

Requirements for criteria and emission limits in view of social adequacy – codified law aspects

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INTRODUCTION

Noise has a significant impact on the quality of life and in that sense is a health problem in accordance with the World Health Organization's (WHO) definition of health. WHO's definition of health includes total physical and mental well-being, as well as the absence of disease.

The effects of noise are seldom openly catastrophic and are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. Although it may cause discomfort and sometimes pain, noise does not cause ears to bleed and noise-induced hearing loss usually takes years to develop. Noise-induced hearing loss can impair the quality of life through a reduction in the ability to hear important sounds and in communication with people. Some of the other effects of noise, such as sleep disruption, the masking of speech and television, and the inability to enjoy one's property or leisure time also impair the quality of life. In addition, noise can interfere with the teaching and learning process, disrupt the performance of certain tasks and increase the incidence of antisocial behaviour. There is also some evidence that it can adversely affect general health and well-being in the same manner as chronic stress.

Through decades parliaments, law developing and research institutions struggle to find effective ways to eliminate noise induced effects on people by setting standards or limits.

Most codified law systems focus on setting limits in a very general way by giving certain figures, numbers or quantities for emissions that are regarded as tolerable in respect of the health of human beings or the environment. Basing on scientific knowledge and according to the research progress these laws are adjusted in respect of the emission limits.

More or less the simple message of these laws is: How much emissions are we allowed to produce or apply legally.

PRELIMINARIES

Noise-induced hearing loss is probably the most well-defined of the effects of noise. Predictions of hearing loss from various levels of continuous and varying noise have been extensively researched. Some discussion still remains on the extent to which intermittencies ameliorate the adverse effects on hearing and the exact nature of dose-response relationships from impulse noise. It appears that some members of the population are somewhat more susceptible to noise-induced hearing loss than others, and there is a growing body of evidence that certain drugs and chemicals can enhance the auditory hazard from noise.

Although the incidence of noise-induced hearing loss from industrial populations is more extensively documented, there is growing evidence of hearing loss from leisure

time activities, especially from sport shooting, but also from loud music, noisy toys, and other manifestations of our "civilized" society. Because of the increase in exposure to recreational noise, the hazard from these sources needs to be more thoroughly evaluated. The latter is one of the most difficult fields to deal in law settings, as most of these noise sources are reflected by the personal interest of the exposed people, either in the way of acceptance, either in the way of denying.

Interference with speech communication and other sounds is one of the most complicated components of noise-induced annoyance. The resulting disruption can constitute anything from an annoyance to a serious safety hazard, depending on the circumstance.

Research over the past two decades has expanded and refined methods for predicting communication interference. Criteria for determining acceptable background levels in rooms have also been expanded and refined, and progress has been made on the development of effective acoustic warning signals.

Noise can interfere with the educational process, and the result has been dubbed "jet-pause teaching" around some of the noisier airports, but railroad and traffic noise can also produce scholastic decrements.

Noise-induced sleep interference is one of the critical components of community annoyance. It can produce short-term adverse effects, such as mood changes and decrements in task performance the next day, with the possibility of more serious effects on health and well-being if it continues over long periods.

Noise can cause adverse effects on task performance and behaviour at work and in non-occupational and social settings. These effects are the subject of some controversy, however, since they do not always occur as predicted. Sometimes noise actually improves performance, and sometimes there are no measurable differences between performance in noisy and quiet conditions. The presence and degree of effects depends on a variety of intervening variables. Noise can adversely affect task performance in a variety of circumstances. More moderate noise levels are a must, especially when speech is the disruptive noise stimulus. Some research indicates that noise can also produce disruptive after-effects, commonly manifested as a reduced tolerance and the presence and timing of control over the noise are critical to the prediction of after-effects. Even moderate noise levels can increase anxiety, decrease the incidence of helping behaviour, and increase the risk of hostile behaviour in experimental subjects.

Annoyance is the complex expression of a defined community's response to survey questions on various environmental and other factors, such as noise exposure. Although annoyance of individuals is sometimes explored in laboratory or field evaluations, community annoyance is most useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads and other noise sources. Factors directly affecting annoyance from noise include interference with communication and sleep disturbance as described above. Other minor are effects are the disturbance of one's peace of mind, the enjoyment of one's property and the enjoyment of solitude. The consequences of noise-induced annoyance are privately felt dissatisfaction, publicly expressed complaints to authorities and potential adverse health effects, as mentioned before.

"Annoyance" has been the term used to describe the community's collective feelings about noise ever since the early noise surveys in the 1950s and 1960s, although some have suggested that this term tends to minimize the impact. While "aversion" or

"distress" might be the more appropriate descriptors, over the years it has been a common suitable description of the social and physical affects. It should be clear, however, that annoyance can result in more than a slight irritation; it can mean a significant degradation in the quality of life. This represents a degradation of health in accordance with the WHO's definition of health, meaning total physical and mental well-being, as well as the absence of disease.

Mostly a level of 55 dB (A) is meanwhile considered as an acceptable level of outdoor environmental noise. It is a level defined by a negotiated scientific consensus without concern for economic and technological feasibility or the needs and desires of any particular community.

The sources of noise producing community annoyance are primarily aircraft, road traffic, and railroad noise, although noise from industry, construction, and within buildings can also be problematical. The leading offenders are usually aircraft and road traffic noise, although the hierarchy depends upon many factors, such as urbanization, numbers of noise events, and proximity to the sources. Recent research indicates that, despite equivalent noise levels, some sources of community noise are more annoying than others.

Impulse noise also appears to be more annoying than continuous noise of equivalent energy.

Although it is a fact that community annoyance is positively correlated with noise exposure level, other variables also appear to be important, such as ambient noise level, time of day and year, location, and socio-economic status. None of these other variables, however, is as powerful as the attitude of the residents surveyed.

SYSTEMS

With regard to the prior mentioned facts environmental laws, especially those concerned with noise give guidance by setting limits of emissions.

This system has no evaluation of the fact whether these emissions are tolerable in respect of social adequacy. Despite the fact that almost all law systems use social adequacy in undetermined terms such as "public order", environmental law mostly is designed without any context to social acceptance to specific social contexts.

To gain certain values there are some systems that might give a guideline to develop more flexibility in judging noise effects legally.

Indicator Systems

1. Determination and function of Indicators

Indicators in general could be defined as the characteristics which are selected to the description of certain not directly measurable and often complicated circumstances (Indikandum) (SRU 1998, p. 93). National developed indicators should be able to give the information whether a Nation moves in the direction of an effective development. To develop suitable indicators or to select, it is to be cleared at first which developments are to be considered in society, environment and economy as relevant about an development.

2. Functions of Indicators

Indicators have different functions or tasks which can be distinguished in descriptive and normative ones (SRU 1998, p. 93). The following list of tasks base on an evaluation of different sources, but are in fact developed as sustainability indicators (SRU

1998; Walz et al. 1996; Lüdeke & Reusswig 1999; Opschoor & Reijnders 1991; UK Department of the Environment 1996).

Indicators should have on one side descriptive tasks:

- the description of condition of a country regarding the effectivity of its noise avoiding development (actual condition analysis)
- the collection of expected future trends regarding a noise avoiding development (prognosis function)
- the evaluation of the condition and expected trends in the background of qualitative and quantitative aims for a noise avoiding development (identification of deficits and appropriate action needed)
- the assistance in specifying and quantification of these goals
- the support of political decision making and priority-setting
- the evaluation of suggested strategies and measures for the promotion of a noise avoiding development
- the progress control of a policy (control function), directed toward noise avoiding
- the clearing-up and communication of politics and society over central of problem areas for a lasting development (communication function)
- international comparisons of the progress, which obtained
- different countries towards a noise avoiding development, and thus the
- evaluation, to what extent different countries follow their obligations for the promotion of a national and global lasting development.

On the other hand indicators should have normative tasks:

In order to become appropriate to these tasks, a system of national noise indicators must above all meet the following requirements:

- It must consist of a visible number of indicators, i.e. the abundance of existing relevant information and data must be consolidated (compression). In countries with comparatively highly developed statistics, for example Germany, a collection of relevant data and items of information is present, for example from the environment -, social and economic report refunding, which are of large value for different purposes, e.g. for scientific analyses and sectoral politics. However a bare unification of these data records constitutes still no national system of noise avoiding indicators. To fulfill the task a strong focusing and/or compression necessary, in order to reduce for politics and public institutions a manageable set of indicators. Such a compression means naturally a reduction of the complex reality. The necessary degree of the compression depends thereby on the use of an indicator system. For the policy and public communication over lastingness a high degree of compression is necessary for example, while for scientific analyses a smaller degree of compression might be adequate. One can speak in this connection also of a hierarchy of indicators, which serve different purposes or users.
- It must ensure a relation to quantitative and qualitative aims for a noise development, which exist in a society and/or a country (goal relation and/or standardization of indicators). Only with appropriate relation to the goal they can be used directly as instrument for the examination of the trend of a society. They differ thereby from descriptive indicators which serve first, like environmental indicators or social indicators, only the description of condition of the ecological or social systems, by having a normative character. Occasionally it

is even demanded that they should be formulated from the beginning as target- actual is and/or Distance to target indicators (z. B. Opschoor & Reijnders 1991, S. 9). In the field of environmental indicator systems often used is the PSR System (pressure-state-response) developed by the OECD. The PSR-framework is based on a concept of causality: human activities exert pressures on the environment and change its quality and its quantity of natural resources. Society responds to these changes through environmental, general economic and sectoral policies (OECD 1994, S. 9). A more detailed version of the PSR indicator system is the Driving-force-Pressure-State-Impact-Response-Model (DPSIR-Model) used by the EUROSTAT. It focuses on the causes (driving forces) of environmental impacts (stress), such as polluting social activities, like mobility, power production, agriculture, tourism and on the other hand the effects (impacts) from environmental condition changes.

Noise as an environmental problem is meanwhile one of the major problems in environmental policy and should be therefore implemented in indicator systems.

Implementation in Codified Law Systems

Basing on these above facts, environmental law, standards and regulations should be linked to these premises:

1. Evaluation of the impact of emissions on the specific social structure.

Necessary is to collect data, what specific social structures are existing. Although the data structure of the effects of noise is scientifically advanced, the data structure of the existing noise emission is by far not sufficient enough. Basis for an exact evaluation is a specific noise register, according to the inhabited areas.

2. Evaluation of the quantity and necessity of the allowed emissions in a specific social context.

Basing on the data structure of a noise register, the combined effects of different noise impacts have to be evaluated. For the infrastructure necessary resources are to be designated with a priority of the level 1. Units or projects, which are not vital or necessary, however grew there with the time, receive the priority level 2. They enjoy protection of continuance but are limited in expansion. New settlements or projects are assigned in principle to the priority level 3. Their admissibility depends on the intensity of the impact and their avoidableness. The evaluation proceeds after the following steps.

3. Evaluation of the social acceptance and annoyance.

To gain verified data, specific research results have to be applied to the project. These are findings of similar projects, scientific research findings and standards that are already implemented in law codes.

Age structure, cultural characteristics, technical and structural conditions and particularly protection-needy institutions are to determine. The larger the agreements with structures already existing are, the smaller is the social impairment.

4. Definition of avoidable emissions in respect of the actual economic and technical demand by setting infringement steps such as public safeguard vs. private interests. The higher the public interest the less barriers are to be put for exposition by emissions.

Despite the fact that almost all law systems use social adequacy in undetermined terms such as “public order”, environmental law mostly is designed without any context to social acceptance to specific social contexts.

Tolerable emission levels are diligently researched in wide areas of noise sources such as air traffic, road traffic, industrial complexes. But meanwhile wide complexes of the leisure time noise influence daily noise disturbances. Therefore codified noise laws need the undetermined correction for the social adequateness of a noise emission.

The requirement of the mutual consideration is a by the jurisdiction developed principle, after which the regulations of law are to be laid out. Special meaning is attached to the requirement of the mutual consideration in the evaluation of the approvability of a project. So an otherwise permissible project (for example a project, which lies in the area of application of a development plan and corresponds to this) can inadmissibly its, if from it in the concrete case unreasonable impairments to proceed and the required consideration is not kept. Thus the defaults of the law and/or the legal rules issued on its basis (everything in front the development plans) separate it from their rigid application and experience a certain making flexible in view to the individual case.

The special development of the requirement of the mutual consideration determines that in the area of application otherwise permissible projects are inadmissible, if they – after number, situation, range or purpose of the characteristic of the construction site stir up annoyances or disturbances, which are unreasonable in concern of its environment or expose themselves to such annoyances or disturbances.

Its status is a single legal typos, with whose assistance the respective noise emission standards are to be laid out.

For instance an open concert stadium may be used for different types of music, such as Rock, Classic or Western. Each type of music might have their social acceptance in certain numbers of community inhabitants. As a point of cultural meeting it might have socially effects such as attractivity of this region, intellectual feeding or simply social life. But it has no imperative need for the existing of the inhabitants. Within short distance it has severe noise impacts, the neighbourhood is disturbed. Although their might be accordance with noise emission standards and in addition with probable passive noise protection a technical approvable planning which even meets the requirements of non-physically effects to the health, it arises mental and psychically effects on the inhabitants nearby. In respect of the requirements of mutual consideration it has no justification to be build in surroundings that are used for housing or recreation but might be justified in commercial areas as well in industrial areas.

The main concern is to achieve the protection of a status quo in certain areas as noise reduced or noise free clusters depending on its actual use.

On the other side technical and economic needs had to be considered if the noise emitting project or unit is placed in areas which are historically for commercial or industrial use and the status quo is containing noise emissions.

The need is a strict diversion between noisy areas and quiet areas. This requires empiric data collection of the noise levels at the time of collection.

Step 2 is the evaluation about the avoidability or more or less the search for alternative settings.

If there are no alternative settings Step 3 requires high general and inevitable interests such as public safeguard or economic inevitable needs accompanied by state of the technique noise protection.

The principal guideline is no additional noise, if it has to be, could it be locally dislocated with less effects, if not is it inevitable.

SUMMARY

Despite the fact that almost all law systems use social adequacy in undetermined terms such as “public order”, environmental law mostly is designed without any context to social acceptance to specific social contexts. Basing on this fact, environmental law, standards and regulations should be linked to these premises:

Evaluation of the impact of emissions on the specific social structure

Evaluation of the quantity and necessity of the allowed emissions in a specific social context

Evaluation of the social acceptance and annoyance

Definition of avoidable emissions in respect of the actual economic and technical demand by setting infringement steps such as public safeguard vs. private interests. The higher the public interest the less barriers are to be put for exposition by emissions.

Basis for the evaluation is the specification of noise indicators and noise registers as a global task.

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