VALUATION OF AIRCRAFT NOISE SOCIAL COSTS: POLICY AND SCIENCE IMPLICATIONS

Guillaume Faburel[a], Foteini Mikiki[b]
[a]Center for Research on Planning: Land Use, Transport, Environment, Local Governments
Institut d'Urbanisme de Paris - Université de Paris XII,
61, Avenue du Général de Gaulle, 94 010 Créteil
[b]Center for Research and Technology Hellas, Hellenic Institute of Transport
6th km, Charilaou - Thermi Road, P.O. Box 361, 57001 Thermi, Thessaloniki, Greece
faburel@univ-paris12.fr; fomik@certh.gr

Abstract

Air transport plays a vital role in the mobility needs and the economy worldwide. It is however accused of generating several nuisances in airports vicinity. Noise problem ranks very high in people's concerns and the question of noise social cost valuation is an ongoing demand. While international air community is faced with the major challenge of sustainable equilibrium between economic benefits, social consequences and environmental impact, a new doctrine putting forward internalization practices is winning ground. This decision-making policy currently emerging, especially in Europe, aims to foster the sustainability of airport operations and suggests that a wise usage of internalization's fruit could insure efficient operability and redress territorial distortion.

This paper aims to present the fruit of a work mandated by the Noise Department of the French Ministry of Sustainable Development. This research addresses the question of why the discrepancy between statements and practice regarding internalisation persists. More precisely, the paper attempts to shed light on the socio-political reasons, beside the scientific uncertainties about social costs amounts, explaining this timorousness. The focus being Roissy CDG airport context, the paper aims to illustrate the policy and science implications that constitute an obstacle in the acceptability of internalisation practices and their implementation.

Keywords: Aircraft noise impacts; Social costs; Valuation methods and technics; Polluter-pays principle; Acceptability; Political and philosophical sciences; System of reference.
Topic area: E3 Valuation of Internal and External Benefits / Costs

1. Introduction: the gap between the social demand and the polluter pays principle application to aircraft noise

Notwithstanding its vital role in our lives and economies, transportation is responsible for excessive environmental pressure. Affecting both populations and territories, it imposes several costs, called social, as they are not fully attributed to the agents responsible. Air transport sector makes no exception, also meeting several environmental constraints. Their external costs penalize their host areas and in particular, the noise problem generated from aircrafts operations becomes more and more acute. Aircraft noise ranks very high in the list of citizen concerns.

Admittedly, noise reduction has increasingly become a focus for EU legislation and ICAO negotiation: international standards, air traffic management coupled with integrated

noise models, exploitation rules, sound insulation programs, land use guidelines… (see Common Options For Airport Regions Program - COFAR, 2001 and 2002[1] ; and U.S. General Accounting Office, 2002). But, number of international airports continue to have tense relations with their host areas. Conflicts, demonstrations, oppositions, coalitions, distrust… figure among the recurrent terms and events in the environmental chronicles.

At the same time, the existing platforms face to the (announced) saturation of their facilities (BIPE, 2001 ; U.S. GAO, op. cit.) with regard to the 3 to 5 % traffic increasing per year (Airports Council International - ACI, 2003). Hence, these oppositions interfere with airports plans and projects thought to answer to this growth, as much for new platforms construction (ex: Third Commercial Airport in the basin of Paris or Denver international Airport), as extension projects (ex: new runway in Boston since 1973, or Düsseldorf since 1991, new terminal to London Heathrow since 1994…), or "simply" air corridor changes above metropolitan area (see in Paris for 2001).

The environmental issue, and more particularly the noise one, becomes determinant for the future of air mobility.

In order to guarantee the social acceptability of airports operation and the territorial insertion of airports, the need for other or alternative proposals and environmental actions is sought in all worldwide airports. "*The air transport industry is growing faster than we are currently producing and introducing technological and operational advances which reduce the environmental impact in source*" (European Commission, 1999). It is about shaping actions types and modes allowing compromises between the two trends : air traffic growth and environmental concern/communities threats near majors airports.

Here, in the sustainable development rationale and its ethic, the questions of aircraft noise social costs and their internalization (polluter-pays principle - PPP), has reappeared in the European debates for the beginning of the nighties. "*The background of the externality problem of transport is caused by the fact that transport has low private costs accompanied by unpriced or underpriced external costs.*" (Button, Nijkamp, 1997, p. 216). However, despite official speeches, in spite its enrichment by scientific theory through the years[2], little has been done for the valuation of aircraft noise social cost. Furthermore, the internalization as firstly introduced and described by the Economics (Marshall, Pigou, Coase) has not really been in practice in the air transport sector.

According Morrell and Lu (2000), 60 international airports, located in 16 countries, apply noise taxes. But, although these actions express the idea of the polluter-pays principle, rather the user-pays one (Alamdari et Brewer, 1994), no airport defines the tax amount according noise effects, and their social costs. "*Ideally, the amount of tax paid should reflect the environmental damage cost caused by the taxed product or activity*" (Barde, 2000, p. 421).

However, in theory it allows to regulate in an optimal manner (Pareto) the noise emissions of aircrafts, and perhaps to reduce its damages. This purpose is quite well known. Especially, it could permit to finance other types of actions, thanks to fund collected. It is about aiming to balance the situations of noise annoyance met almost everywhere around airports. For example, some airports authorities more and more consider that the internalization could be used to compensate people and local governments which should have changed their behavior (of residence, of planning..). This action adds a new internalization mechanism to the classical one. The symbolic weight of this new mode increase more everyday in the arguments of opponents to aircraft traffics. For at least these

[1] www.cofar.org

[2] Its roots through externality concept even come from the turn of 19th century (Marshall, 1890), and since see works from A.C. Pigou (1932) and Coase (1960).

two reasons, a theoretical one, and the other more pragmatic, internalization could participate to the better territorial insertion purpose. That's for example the reason why stakeholders speeches, and not only local governments and communities ones, currently often relieve internalization expectations (see for European case CEMT, 1994; CEMT, 1989; Green Paper, 1996; CEMT, 1998; White book of the European Commission, 2001…, and even within the OACI negotiation process, ANCAT: 1998).

The economic literature suggests one explanation of this gap : the uncertainties and limits carried by the social costs measures and methods of evaluation (Schipper, Rietveld, Nijkamp, 2001). Yet, whatever methods used, the evaluation of transportation noise social cost have been on the increase during the last ten years (Navrud, 2002). So, although remaining exposed to limits and skews, the methods and their results appear more reliable than before. Besides, some Scientifics believe that data could be now sufficient to realize meta-analysis in order to guarantee transfers information products for airport capacity extension projects (Button, 2003).

Finally, despite those methodological progresses, despite the growing expectation for the use of internalization tools, and despite the policies possibilities stemming from (*supra*), we have to note that the social cost data are not yet perceived like really decision making supports in the aircraft noise field. So, why social cost evaluations finally do not make the object of any real political interest? Why internalization instruments are not really defend and support, are not place on the political agenda

2. The socio-political hypothesis, and the method applied

In order to try to answer to these questions, according to us we need to admit the necessity to extend the analyze scope. We need to replace the major argument on methods and social costs data reliability (i.e. the internal validity of methods) into an much larger explanatory perspective, a socio-political one.

> "*Sustainable development impose to remove the conventional blockages between economic valuation and the environment, not only in the calculation itself, but also in the way in which it is solicited for constructing public decision.*" (Cohen de Lara & Dron, 1998)[3].

What are the more socio-political reasons of such a gap between :

- on the one hand, the wish more and more shared to internalize and the multiplying attempts of social costs evaluations,
- and, on the other hand, actions that appeal to internalization while taxes don't rely upon noise measurable effects and their real social costs?

So, our research focused on the role and usefulness of types of evaluation in decision making process related to airport and their environment. More precisely, we worked towards two specific goals.

First, in our socio-political perspective, we wanted to replace the major scientific argument indicated before in more complex contexts, often crossed by tensions between various stakeholders categories. So, we also sought to keep ourselves at a distance from the social defined throw the techno-economic analysis categories and its considerations on the methodological practices conformity to currently standards. This question, which sends back to the internal validity of the methods, gives pace to several particular experts' debates: convergences and uncertainties of the results, technical performance of the statistical run tools or respect of the data-transfer conventional protocols.

[3] Author's translation.

Secondly, our socio-political perspective allowed us to cover purposes and principles involved today in the public arena in order to act on this social : admittedly taxation, but also indemnification, compensation, mediation**,** negotiation, environmental justice, equity, sustainable development etc. So, in return, this covering had to allow us not only to inform on the causes of the gap between internalization purpose and its reality, but mainly to enlighten the opportunities offered by the methods of evaluation and their results, in contact of developing territorial compromise wills and guaranteeing social acceptability of airports. What could be the possible trades between on the one hand, the methodological uncertainties and, on the other, the political opportunities offered by the methods and the data produced to answer to new operational stakes and rationales (territorial insertion) for airports in conflict situations? For example, the housing prices depreciation, measured by the hedonic price method, or the effects on health, observed by the method of the damage cost, don't they come to join any strong compensatory expectations within the local populations?

In order to deal with this questioning, we undertook to measure the political acceptance:

i. of the social costs evaluation procedures, data produced and then spread;
ii. as well as of internalization, its rationale, tools and goals, in the framework of an eventual renewal of means of actions regarding airports.

Following two previous researches, the first lead for ADEME (French government agency in charge of energy and environment studies) and the Val-de-Marne County on the measure of the aircraft noise social cost at Orly Airport (Faburel, 2001), the second one for the French Ministry of Transports (Research Office) on the institutional and social acceptance of this evaluation (Faburel, coll. Leroux et Colbeau Justin, 2000), this research addresses this questioning through the Roissy CDG case (1st French airport in passagers). It has been mandated by the Noise Department of the French Ministry of Ecology and Sustainable Development (Faburel et Mikiki, 2003).

The work was structured in two methodological steps. In the first place, a review of existing literature allowed to produce a state-of-the-art on the practices of social cost valuation on aircraft noise and subsequently, on the use of internalization tools in different countries. This first phase consisted in drawing an inventory of some policies adopted regarding the aircraft noise mitigation, and then in analyzing research and study documents, scientific articles, and the wide audience journals carrying on: the social costs valuations on aircraft noise available till now, and the PPP debates. A recent EC bibliographical work (Navrud, 2002) enriched the analysis and so did the study of three airport cases that we judged pertinent for our purpose: Amsterdam Schiphol, Francfort Rhin-Main, and Sydney Kingsford Smith.

Choosing these airport cases was justified given the fact that among major international airports, there was remarkable activity in the noise field in these three ones. These airport cases were interesting to reveal the gap between the internalization expectation, their evaluations supports and the PPP reality. In fact, a second hypothesis arise from this stage: to consider this gap as the indirect fruit of the inadequate classical policy rationale in the field of transport-related environment (technical, regulative and planning) faced with social demand evolutions and environmental stakes. So, the necessity to consider the specific context of each airport so as to better understand such discrepancy.

Once we accomplished the identification of prominent facts and common features within the observed situations, the second methodological phase consisted then, in the realization semi-directive interviews with eight principal stakeholder involved in the noise

field regarding Roissy CDG[4]. The aim was to apply our questioning to the Roissy CDG case. These interviews were performed using a properly conducted guide which was composed by three main rubrics: the first one was about the issues related to aircraft noise (representations regarding noise externality) ; the second one dealt with the notions and the valuation practices (the attitudes and reactions faced to the bottom and aims of valuation methods) and the third one approached positions adopted about internalisation of social costs (the potential usage of valuations results). Through these interviews, we approached four important dimensions for our measurement of the acceptance:

i. the knowledge endowment on noise, social costs, valuation methods and practices,
ii. the general look on the valuation, the attributed role of experts in the decision, and the criteria applied to consider the methods of social costs valuation,
iii. the judgment drawn about actions in force in the aircraft noise domain and the points of view given out on the rationalities and attitudes of different actors of the field,
iv. the degree of political acceptance of existing modes of internalization as well as of the available monetary valuation processes in comparison to other modes of actions.

3. Results: The role of stakeholder logics in the few application of polluter-pays principal

3.1 An object in the dark: the individual and collective effects of aircraft noise

The first stage of our work certainly confirms first of all that the aircraft noise social costs valuations remain till today very few in numbers. However, the existing ones have been produced these last years. Besides, on other transportation noises, they have been multiplied (Navrud, 2002). This making, processes of measurement have been refined, models of statistical runs have been enriched and the results appear rather stronger than before, to the point of inciting the undertaking of meta-analyses (*supra*).

Moreover, the results of this first methodological step show that the socio-political future of social costs valuation and its products as well, and in an extension, the socio-political future of a pragmatic internalization is connected with aircraft noise effects. For example, the social cost measurement was the more often used in the very same countries where we can count, the "more" of effects valuations, while new modes of action, complementary to the conventional ones (*supra*), are on this day in discussion.

This is verified in at least two case studies, the one of London Heathrow (3rd airport in the world in mppa: ACI, 2003) and the one of Amsterdam Schiphol (9th). In Amsterdam Schiphol, for example, two recent works of measurement have acted towards the introduction in the political culture of the issue of noise social costs and their internalization: a measurement of the annoyance induced and of the well-being of populations through quantitative indicators derived by methods of declared preferences (Van Praag and Baarsma, 2000), and an aircrafts noise social cost valuation based also on methods of declared preferences (Van Praag et Baarsma, *ibidem*). These valuations are followed by the undertaking of a met-analysis of property values depreciations attributed to

[4] The stakeholders who were solicited in an alphabetical order : ACNUSA (French Authority for Aircraft Noise Control), Aéroports de Paris - ADP (Airport Operator for Parisien Paltforms), Air France, Conseil Général du Val d'Oise (Council of Val-d'Oise), Direction Générale de l'Aviation Civile - DGAC (Civil Aviation Administration), Mairie de Gonesse (City of Gonesse), Ministère de l'Ecologie et du Développement Durable – Mission Bruit (Department of Noise – French Ministry of Ecology), and Union Française de lutte Contre les Nuisances Aériennes – UFCNA (Neighbours Community Federation).

aircraft noise (Schipper 1997; Schipper, Nijkamp, Rietveld, 1998). And, without however auguring n efficient link, the question of the discrepancy between existing noise tax amounts and social costs reality has been raised since (Lu et Morrell, 2001). This questioning participates till now in the emergence of a debate on the people's compensations (Baarsma, 2001). As far as London is concerned, the former estimations of property values depreciations attributed to noise (hedonic price method), as well as the review of numerous valuations undertaken elsewhere (Schipper, *ibidem*; Schipper, Nijkamp, Rietveld, *ibidem*), have also incited, for example D.W. Pearce et B. Pearce, to confront "noise-tax" imposed to companies. The results show a discrepancy. They recommend to urge an increase of about 2% of the air tariffs (i.e. 1,5 €) so as to cover the costs of property depreciations attributed to noise in London Heathrow (Pearce & Pearce, 2000).

Because cultural particularities do their prints on such interfaces (ex. Principle of compensation for planning constraints carried by the English law), we don't assert a causal liaison between valuation and decision. Nevertheless, it was easy to admit following this first step, the necessity to consider the question of aircraft noise effects (annoyance, property values depreciations, health impacts…) as being consubstantial to the integration in political culture of the question of internalization. Internalization is so reconsidered according to the points of view perhaps more federated by the territorial stakes: difficulties met for the noise limit respect, in force since 1997 in Amsterdam Schiphol; important debate around the new terminal T 5 in Heathrow[5]. This ascertainment led us to two adaptations.

The first was to undertake a quick review of valuation works of aircraft noise effects on populations and territories, far from the sole transcription under the form of social costs. It derives from the typology treated, that besides the traditional forecasting analysis of air traffics, or even the econometric approach of airports economic impacts (enterprises, employments…), we find for the environmental question acoustical studies and, more and more, measurements of air quality. On the contrary, with a few exceptions (airport cases previously evoked), few works have precisely observed the relations between airports, societies and local territories. We just note some descriptive assessment or even the observation of noise impacts, with a solely statistical regard (ex: property values depreciations).

In fact, the singular geographies that seem to appear around airports, due to some noise effects, are not dealt with thanks empirical observation, even if they are in the debates. The case of urban planning constraints nearby some airports, yet subject to regulation in quite a number of countries (Noise Compatibility Programs), and especially newly incited by the OACI in the international negotiations led in 2001, is interesting. It didn't dealt with empirical analysis, coupling with GIS use the land use evolution with local agents surveys viewing to learn their strategies of localization (cf. Cidell & Adams, 2001, for the USA case; Faburel & Barraqué for the case of France).

For Roissy CDG, but for other airports as well, French, European and American ones, we didn't count any reliable assessment of:

- heath impacts (one real tentative over the last 20 years);
- the annoyance and especially of the more complex "noise living experience" (a recent survey commanded by both Ministries of Ecology and Transport just

[5] Decision taken at the end of the year 2001, after 8 years procedures, and associated by the "no" of English government to an upper limit of noise levels, but the one of movements, fixed at 480 000.

focused on the relations of noise and annoyance dose- responses: Vallet, Vincent, Olivier et Paque 2000);

- the residential behaviors purposes and turn over in populations living in the more or less immediate proximity of the airport (exception made by a qualitative analysis achieved by interviews with local real estates and communities residents: Martinez, 2001);
- eventual property values depreciations linked to the noise exposure, however often assessed abroad (Levinson, Gillen, Kanafani, 1998; Schipper, Nijkamp, Rietveld op. cit.);
- social practices in relation to the airport presence (however demonstrated for the other Parisian commercial airport, Orly: Faburel, 2003a);
- the effects of planning choices and procedures in relation to the preventive management of nuisance exposure thanks planning rules (Plan d'Exposition au Bruit);
- ...

A second adaptation ensued then from this finding. Noise effects valuation, social costs estimation and debate about the PPP application appear closely linked. Furthermore, the few of empirical data on the social costs suggests an obvious lack of effects measurement. So, we have enriched our interviews guide destined to the agents -2nd step of the work- in order to better understand the role of the effects topic in our analysis on the political acceptability of social costs valuations methods and of modes of action that their results can nourish. We add questions focusing on the representation of such effects existence, the knowledge of this subject and on their observation, the judgments carried on the attitude of public power as regards their valuation. Finally, our interview guide included three rubrics corresponding each one to a stage of the thinking, which goes from the noise effects valuation to conclude in the internalization, via the social cost estimation.

Before presenting the core results of the transversal analysis performed by this second step of our work, let's present some very general learning.

First of all, we have to note that all agents had developed certain sensitivity towards the role of aircraft noise on airport platforms future. All, hence, welcome the initiative of enlightening the problem posed by airports and their close territories. In this sense, valuation, for a long time understood as a judgment carried on the public power action and therefore traditionally understood as means of responsibility control, entered into thinking habits of agents of the air and airports field. It is for example the reason why our initiative has been appreciated: prompt and cordial hosting, important agents implication in the validation of analysis that we produced from the interviews that we led with them… Moreover, almost all agents admit the necessity to remedy negative externalities also through internalization. But, a major divergence appears in the points of view. This distinction, which appeared thanks to questions posed on the noise effects (representations, knowledge and valuations), coincides with two representation schemes revealed, which we are going now to present.

3.2 The technique for the debates rationalization

The transversal analysis of the interviews performed underlines the role played by a referential that we have named for convenience *legitimate technique*, in the construction of a certain type of rationality. This rationality makes use of a scientific and technical language, and thus of a certain point of view on the validity of valuation works, to reject the existence of a number of aircraft noise impacts on the populations, however impacts

not having yet really focused scientific regards (property values depreciations, health effects, sometimes: pauperization…).

According to the Civil Aviation Administration (Ministry of Transports), the company Air France and in lesser degree the technical services of the Ministry of Ecology (Noise Department), number of these effects has not been demonstrated, with the exception of annoyance admitted by all. Why have they to consider them, notably by measuring the social costs? These agents have in fact few interest in such valuation, and, whatever it is about, use scientific literature on assessment uncertainties which affect the social cost measurement.

In fact, this rationality is particularly based on technique and objectivity, themselves supported by a unique representation of knowledge and of its validity. This singular representation of pertinent analysis categories (ex: acoustics) and of know-how (ex: techniques of modeling) would have had a much superior productivity according to them: to rationalize the debates by legitimating certain environmental arguments. They stipulate for example that the noise exposure values are well more operational and acceptable for defining internalization amounts, for applying thus the polluter pays principle. In this sense, they judge that the PPP is already well applied: its rate is defined by the acoustic category of aircraft (OACI Chapters) and its base is everywhere calculated from the costs of house soundproofing appearing in the perimeters, also delimited by the levels of noise (in France, Plan de Gêne Sonore).

Now, in the same time, the acoustical regards and the metrological tools for controlling noise levels correspond to the competences of these same administrations or companies: legal prerogatives to control the respect of standards and norms (chapters) for Civil Aviation Administration; a non-discrimination commercial issue thanks to the standardization of rules for Air France (chapter). Otherwise, this representation based on "technique" has in the same time permitted, during the interviews, to convey particular registers of justification on the general interest and public utility. This has be done through legal considerations (planning rules) and economic purposes (to create wealth), using for example the homo-economicus notion for the understanding of residential mobility[6]. This notion set a lot of quantitative assessments of relations between airports and local territories.

Here is enriched a principal political coding that has for a long time determined more profoundly the valuation (non) practice, notably the one of aircraft noise effects and social costs; here is presented one of the "structuring" effects of the technique as legitimism and rationality of action: rationalize the debates (*supra*).

Let's specify here that this role of the *legitimate technique* as a referential of representation and action of civil aviation or even of air companies is not at all particular. We can meet it in a number of countries, and notably in USA (Faburel, 2003b). In almost all airport situations observed, the actions led in the domain of aircraft noise is mainly based on acoustics, beyond cultural and political identities: international aircraft normalization; modeling and instruments requested for the definition of takeoff and landing procedures and for setting trajectories more respectful of the territories overflown; perimeters of zones in which planning rules and soundproofing assistance criteria are applied; determination of the actors authorized to participate in airport noise commissions…

Our main questioning was about the more socio-political causes explaining that the internalization, although present for a long time in the transportation field debates, and the

[6] Airport proximity attracts populations. How conceive a particular residential mobility and thus the noise effects on territories ?

economics literature, continues to be dissociated, in the aeronautic world, from the noise effects monetisation. We should respond through the existence of this political coding which, using the uncertainties relieved by sciences, makes the rationalization by the technique the first goal of historical public policy in this actions field.

However, this coding has in the same time made a discrimination between objects however closely overlapped: airports and territories nearby. By discourses built on the noise effects, it broke, or rather differed, all tentative of observation of dynamics and mutations more localized, notably thanks to methods regarding aircraft noise costs for the communities. It has indirectly contributed to the collectivity blindness facing the potentially multiple and complex noise effects on populations and territories, while crystallizing the debates about emissions, topic which tense the relationships between stakeholders. Let's specify here that other agents of the system, such as the local governments, also participated for a long time to this valuation gap situation, by their few valuation initiatives. Thus, this argument and the rationalities behind have not perhaps permitted for a long time to glimpse the space of trade-offs and of eventual decision possibilities, which the comprehension of these dynamic effects could, in return, enlighten (*infra*).

However, the horizon of the real internalization seems more open today, if we judge it in particular from the experts points de view and also more and more stakeholders for about ten years (*supra*). In the context of Roissy CDG, the other interviews led stipulate this will. The local governments, the communities, the ACNUSA (French authority for noise control), or even, but this a new and more determining regard, given its historical role in the debate, the airport operator (ADP), all these stakeholders call for an implementation of the polluter pays principle on the aircraft noise.

3.3 The territories against the technical referential to ask for the implementation of the polluter-pays principle

Admittedly, this wish involves logics and rationality often different: local power coalition when competition between local elected prevailed in the past; relation with associations when the only litigation process directed their mobilization; mediation logic of airport managers when its legal and technical skills help the normative rational of the aviation administration and airlines companies; or even political mission of dialogue for ACNUSA, new stakeholder of the field.

Nevertheless, the values and symbols attached to the future of territories (proximity, identity, partnership, project, empowerment…) constitute the argumentative matrix of a new speeches that solicits strongly implementation of internalization actions in CDG case. So, we are in front of a second referential: the territories, their values and symbols. And, this referential is globally supported, due to the legal competences of local governments or for neighborhoods the legitimacy of belonging community, by these last stakeholders.

This more shared expectation for internalization has as an objective not only to incline other constructors, companies, and air transport users behaviors (conventional goal of internalization), but especially to create the necessary funds for implementing new measures that, due to this referential, would be more territorialized: destination of airport employments to citizens located nearby airports, local transport services, funding for property values depreciation compensation, or even for those deciding to remain…

Furthermore, this waiting is based on another representation of noise effects. First of all, contrary to previous agents, and without more valuation findings, these territorial stakeholders consider the effects to be numerous. They draw from their personal noise experiences as well as those of social or political networks created, to feed the debate: some deputies note population turns over (moves out), local governments face to land use

constraints to consider rehabilitations, or even to satisfy the population willing to stay in these communities; citizens who estimate their property value depreciated and/or lead qualitative surveys with doctors to base their arguments on the health effects of aircraft noise. Moreover, they consider this evaluation lack and uncertainties as an public ambition shortage to mitigate noise effects. So, they ask for mobilization of other knowledge (human and social sciences), of other categories of analysis (equity, environmental justice…) and observations methods (surveys, focus groups, in depth interviews…).

This evolution of mean speech adopted shows: the barriers imposed and distance created by the historically prevailing referential of the *legitimate technique*, and the role of focus on the effects question to reveal it. A fast repositioning of certain agents in the system is resulting.

This double evolution of arguments and respective positions balances the interaction of power, turning progressively airport into a socio-technical object. And, this is not at all particular to the French case. In a large number of countries, territorial reference, through the values and principles it carries, shapes the legitimism of logics and oppositions. It also builds coalitions that resist tougher and tougher to the wills of airport extension, or simply to the existing platforms function (Faburel, 2003b).

In fact, following the Callon terminology (1997), multiple territorial swarming result from the historical centering debate through the *legitimate technique* and the tacit criteria that it carries. Territories enter, under various forms, in the public arena. This entrance is certainly not independent from the progressive emergence, almost everywhere in Europe, of the new airports objective mentioned before: to guarantee the acceptability of territorial function of airports. Especially, with regards on speeches held by territorial stakeholders, and the local community of spirit which they express, it seems that one of the obligatory path to guarantee this acceptability is to fully debate on the polluter pays principle issue: developing first the valuation of noise effects on populations and territories, and undertaking works of measurement of their social costs.

4. Conclusion: Setting airport effects in scientific controversy and political culture

Since there finally seems to exist an organic link between the valuations types mostly applied (from quantitative obedience) and the nature of political answers brought up by now (regulating and planning command and control). Since this coupling by the technique can be, according to us, linked to conflict situations that we meet almost everywhere in the world around airports. It appeared important to us to prolong this work by a questioning on the pre-requisite of passing from the intention to the action of internalization. What other types of valuations are necessary and what are the conditions of their implementation to feed the debates and thus help this mode of action to emerge in the context of Roissy CDG? Because dealing largely with the valuation and its place in the decision making process, the interviews performed allow us also to glimpse some answers to this question.

Certainly, according to interviews led, there will be place to evaluate the social cost of aircraft noise, like what was undertaken in some countries. But, as the methods suggest, and especially as the representations and political coding of actors demonstrate it, this assessment of social costs should thus be coupled with the valuation and the comprehension of sinuous and potentially multiple effects of aircraft noise on populations and territories.

So, it would be appropriate not to substitute (acoustics and psycho-acoustic help to understand, and besides, some progress still remains to achieve) but to solicit social sciences, and especially social psychology, social geography or even political sciences. Considering the structural weight of technical logic and reference, these disciplines are

excessively less represented in the aircraft noise field: at the opposite of acoustics and at the opposite of other fields defined by mitigating surface transport noise, and especially by dealing with other noise phenomena in urban environment[7].

This mobilization and this coupling would not only permit to enlighten the hiatus that appears for quite some years: while noise levels more or less stabilize in spite of the traffic rise, or even decrease around numerous big airports (Chicago O'Hare, London Heathrow, Francfort Rhin-Main, Roissy CDG…), the annoyance seems to increase (showed for the first time by Katska in 1995 tanks to longitudinal approach) and the debates are quite tended and led by the effects question. Those mobilization and coupling would perhaps permit to open and thus to strengthen monetisations: residential choice criteria for the hedonic price method, the link between households *ex post* satisfaction and house soundproofing for the method of protection costs, the sanitary effects for the damage cost method...

Also in socio-political terms, this opening could therefore, by taking into account these other dimensions, act finally to the qualification of common objects (ex. of noise effects), or even of the "hairy" objects opposed to modern objects (Latour, 1999). Like other types of economical calculation, the monetary valuation finally approaches the implicit transfers and therefore social interactions (roots of externality notion). By putting the effects in visibility, monetary valuation could have a career, which it is theoretically destined for: not just carry the scientific evidence, but open space of exchange between stakeholder and representation categories, that are these days opposed everywhere (Faburel, 2004). In that way, monetary valuation could have real operational implications, far from current situation: a certain political coding that makes technical validation the main criterion of election, and so acoustics the first foundation which pretends to be an internalization. As the Schiphol and London cases tend to show, it could help then to broaden the ways of territorialized responses to tensions that emerged from situations of discomfort and annoyance. For instance, hedonic price method permits to also inform the influence of positive airports effects (jobs supply, local transport services…) on property values. Wouldn't it be a mean to set a possible political compromise?

However, in this perspective of common objects emergence in terms of learning, it is required to implement interdisciplinary studies, far from the sectored approaches somehow partitioned and the sequential logics that could have prevailed from the past. Moreover, besides their necessity in front of complex phenomena to observe, the multiplication of the looks, the opening to others sensibilities could also help to the learning of the subject that haunts number of actors implicated, the aircraft noise effects and its scientific potential controversies. Those last could for example fully permit to face vulgates that are, all along the time pass, developed on the persisting valuation gap, or have been fed by purely functional analyses. These vulgates tense the relations between actors, more than drawing the possible compromise contours. In this sense, these works would more largely bring their contribution to the inflection of the linear phenomena representation model, therefore the one often positivist and technique deductive, dominant in the domain of action that occupies us. They would help to overtake the technical trap in which science is found these days in this field of public action.

Finally, considering the link gathering rationality production and democracy exercise (Stengers, 1997), there is according to us a necessity to consider the decision processes in

[7] France has tradition of social studies in noise and sound landscape field **:** Centre de Recherche sur l'Espace Sonore et l'Environnement Urbain - CRESSON (Ecole d'Architecture de Grenoble et CNRS), Centre Scientifique et Technique du Bâtiment – CSTB, Ecole d'Architecture de Nantes, and, more recently, Centre de Recherche sur l'Espace, les Transports, l'Environnement et les Institutions Locales (University Paris 12).

which this type of valuation works and thus the confrontation of scientific looks could take place.

If the question of noise effects did not emerge in a number of airport contexts, it stems from what finally constitutes the principal productivity of the technique framing: fencing the debates. Airports perhaps need less technical efficiency than political pertinence argument from valuation (Stengers, 1995), in order to shape acceptable decisions. Surely, to develop transversal valuation works could help in this sense. And, more important seems even to test these assessments through the confrontation of points of view and waiting represented in the public arena. And as the ramifications between the technical regard and the sequential and normative action logics were multiple and lasting, the setting in scientific controversy should be accompanied by the setting of effects question into the political culture. Since the setting of decisions concerning environment requires more and more negotiated agreement between all stakeholders, only the opening of debate to the recognition and the participation of local governments and communities could to our point of view act in this sense (Callon, Lascoumes et Barthe, 2001). By allocating responsibilities, ways of overtaking conflicts could be then considered.

But, again, a lot of empirical analyses have to be led so as to give sense to this orientation that could help perhaps airports in the conflict contexts in which they are. Once again, few valuation emanating from the field of public policies analysis has, to our knowledge, approached the procedures and their implementation to attempt such openings in view of reintegrating airports in their host territories.

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