MADRID
inter.noise 2019
June 16 - 19
NOISE CONTROL FOR A BETTER ENVIRONMENT

Critical Assessment of Aviation Noise Communication Strategies in the European Union

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ABSTRACT

Growing awareness of the negative externalities of aviation has led to increasing objections to airport development, notably to expansion. This can be challenging for airport operators - particularly in regions where air traffic is growing rapidly, or where expansion is sought. In response, the air transport industry has gone to great lengths to reduce the impact of noise. However, these efforts are not always translated into reductions in noise annoyance. An EU Horizon 2020 funded research project, Aviation Noise Impact Management through Novel Approaches (ANIMA), looked to address this gap by developing new methodologies, approaches and tools to manage and mitigate the impact of aviation noise. Specifically, this paper reviews current practice in relation to airport communication and engagement activities in relation to noise. The paper reviews guidance provided by the aviation industry on public participation, finding that although the requirement for communication is made clear, guidance on exactly how such communication should take place is often lacking, as is the need for two-way dialogues and processes of evaluation. These findings are supported by a review of the literature surrounding the public participation to identify what the key components of such engagement activities should look like. The paper concludes with a call for an increased focus on community engagement by the aviation industry, and stresses the necessity not for communication to be a 'bolt-on' to existing ICAO Balanced Approach elements, but to be an important and necessary component of noise management in its own right.

Keywords: Airport Noise, Communication, Non-acoustic factors
I-INCE Classification of Subject Number: 66

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1. BACKGROUND

The air transport industry has been the driver behind much of the global economic growth witnessed in the last 50 years, however it is increasingly under pressure to address the negative externalities of its operations. At a global level there are increasing calls for the industry to address the carbon emissions that arise from the combustion of aviation fossil fuels and that contribute to climate change. At the local level however, the issue that most commonly impacts the industry at is noise.

Aviation and environmental noise have always been closely linked - the first editorial complaint about aircraft noise was published just 8 years after the Wright brothers maiden flight [1]. Today, it is estimated that over 2.5 million people are exposed to noise from airports of an Lden of 55 dB or more, from just 45 major airports [2]. This is an important figure when put into the context of a recent World Health Organisation (WHO) report which recommends reducing noise levels produced by aircraft to below 45 dB Lden, as noise above this level is associated with the onset of adverse health effects [3]. Environmental noise is associated with a multitude of health impacts [4], not least sleep disturbance, cognitive impairment, cardiovascular disorders, ringing in the ears (tinnitus), mental health problems and even premature death. A 2011 study by the WHO found that noise pollution ranks second as an environmental and public health burden behind air pollution [5].

Against this background, local communities and environmental action groups have mobilised to form campaign groups with the aim of halting the growth of the aviation industry, often objecting to airport expansion; for instance at London Heathrow [6], Vienna [7] and more recently Nantes [8].

In order to retain their social licence to operate [9] the aviation industry has responded by seeking to reduce noise impact. This has primarily been organised behind the International Civil Aviation Organisation (ICAO) Balanced Approach [10] – a set of international guidelines for the reduction of noise around airports, and enshrined into European policy through Regulation (EU) 598/2014. The Balanced Approach is based on 4 pillars:

1. Reduction of noise at source
2. Land-use planning and management policies
3. Noise abatement procedures
4. Operating restrictions

These pillars represent a suite of priorities and guidance for the industry to help the manage down its noise impact, and they have, to an extent, proved successful. The industry is often quick to illustrate how airframe and engine technology improvements (noise at source) have seen today's modern aircraft become some 75% less noisy than the aircraft of 30 years ago [11]. In reality however, this picture is rather more complex.

The aviation has grown consistently for many years, with growth expected to average 4.8% per year (globally) to at least 2030 – and with much higher rates predicted in developing nations [12]. The result is that whilst individual aircraft are significantly quieter, there has only been marginal improvements in noise exposure to airport

communities, as illustrated through conventional long-term average energy-based Leq-type noise metrics such as Lden (the adopted standard in Europe) [13].

At the same time, annoyance [14] of local residents to airport noise has increased, with recent studies suggesting that the percentage of highly-annoyed people living near airports has gone up for given noise exposure levels [15]. The rationale for this is that whilst metrics based on sound energy over a period of time correlates well with physiological health impacts (i.e. hearing loss), the same cannot be said for the way in which noise is perceived [16]. Studies have shown that whilst acoustic factors certainly play a role in the annoyance response to noise, non-acoustic factors - those "not directly connected to the nature of the sound" [16: p232] - too make a notable contribution. These include human, socio-economic and other factors such as the time of the noise exposure, and pre-held perspectives of the airport (or of aviation) [17]. Some authors go as far as suggesting that non-acoustic factors may play a bigger role in annoyance than the sound itself [18,19].

Vader [20] identified 31 non-acoustic factors able to influence noise annoyance and categorised them by their strength as an indicator, and the extent to which their influence could by modified by aviation actors. Of these 31 factors Vader identified seven that are both modifiable by aviation actors, and that also have a strong role to play in terms of their potential to influence annoyance:

- Attitude towards the source
- Choice in insulation
- Choice in compensation (personal)
- Influence, voice (the opportunity to exert influence on behaviour of source)
- Perceived control
- Recognition of concern
- Trust

The implication of Vader's work is that airports are able to play an active role in minimising the impact of non-acoustic factors in the community response to noise. Doing so should therefore be part of a comprehensive response to ameliorate the health impacts associated with noise exposure.

2. COMMUNICATION AND ENGAGEMENT IN AVIATION

Given the nature of the modifiable non-acoustical factors it is hardly surprising that many aviation actors have identified communication and engagement as key elements in the management of noise impact - see for example [21-29]. Illustrative of this shift in focus is the position taken by ICAO, who when re-visiting their 4 core principles of the Balanced Approach in 2007 added a '5th Pillar' – 'People issues'. This commitment was later developed further in Circular 351 – Community Engagement for Aviation Environmental Management [30]to describe different methods of communication (i.e. emails, telephone, websites) and to stress the importance of public consultation so that communities' views may be taken into consideration in decision-making processes and so that disputes may be overcome. Such consultation should be collaborative and enable

participants to be fully informed about noise issues and proposed solutions at the airport, which ICAO suggests may lead to better acceptance of the solutions.

Whilst this guidance is commendable, and is certainly a step in the right direction, it is noticeable that many of these documents present only cursory statements that support the requirement for communication and engagement, but that go little further. They lack the processes of truly authentic participative and dynamic community involvement in airport planning and decision making and take the perspective that if a communication took place then it has been successful. There is no account of whether the communication resulted in any change – be it on the part of the recipients or of the airport itself. By way of an example, ICAO's [30] overview of case studies included the case of Air Services Australia (AsA) community engagement around changes to flight paths at Melbourne, Adelaide, Canberra and Cairns. Here the communications are described as successful because they "ensured there was a high level of community awareness of proposals within affected communities" (p. 30). The implication is that communicating is itself is that communication is the singular measure of success.

To compound these issues, initial findings from the ANIMA project suggests that the extent to which airports have gone to implement fully consultative and detailed engagement processes is limited. Many airports for example provide information and data to their community stakeholders that is often rich and detailed in nature, but that go no further than information provision. These findings support the work of Rawson and Hooper [31] who suggest that whilst airports do use a range of tools to engage stakeholders, actual approaches vary in the extent to which they facilitate genuine participation in decision-making. They suggest that "(t)he majority of techniques employed by a number of UK airports…seek to only inform stakeholders and would therefore be classified as methods of non-participation[6]" [31: p.40]. The disjunct between guidance and practice is made worse by the fact that engagement can get things wrong. For example, Hooper and Flindell [17] make the observation that communication protocols, tools and metrics used by airports are often "too complicated, over-technical, and do not even focus on information which the public actually want or need to know" [17: p1]. This is exemplified by the use of long-term average metrics that may be helpful for instance, to policy makers, but which do not actually represent how noise is experienced by residents living near to airports. The consequence is that on the one hand, residents are being informed through airport communications that the noise situation where they live is improving, however their own experience, or perception, is of a soundscape that is deteriorating in quality, and having an increasingly negative impact on their quality of life. This can lead to distrust in the information provided by airports, and in the intentions of airport managers themselves. The worst-case scenario is that it can also lead to further exacerbate annoyance.

3. THE THEORY AND PRACTICE OF PUBLIC PARTICIPATION

If airports are to communicate and engage with residents effective it is pertinent to examine the principle elements of effective communication and engagement.

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[6] In reference to Arnstein's [32] Ladder of Citizen Participation – described in Section 3.

Public participation (encompassing the ideas of communication and engagement) can be defined as "a process of engagement, where people are enlisted into the decision making process to contribute to it'. It thus requires 'that those initiating the process are open to the potential need for change and are prepared to work with different interests to develop plans or amend or even drop existing proposals" [32: p147]. The concept can be visualised through Hanchey's [34] Objectives of Public Participation (Figure 1), and its potential to distribute information, to promote community acceptance and to diffuse conflict.
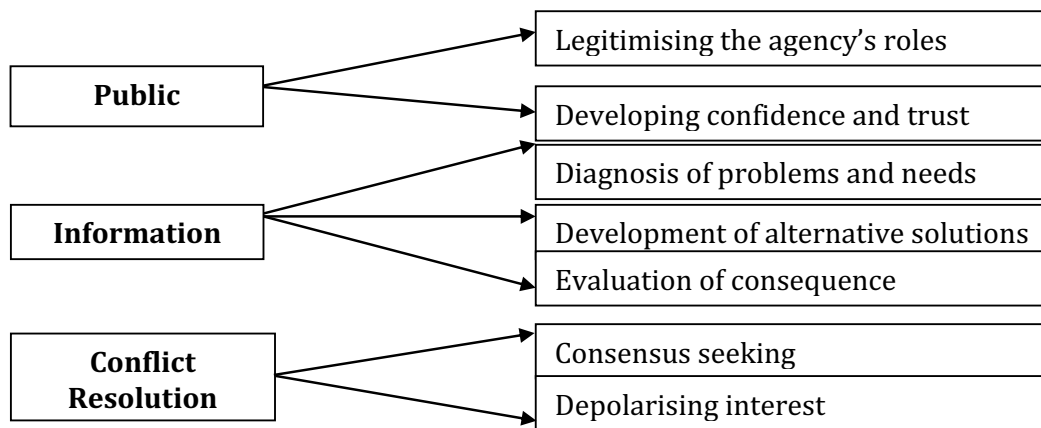

Figure 1: Objectives of Public Participation (Hanchey, 1998)

Participation conducted in this way facilitates greater organisational transparency, and develops community trust in, and an understanding of, a given organisational proposal, thereby reducing the potential for stakeholder-business conflict. Hence, these theoretical aspects of public participation speak directly to the non-acoustical aspects of annoyance where trust, legitimacy, empowerment, fairness and accountability are key factors.

Public participation also speaks to the idea of social learning [35]which comprises two primary elements: cognitive enhancement 'the acquisition of knowledge' and moral development 'the reservation of personal and selfish requests in favour of actions which benefit society as a whole; in public participation' [35: p446]. If participants do not develop morally or enhance their level of cognition and process of thought, the participation exercise will be based upon individual benefits rather than those of the wider group. Thus, if aviation actors are seeking to achieve more socially acceptable outcomes in their development decisions and improve attitudes to the perceived source of a problem, they must support participants in the 'acquisition of knowledge'. This is essential in facilitating the 'moral development' required to appreciate both sides of any argument, and provide opportunities for engagement in decision-making that can help to build consensus on the most acceptable outcomes.

Webbler [36: p38] expands on this concept by describing the Normative Model of Public Participation in which participation includes a vision of what the participation

should accomplish, in what manner, and by bringing together the concepts of fairness and competence'. Fairness creates the opportunity for equality and popular sovereignty to emerge and for personal competence to develop', whilst competence increases the ability of participants to make the best possible decisions, using appropriate tools and knowledge [33].

The requirement for two-way dialogue in communication and engagement is expressed by Illingworth and Jack [37] who discuss how communication between 'experts' and 'non-experts'. They suggest that such dialogues are typically one-way – leading to voiceless, disinterested and discouraged audiences[38]. Effective communication requires a two-way dialogue to be effective, with experts listening to non-experts and being willing to modify their approaches accordingly. Illingworth and Jack [37] point out that such an approach is particularly effective at giving underserved and disadvantaged communities a discernible voice, thereby helping to increase the success of any potential intervention [39]. To achieve this, environments must be created in which hierarchies are levelled, allowing non-experts (particularly underserved community groups) and experts to take part in meaningful dialogue, and through which the understanding and opinions of the non-experts can be fully expressed. Consideration of this is an initial step that should ideally be taken during the design and before the delivery of any potential interventions. Doing so would help to ensure that participants were drivers of change rather than recipients of actions to which they had no ownership. Methods such as deliberative mapping [40] the use of competency groups [41] and Q methodology [42] are ways in which this can be fostered.

In terms of actually transferring information between airports and their communities, Hooper and Flindell [17] discuss the importance of transparency and its ability improve understanding (comprehension), enhance tolerance and acceptance, and at the same time enable residents to identify and focus on real issues of importance to them. The authors state [17: p.7] that "positive outcomes can only be achieved once noise communication approaches are designed with the end-user in mind", with effective stakeholder engagement requiring "considerable effort in the 'education' of residents as to the nature of airport operations and how their changing pattern results in differing noise exposure outcomes on the ground".

Stakeholder theory can help illustrate the value of effective communication and engagement, stating that "companies' capacity to generate sustainable wealth over time is determined by their relationships with stakeholders" [43]. The transition from a shareholder to a stakeholder paradigm leads to a change in the company's rationale, away from profit maximization for shareholders towards the creation of value all stakeholders [44] In this way there is the opportunity to create new forms of double-effect shared value to both groups [45]. Doing so also helps to ensure that a business can maintain its social licence to operate [9].

Thus, we can see how it is important to move beyond tokenistic communications and to move towards active, engaged and intentional dialogue - leading to accountability, transparency, partnership and the construction of measurement, evaluation and feedback in policy and practice.

Enabling joint organisational and citizen responsibility for shaping co-produced outcomes, can lead to benefits for all airport stakeholders. This is illustrated by the work of Arnstein [32] and Asensio [33]. Arnstein's [32] 'Ladder of Citizen Participation" provides a useful framework for exploring the range of communication and engagement activity that can be undertaken by an organisation, describing eight different levels of citizen participation as an metaphor for degrees of citizen power (Table 1).

Table 1: The Ladder of Citizen Participation [32]

8	Citizen Control	Citizen Power
7	Delegated Power	
6	Partnership	
5	Consulting	Tokenism
4	Informing	
3	Placation	
2	Therapy	Non-participation
1	Manipulation	

The ladder illustrates eight different degrees of participation, influence and value, as the ladder is ascended, categorised what is essentially a non-participation approach (therapy and manipulation), through to tokenism (placation, informing and consulting), and with true citizen power only being achieved through partnership, delegated power and citizen control. It is in this category where citizens are afforded to voice their opinions, negotiate in trade-offs, and actively influence decision-making.

Building on these concepts, Asensio [33] suggests that trust develops amongst stakeholders through "a long-term, honest, and transparent two-way communication". Asensio describes the main components of an effective community engagement process (in this case by an airport) as information (provision), consultation, participation and empowerment.

The health implications of aviation noise, coupled with Asensio's four factors, suggests that literature in public health could also have relevance in aviation, for instance Community-based participatory research (CBPR). This concept is rooted in principles of collaborative and equitable partnership in all phases of research, with partners working together to identify mutual issues and to take action to address them. This includes a focus on: "empowerment and power-sharing processes that attend to social inequalities; building on community strengths and resources; co-learning and capacity building among all partners (and) attending to the local relevance of public health problems" (Ward et. al, 2018, p. 25). CBPR emphasises equitable group dynamics and promotes equitable processes within partnerships and equity in the communities who are engaged. As Ward et al. [47: p.25] report, the "development of an evaluation framework that describes the manner in which equitable group dynamics promote intermediate and long-term equity outcomes can aid partners in assessing their ability to work together effectively and improve health equity in the broader community." By linking social and contextual factors to partnership dynamics, it would

appear that evaluation in communication and engagement, in general, could equally accord increased understanding of the effectiveness and equity within the techniques adopted and illustrate ways in which partnership outcomes may be best met.

There have been discussions across disciplines about the attributes of effective communication and engagement. It involves information sharing, participation, consultation and empowerment which lead to the citizen power and partnership-working that characterises open dialogue and engagement. However, without evaluative processes and feedback mechanisms that capture the effectiveness of the communication and engagement approaches adopted, practices remain unchallenged and static. It is a reflective, cyclical and dynamic process of intervention development – deployment – assessment – evaluation – review – revision and re-deployment that yields more nuanced understanding and effective partnership involvement in decision-making.

4. CONCLUISIONS

The aviation industry needs to move away from one-directional information provision and tokenistic engagement, and towards truly two-way and meaningful dialogue based on a non-hierarchical environment that facilitates candid, clear and plain language discussions amongst those who may be non-experts on airport operations but who are experts on their own quality of life and what it is like to live in their community. Interventions based on these principles can enable an understanding between all individuals involved in an engagement, and the development of a nuanced narrative that better reflects the experience, perceptions and needs of airport community residents.

In so doing, this would help to ensure that those engaged with were drivers of change rather than recipients of actions to which they had no ownership. Previous research has utilised techniques such as deliberative mapping [40] and the use of competency groups [41] to try to establish such two-way dialogues. The main features of these types of techniques are that they make use of a 'common language' that is comprehensible to all, ensures there is access to expertise for everyone involved and that decision-making processes are inclusive, transparent and allow the validity of claims to be challenged. An example of this is the Vienna Airport Dialogue Forum, established to continue the work undertaken in a mediation process that began due to opposition to a third runway. The forum is a non-profit organisation representing approximately 2 million people, across 120 municipalities, the provinces of Vienna, Lower Austria and Burgenland, as well as numerous citizens' action groups. It monitors compliance with the agreements made through the mediation process and deals with issues, questions and conflicts that arise as an on-going basis, as related to existing airport activity, and any proposals for future expansion. The forum meets regularly, and is consulted before any operational change is implemented. Forum members, and members of the public, are able to bring concerns to the table for discussion, and if appropriate these are taken forward and put through modelling by AustroControl, with a representative attending Forum meetings to present results independently from the airport operator. Moreover, noise reporting on airport activity is not produced by the airport, but by the Dialogue Forum itself- helping

to ensure impartiality and trust in the information provided. These processes mean that all communities have a voice and an opportunity to express their concerns to the airport, whilst consultation before operational changes are implemented ensures that residents feel empowered to have some control over the noise situation that they experience.

From the dissemination of raw noise data and flight track information, to detailed noise action plans and contour maps, information provision is an activity that is increasingly undertaken airports. However, in many instances such provision takes on a passive nature and the evaluation of impact is difficult to establish. For such communications to be truly effective, it is necessary for participants to see that they can influence decisions (empowerment) and to be asked whether a communication tool/way of engaging works for them as individuals and their own specific needs. Alternative, **innovative approaches, robust evaluation and general debate about empowerment and the cornerstones of effective dialogue are required.** In this way, communication and engagement can move beyond tokenistic one-way conversations and towards inclusive two-way dialogues that will be better able to influence non-acoustic factors, annoyance, and thus the health impacts brought about by aviation noise to millions of people across the world.

The ANIMA project aims to contribute to this dialogue through a number of its core deliverables ranging from pan-European reviews of regulations and best practice, to critical reviews of noise impact and annoyance, and to evaluations of noise management interventions and the effectiveness of communication campaigns designed to lower annoyance. Further information about the project can be found at www.anima-project.eu.

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