

A System for Management of Urbanized Areas in the Aspect of Acoustic Effects

Janusz KOMPALA

Central Mining Institute
Pl. Gwarków 1, 40-166 Katowice, Poland
e-mail: j.kompala@gig.eu

(received April 30, 2010; accepted December 17, 2010)

Within the boundaries of many municipal urbanized areas, large grounds are found, from which the noise is emitted into the environment, surrounded by the regions liable to acoustic protection. Such a condition generates many problems including also those ones related to the lack of the fulfillment of requirements concerning environmental protection against excessive noise. Therefore the aim of vital importance is the proper management of municipal grounds, both in view of the investment in policy steering, especially of new investments, and in the case of activities aimed at maintaining or restoring (revitalizing) the acoustic properties on the grounds that have already been used or simply degraded before.

Keeping the scale of the problem in mind, such activities must be carried on not temporarily, but must have a systemic character. The structure of every system is characterized by the appropriate relationships among their elements and the properties of those relationships. In case of the noise management system, the elements of such a system are the activities connected with the management itself that are the actions which rely on specifying the aims and causing their realization within the scope and on the grounds subject to the managing entity. The superior aim of such activities should be to supply the tools for improvement of management and in the process of taking decisions that relate to investments including the of optimization conditions and maintenance of socio-economic importance of such areas.

Keywords: environment, noise, system, management, optimization.

1. Introduction

The noise management process on urbanized grounds (POPESCU, MOHOLEA, 2010) can be considered as a “process of fulfillment of needs” using the process-programming proposed by Dietrych (DIETRYCH, 1978; KAŻMIERCZAK *et al.*, 2008). With such an approach to the problem at the first stage one should made the recognition of real needs, which results in determining specific aims (needs)

that should be realized (*Research for "Quieter Europe" in 2020*, 2004). On this basis, one can begin the sub-process of designing, which should end with the choice of proceeding conception and constitute the base for working-out a construction of the process that serves the fulfillment of the identified need. The last stage in this scheme of proceeding is the right process of realization that is the fulfillment of a specific need (Fig. 1) (KOMPALA, 2005; 2009).

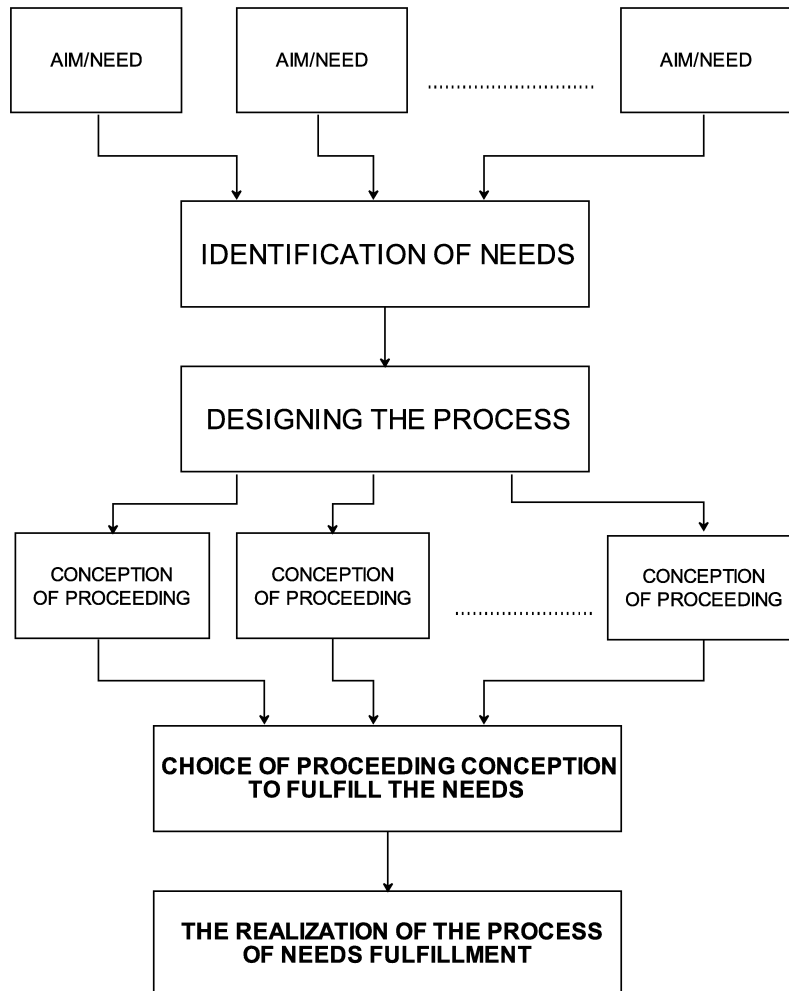


Fig. 1. Scheme of approach to programming in the process of needs fulfillment.

In respect of the above remarks, one can assume that the management is a decision-making process, which determines appropriate activities and the way of their implementation (DIETRICH, 1978; KAŻMIERCZAK *et al.*, 2008; STABRYŁA, 2000). It can have a subjective character, in particular when it is connected with

making use of big financial resources. The management relies on an assessment of possessed information on potential risk as well as on possible ways of its minimization. While taking specified decisions, which concern the risk management, many factors are taken into account, and first of all:

- the potential risk to health of people and their quality of life,
- the potential risk to the environment,
- an economic account and comparison of costs and benefits,
- the public opinion – remarks submitted by the public.

2. Model of the general environment management

Hence, for needs of creating the noise management system, it is possible to connect the general management model with the model based on accepted sequences of aims being realized in the process of needs fulfillment. The result of such an approach to the problem can be the determination of aims – understood as combining the strategy and managing activities – of the organization with the definite structure. In case of noise management on municipal grounds, there is a need to maintain the standards, and in case of exceeding them, to reduce the noise on the areas subjected to acoustic protection to the permissible values. For realization of this task resulting from the binding legislation, the realization of partial aims is necessary, including such a fundamental aim as working out an acoustic map and, basing on it, a protection programme against the excessive noise.

That is to say, the management model prepared (Fig. 2) should take into consideration (DIETRICH, 1978; KAŻMIERCZAK *et al.*, 2008) what follows:

- The Strategy as a set of aims that constitute the criteria for taking a decision;
- The structure, within the framework of which the individual aims are being realized;
- The managing activities, the aim to which belong:
 - planning of tasks,
 - organizing of tasks,
 - realization of tasks,
 - motivating of executors,
 - control of the realization.

In the map of process realization of every aim, three separated basic phases can be distinguished:

1. Initial phase (activities connected with taking decisions as well as with preparation and adjudication of tenders).
2. Realization phase.
3. Final phase (activities that result from the origin of the acoustic map or protection programme as well as from the process of using them).

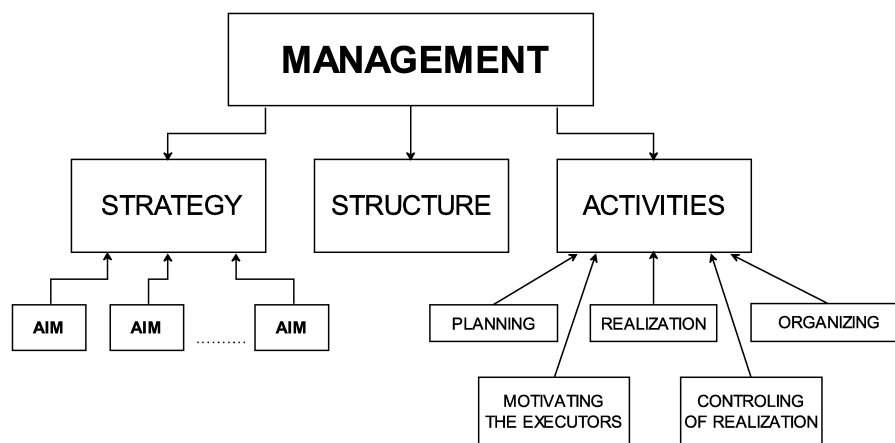


Fig. 2. Scheme of proceeding in the model of environment management.

An example of the proceeding scheme in the form of a process of map for complex activities connected with the total noise management in the local government unit is presented in Fig. 3 (KOMPALA, 2009).

The scheme of activities proposed in the generalized process of map reproduces the way of taking decisions as long as the earlier defined needs are fulfilled. The created scheme of activities takes into account the methodology of structural analysis, with the use of the optimization processes (for example the criterion of minimal flows of documentation or financial expenses) (STABRYŁA, 2000; YOURDON, 1996).

The map of the process includes also the activities from the field of management. Thanks to such an approach, it is possible to make a division into sub-systems (for example creating the acoustic map or programme of environmental protection against the noise), which correspond to the identified partial tasks that are described by the identification of information inputs-outputs, existing flows of information, realized tasks and created documents. In respect of the fact that the full realization of the process requires most often the involvement of external entities, the map of the process includes also the description of interconnections between the participants of the activities as well as sequences of the involvement of individual entities (including e.g. independent external experts) into the realization of the process activities within the scope of the scheme (KAŹMIERCZAK *et al.*, 2008; KOMPALA, 2005; 2009).

Such a layout of the map of the noise management process, made out for the needs of a local government unit, allows to assess the cooperation of entities, to correct the shortcomings found at individual stages and to apply optimization methods in the assumed management system.

For the needs of mapping, some assumptions have been made concerning a general division of the organization level. It has been assumed that the acoustic

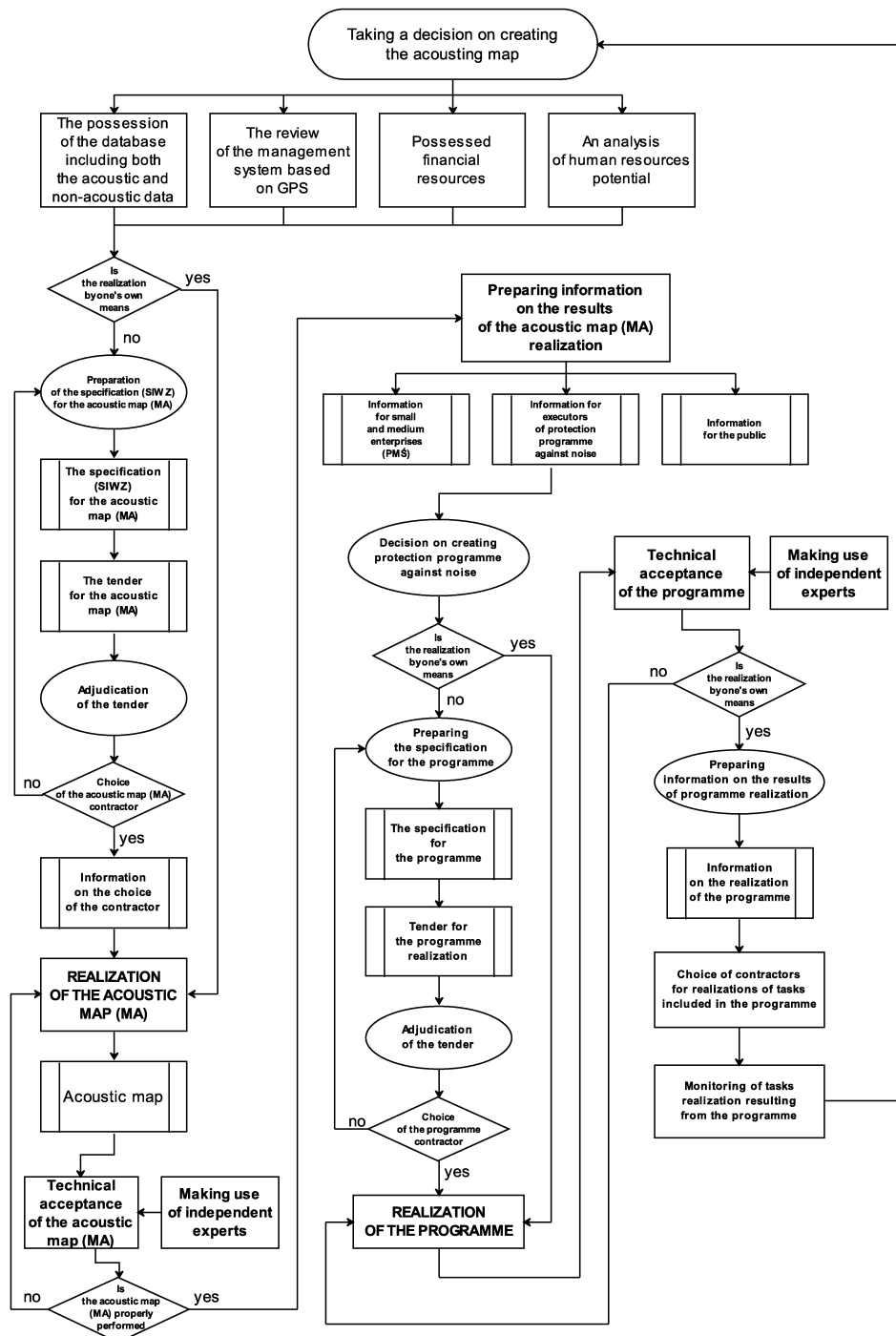






Fig. 3. Diagram of activities connected with the protection against the noise within the framework of the general environmental management system.

map will be used in the office and an operator of the GIS system will be located there. In turn, the external entities are responsible for data acquisition and preparing the acoustic map and environmental protection programme against noise. It has been also assumed that the optimization of this structure as well as structural solutions on individual levels of the process participants are not subjected to modification. The consequence of such an approach to this process is a differentiation of processes as strictly defined procedures connected, for instance, with the necessity of making decision on the acoustic map realization and environmental protection programme against the noise – in accordance with the legislation, or application of competitive tendering law (closed procedures), and procedures connected with the realization of the aims assumed (open procedures).

An analysis of such a map allows to make an inventory and to identify the individual:

- Processes and closed procedures.
- Processes and open procedures.
- Decisions that are made.
- Documents produced in the process.

In the general diagram of the processes map discussed, the individual activities have been presented as:

- | | |
|---------------------------|---|
| – Closed procedures |  |
| – Open procedures |  |
| – Decisions that are made |  |
| – Documents produced |  |

3. Conclusions

The results of the above considerations allow, in the author's opinion, to formulate the following general conclusions and observations:

- In case of the system approach, it is necessary to work out the proper strategy of realization of the earlier defined aims/needs. This strategy is prepared by the local governments managing a specified city (urbanized area). It should take into account the criteria of selection of the aims/needs including the general preferences defined in the accepted fundamental strategy, the determinants connected with the external and internal factors, the time perspective accepted or the assumed level of risk.
- Specifying the noise management strategy should become the point of origin to the activities connected with its realization, which means that for the needs of the description of an organization, e.g. by means of a model of the “the process map” type, the detailed inventory of this organization structures, and next its optimization for making right decisions connected with the noise management in the environment.

- The principle of making the optimal decision is an activity resulting from the theory meaning such an activity, which is both permitted and the best one from the point of view of the criteria of its assessment.
- The realization of the activities in the field of environmental protection, including protection against the noise, should every time take into consideration a connection between the individual forms of effects on the environment and results of these effects, including economical consequences (e.g. estimation of the economical losses is of importance in making more realistic accounts of investment costs). Therefore, in order to undertake rational activities in accordance with the theory of management, it is necessary to consider not only the costs of the investment itself but also other losses that they maybe caused in the environment.
- If a well thought-out and total fight against noise is abandoned, a gradual degradation of the environment can arise, which when reaching a high level will make it incapable of the fulfillment of functions both the current or planned for it.

References

1. DIETRICH J. (1978), *System and Construction*, [in Polish: *System i konstrukcja*], WNT, Warszawa.
2. KAŹMIERCZAK J., LIPOWCZAN A., BATKO W., BOCZKOWSKI A., KOMONIEWSKI M., KOMPALA J., RUDNO–RUDZIŃSKA B., RUDNO–RUDZIŃSKI K., WIERZBICKI J. (2008), *Manual for Municipal Office Workers Taking Part in Creation and Using Strategic Acoustic Maps*, [in Polish: *Poradnik dla pracowników samorządowych uczestniczących w tworzeniu i użytkowaniu strategicznych map akustycznych*], Wyd. GIG, Katowice.
3. KOMPALA J. (2005), *Methodology for Spatial Classification of Transport Routes in the View of their Impact on the Acoustic Climate of the Environment*, Archives of Environmental Protection, **31**, 4.
4. KOMPALA J. (2009), *Acoustic Map and Environmental Protection Program Against Noise, As Elements of Environmental Management System*, [in Polish: *Mapa akustyczna i program ochrony środowiska przed hałasem jako elementy systemu zarządzania środowiskiem*], Prace Naukowe Głównego Instytutu Górnictwa: STUDIA-ROZPRAWY-MONOGRAFIE, Nr 877, Katowice.
5. POPESCU D.I., MOHOLEA I.F. (2010), *Monitoring the reaction and response of people to urban noise*, Archives of Acoustics, **35**, 2, 237–244.
6. *Research for “Quieter Europe” in 2020* (2004), European Commission Research Directorate General An Update Strategy Paper of the CALM Network.
7. STABRYŁA A. (2000), *Strategic Management in Theory and Company Practice*, [in Polish: *Zarządzanie strategiczne w teorii i praktyce firmy*], Wydawnictwo Naukowe PWN, Warszawa-Kraków.
8. YOURDON E. (1996), *Contemporary Structural Analysis*, [in Polish: *Współczesna analiza strukturalna*], WNT, Warszawa.