws and/or regulations, including international declarations, conventions, and treaties. The impact on communities surrounding the organization is described in GRI Standard 413 - Local communities [7], describes groups people who live or work in any areas subject to economic, social, or environmental impact (positive or negative) resulting from organization's operations. Physical protection, mental, unhealthy, risk assessment, long latency occupational diseases and under-reporting are topics of this standard [3] that can be directly related to biological effects ionizing radiation (IR) [8].

IRs have atomic or molecular ionization characteristics and show benefits or cause serious harm to living beings. Thus, their regulation is necessary for the occupational safety and health exposed workers [4]. In this context, aim this study was to present review the materiality related to radiology protection in organizational sustainability reports.

2. MATERIALS AND METHODS

The study took into consideration the review of existing literature, technical references and research papers published as 2015-2022, to level concepts about sustainability present in a disperse environment full of definitions. The indicated period considered the year publication of agenda 2030 (2015) in the United Nations document "Transforming our world: the 2030 Agenda for Sustainable Development" [9], which significantly influenced all society's efforts [10] in favor to sustainability. Published sustainability data and reports were from companies with the potential to exert influence for environmental innovation in the corporate sustainability.

3. RESULTS AND DISCUSSION

The review results are shown in Table 1 and the following parameters were evaluated: institution, reliability - environmental data, stakeholders, materiality, and GRI.

Sustainability reports have reported reliability and environmental data; these items increase transparency, promote trust and credibility internal practices in organizations' auditing systems. Reporting reliable and environmental data has allowed stakeholders to form opinions about regulatory norms of organizations. This transparency was used to inform reliability data for public debate and support the development of environmentally desirable policy. Thus, when an organization is certified by ISO, IBAMA, INEA, CNEN, AIEA, it is known that it has obligatorily gone through various assessment processes and fulfilled a series requirement. These requirements must be maintained just as it is necessary to continuously increase levels from environmental management processes. With this, the certification demonstrates to customers and stakeholders trust and responsibility, which helps the organization to be internationally recognized through the activity it performs. The GRI standards on environmental, social, and economic impact can be understood since opinions can only be formed from the transparent and reliable information made available through periodic sustainability reports [11].

Communities, workers, governments, and services related to ionizing radiation sources are part of the stakeholder group. The stakeholder parameter indicated its importance to be considered when identifying material topics, as they are used to establishing the basis for the communication between organizations. The organization's activities and infrastructure can have significant economic, social, cultural and/or environmental impact in local communities. Where possible, organizations are expected to anticipate and avoid negative impact local communities. Establishing timely and effective stakeholder identification and engagement process is important to help organizations understand vulnerability local communities and how these populations may be affected by organization's activities. Due to the heterogeneous nature local communities, organizations can be found to assist the surrounding communities by offering preferential care, teaching, free online courses to external public. Therefore, organizations used in their sustainability reports materiality topics regarding stakeholder parameters proposed by GRI [6-11].

The materiality analysis was conducted by the organizations to identify topics that had the greatest potential to generate and suffer impacts, both negative and positive. In the review process of the institutions' materiality, it was found that some topics present different perspectives from stakeholders. Materiality was a resource used to define and propagate the main topics that helped organization achieve its strategic objectives within market. This matrix allowed the analysis each relevant topics, seeking actions that minimize costs and improved organization's participation for

sustainability. The structuring materiality matrix allowed organization to plan its practical initiatives for sustainability in orderly and efficient manner [6-11].

The radiation parameter can be further expanded and addressed in several sustainability topics where radiation protection issues must be addressed, such as environmental assessment of suppliers in GRI-308 [13], and management is approach GRI-103 [11]. Radiology protection is not directly addressed in these benchmarks, but its effects and impacts can be described in GRI guides contemplated in sustainability reports (Table 1) several institutions [14-22]. The radioactive waste disposal has been managed through several radiology protection and safety standards [23-26] such as at nuclear industry [27].

4. CONCLUSION

The 2030 Agenda with its wide range 17 sustainable development goals (SDGs) and 169 targets is ambitious. Integrated and indivisible approaches are important to balance environmental, economic, and social dimensions. The adoption ESG programs is essential for organizations to demonstrate effective and transparent contribution to SDGs, especially those using ionizing radiation sources. Application methodologies and benchmarks identify material topics related to radiology protection. These topics influence impact the diversity and complexity SDGs and targets, as they are fundamental to understanding and operational boundaries. In addition, it is important to create a basis for comparison between organizations in same sector. To prepare the materiality matrix, methods should be defined in advance so that they can be repeated and revised periodically. Thus, they become demonstrable, reliable, and transparent, within the knowledge of sustainability and direction the organizations' strategies, as well as stakeholders. Therefore, the topics related to radiology protection have high relevance due to their economic and environmental impact. Only this axis can define the materiality a topic since the GRI standard can be based on only one of the dimensions.

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Table 1: Institution, reliability - environmental data, stakeholders, materiality, and GRI.

Institution	Reliability - Environmental Data	Stakeholders	Materiality	GRI
ELETROBRAS [14]	IBAMA; INEA; Radioprotection Institute; CNEN Dosimetry; International Atomic Energy Agency - IAEA; Standard ISO 26.000.	Employees; Suppliers; Service Providers; Customers; Shareholders; Community; Environment; Government Agencies; Media; Unions.	Safety practices; Effluents/waste; Water management; Environmental management; Anti-corruption practices.	G4-18; G4-19; G4-20; G4-21; G4-22; G4-23.
ELETROBRAS [15]	IBAMA; INEA; CNEN; AIEA; EPA; Standard ISO 26.000.	Shareholders/investors; Distributors; Suppliers; Government/licensing agencies; Employees/trainees; Nuclear industry bodies; Social, environmental and community organizations; Trade unions/class associations; Press/media.	Safety practices; Effluents/waste; Water management; Anti-corruption practices.	102-32; 102-40; 102-42; 102-43; 102-44; 102-46; 102-47; 102-50; 102-52, 102-54; 102-56.
ELETROBRAS [16]	IBAMA; INEA; CNEN; AIEA; EPA; Standard ISO 26.000.	Workforce/family; Employees; Investors/shareholders/market analysts; Communities; Society; Press/opinion leaders; Partners/sponsors/suppliers; Governments/parliamentarians/regulators; Customers.	People management/development; Health/safety/welfare; Human rights; Communities.	102-4; 102-11; 102-40; 102-42; 102-43; 102-44; 102-47; 102-49; 103-1; 103-2; 103-3; EU-21.
UNIMED Vitória-ES [17]	Certified RN277:2011; Standard ISO 9.001:2015	Suppliers; cooperative members; beneficiaries; employees; government and society; environment; surrounding community.	Anti-Corruption; Occupational Health and Safety; Training and Education; Local Communities.	102-21; 102-43; 102-44; 102-46; 102-47; 102-49; 103-1.

UNIMED São José do Rio Preto-SP [18]	UNIMED Gold Seal of Governance and Sustainability; Abrinq as a Child-Friendly Company.	Cooperative/Collaborators; Beneficiary Public; Health Service Provider, Other UNIMEDs, Counselors/Executive Directors; Community; Public Organ.	Own Resources; Communication and Relationship Channels; Local Communities; Additional Products; Products - Health Plans; Preventive Medicine.	G4-24; G4-25; G4-26; G4-27; G4-DMA; G4-EN1; G4-EN2; G4-DMA G4-LA4; G4-DMA; G4-LA5; G4-LA6; G4-LA7; G4-LA8
UNIMED Blumenau-SC [19]	Certified RN277:2011; Standard ISO 9.001:2015	Suppliers; Cooperative members; Beneficiaries; Employees; Government and society; Environment; Surrounding community.	Anti-Corruption; Occupational Health and Safety; Training/Education; Local Communities.	102-21; 102-43; 102-44; 102-46; 102-47; 102-49; 103-1
Beneficiencia Portuguesa de São Paulo [20]	Code of Conduct; Internal rules, laws, and procedures.	Directors - Executives of the organization and Specialists in the sustainability theme.	Humanized care; Diversity; Philanthropy; Customer safety; Education and research; Quality of healthcare services; Relationship with the government.	102-8; 102-41; 103-1; 201-4; 102-40; 102-42; 102-43; 102-46; 102-54; 306-2; 401-1; 401-2; 402-344
Beneficiencia Portuguesa de São Paulo [21]	Code of Conduct; Internal rules, laws, and procedures.	Directors - Executives of the organization and Specialists in the sustainability theme.	Humanized care; Diversity; Philanthropy; Customer safety; Education and research; Quality of healthcare services; Relationship with the government.	102-42; 102-43; 402-44; 102-46; 102-47; 102-49; 102-54; 306-2; 401-1; 401-2; 402-344
Beneficiencia Portuguesa de São Paulo [22]	Code of Conduct; Internal rules, laws, and procedures.	Directors - Executives of the organization and Specialists in the sustainability theme.	Philanthropy; Customer safety; Education and research; Quality of healthcare services; Relationship with the government.	102-42; 102-43; 402-44; 102-46; 102-47; 102-49; 102-54; 306-2; 401-1; 401-2; 402-344

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