

THE INTRODUCTION OF ACOUSTICS IN ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) FRAMEWORKS

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1 Introduction

First referenced in a report in 2006 by the Principles for Responsible Investment (PRI) the purpose of Environmental, Social and Governance (ESG) frameworks is to contribute to a more sustainable global financial system. The consideration of ESG issues has been found to affect portfolio performance, including materially improving risk-adjusted returns [1].

The implementation of ESG strategies is complex for at least two reasons—it is nebulous to determine relevant metrics, and the associated data is exceptionally variable. The complexities of the data include subject (e.g., climate change, indoor environmental quality, social justice, equality), size of datasets, measurement frequency, and so on. Understandably, it is nearly impossible to effectively set, manage and report on sustainability goals without meaningful metrics and data.

In 2015, 193 countries adopted the Sustainable Development Goals (SDGs). Their purpose is to establish a shared plan to “end extreme poverty, reduce inequality, and protect the planet by 2030” [2]. The 17 interlinked objectives are to provide a “shared blueprint for peace and prosperity for people and the planet, now and into the future” [3]. It may be said that the successful adoption of SDGs has been facilitated by ESG frameworks, predominantly by the Social pillar.

The following paper uses the same process to design, develop and deliver the context that is necessary to institutionalize acoustical principles that can be adopted by ESG frameworks by discussing ‘how’ acoustics has or can have environmental impacts (e.g., materials use, energy performance and efficiencies, community and environmental soundscapes), social impacts (e.g., acoustical equity, health and wellbeing, social engagement, individual agency), and impacts on governance (e.g., holistic approach to architectural and environmental acoustics) [4, 5].

2 SDGs

Herein we contemplate opportunities to relate acoustical principles to SDGs. The intent is not to force ‘inclusion’ or to make ‘absolute’ claims but rather to promote rationale that may be relevant to different organizations (and their stakeholders). Many of the presented concepts build upon fundamental and advanced acoustical concepts—whether specific to acoustics (i.e., physics of acoustic energy and its transmission) or psychoacoustics (i.e., perception of sound and associated physiological effects). For the latter, the thought-exercise builds upon the principal factors affecting the acoustical

experience of occupants, which are generally assessed via questionnaires to qualify acoustical satisfaction (i.e., communication, acoustical privacy, acoustical comfort) rather than acoustic measurement, or via health assessments.

2.1 SDG 3: Good health & well-being

The public is well-aware of the risks of sudden or sufficiently prolonged exposure of elevated levels of sound. Agencies and noise regulations have successfully communicated the auditory impacts (e.g., hearing loss) resulting from ‘noise exposure’ and ‘noise pollution.’ In contrast, the effects of sound on our non-auditory health (i.e., psychological, physiological; e.g., cardiovascular system, cognitive, physical health) is, generally, incorrectly assumed.

While ‘noise’ has negative effects on our non-auditory health, our assessment of sound as ‘noise’ depends on its characterizations (i.e., ‘dimensions’): (1) temporal, (2) spectral and (3) spatial. The combination of these physics, not only ‘sound level’ (i.e., ‘noise exposure’), affect our assessment of our environments (i.e., ‘noise sensitivity’).

Ultimately, ‘sound’ is omnipresent and an essential baseline to our lives. The ‘mindset’ should never be about ‘eliminating’ noise but rather ‘managing’ its transmission from ‘disturbing’ sources (e.g., industrial, transportation).

2.2 SDG 4: Quality education

Though about access to ‘good education,’ there is ample evidence indicating the need to consider acoustics in schools. Academic and industry research has found that classrooms having poor acoustical privacy (i.e., intrusion of external noise) negatively impact students’ learning.

2.3 SDG 7: Affordable & clean energy

There is increasing pressure on manufacturers to design ‘better’ and ‘more efficient’ solutions, while also meeting a growing number of stricter constraints (including ‘quieter’). While the authors respect the good intentions, it is more important to assess ‘context.’ By way of example, 60 dBA from a washer/dryer unit may be acceptable when installed in an isolated location (e.g., basement) and unacceptable in a UK/European-style home (e.g., kitchen). Developing this further—it is more important to improve the performance and efficiency of a system than an individual component.

Although a challenging exercise, optimization of critical system components may benefit from relaxation of noise criteria in particular spaces. Case-specific studies are needed to assess the short- and long-term benefits of systems operating with looser constraints but with appropriate controls for

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noise, such as HVAC in open-plan spaces with masking sound, mechanical rooms with greater acoustical isolation, and building systems (e.g., generators, chillers air-handling units,) with plenums, silencers, and barriers.

2.4 SDG 8: Decent work & economic growth

The effects of noise on productivity in workplaces is a popular research topic in acoustics. Intuitively, distractions in the workplace lead to poorer employee performance, comfort, and satisfaction scores. Continued research is needed to describe the economic benefits of having ‘good acoustics’ on Return On Investment (ROI) metrics (e.g., productivity, absenteeism, retention) [6].

2.5 SDG 9: Industry, innovation & infrastructure

Holistic frameworks centering the needs of occupants empower building professionals to design and build spaces more efficiently. For example, an understanding acoustical privacy—the parameters affecting its signal-to-noise equation—can lead to accurate specification of wall construction (e.g., architectural applications) or of noise mitigation solutions (e.g., environmental applications).

Effectively, complex concepts (such as acoustical satisfaction) can be inferred via measurable acoustic metrics. Sensorial experiences (e.g., acoustical privacy, acoustical comfort, communication) can be ‘calculated’ using traditional acoustic metrics (which, when used individually, cannot). Better design is the result of the intentional planning and specification of criteria of acoustical features.

2.6 SDG 10: Reduced inequalities

Many forms of inequality exist, and the authors support the movements demanding that all forms of discrimination be curtailed. Herein, we address a ‘simpler’ notion of [acoustical] equity: suggesting that people have equal right to similar acoustical experiences—whether it be the right to acoustical privacy (from noise intrusions) at home, to similar working conditions at work (e.g., ability to perform tasks) [5], access to consistent quality of healthcare [6], in classrooms [7]. Other initiatives, such as on topics of Diversity, Equity and Inclusion (DEI) and neurodiversity, exist [8].

2.7 SDG 11: Sustainable cities & communities

The creation of sustainable cities and communities requires that those environments foster our health and wellbeing, that which we know is affected by our acoustic environments.

2.8 SDG 14 & 15: Life below water & on land

Environmental noise is, perhaps, one of the largest sectors of the acoustical industry. There is much literature documenting interest and impacts of noise on communities and cities, people, wildlife [9]. There is ongoing research seeking to develop advanced conceptual frameworks to characterize the acoustical experience in these natural environments (e.g., national parks) with the intention of conserving and preserving the soundscape (i.e., the sensorial experience).

3 ESG Pillars

Philosophically, we believe the purpose of ESG frameworks is for an altruistic outcome. For this, it is necessary to study our ‘acoustical ecology’: the ways in which we connect and interact with our acoustical environments. For this reason, we have repeatedly stated our priority about centering the needs of the ‘being.’ But topics of acoustics extend beyond the apparent connection with Social pillar with the greatest opportunity existing with Governance. Agencies may, notably where precedents (or guidelines) have been set, to define policies addressing acoustics in and around the built environments and in nature. There is, however, a continuing need to refine our acoustical vocabulary and our metrics [4].

To facilitate the introduction of acoustical principles into ESG frameworks, we proposed adoption of SDGs. SDGs relevant to environmental, social and governance may be {7, 8, 9 and 11}, {3, 4, 10, 11, 14 and 15} and {3, 4, 7, 8, 10, 11, 14 and 15}, respectively.

4 Conclusion

An in-depth study of a company’s sustainability and ethical objectives is critical to establishing its identity. ESG provides a universal vocabular connecting professionals to the wider community. Just as we emphasize the role of acoustics and noise control in planning, performance, and policymaking.

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