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The assumed motives of opponents to infrastructure facilities: the 'planners' perspective' or fair distribution of risk?
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Abstract
In environmental planning, decision-making on land use for infrastructure increasingly causes conflicts, in particular with regard to contested waste facilities. Risk management and perceptions have become crucial and the focus has now shifted away from siting theory towards balancing the local concerns of host communities with the nationwide concerns of the users of the facilities.
Empirical investigations of these conflicts brought clear advancement in the fields of environmental psychology, geography and risk research. However, in planning and policy design the dominant one-dimensional approach among planners remains and the approach to address resistance to facility siting is not firmly founded in empirical evidence. Instead it uses simplified assumptions about the motives of opponents, seeing residents as merely protecting their 'turf' and exclusively focusing on their own 'backyard'.
This paper presents the findings of an empirical study on risk perceptions, based on a large-scale survey in six decision-making processes for different types of waste facilities. A scale is developed to measure the planners' perspective of the motives for opposition. The analysis shows that the crucial factors in perceived risk perceptions are not personality traits (e.g. selfishness, economic rationality). Crucial factors appear to be: perceived environmental injustice, fairness of the process, and personal commitment to others. Continual thinking in terms of 'backyard' motives disregards the socially motivated norms for equity, fairness, and commitment to others and may easily undermine co-operative behaviour.

Keywords:
Risk perceptions; Waste infrastructure; NIMBY-scale; Community commitment; Equity; Procedural fairness

Introduction

In environmental planning, decision-making regarding land use is increasingly controversial, in particular regarding contested policies such as waste management. Allotting locations for waste infrastructure easily generates conflicts, because decisions pre-eminently concern the distribution of 'bads', the axial principle of the risk society (Lash and Wynne, 1992:3; Beck, 1992). These 'bads' are embodied risks, which are perceived differently by the various actors involved. Public facility location theory originally focused on the question where to locate public facilities taking in consideration efficiency and equity concerns (DeVerteuil, 2000). Now the focus has shifted towards configuring public facilities in such a way to balance the local concerns of host communities with the wider concerns of the investors and the allocating authorities.

We start by presenting a discussion on the nature of the problem: is it an issue of land use in spatial and economic terms or is it largely a problem of policy and governance? All planning approaches seem to have one thing in common; they are based on entrenched assumptions about the behaviour, the motives, and the preferences of the people involved in location conflicts. Motives of opponents are often reduced to simple protection of 'their backyard', assigning the label nimby ("not-in-my-back-yard") as an "explanation" for opposition. In several recent reviews of the research literature, the validity of such suggestions is clearly rejected (Schively, 2007; Wolsink, 2006a).

The original approach to the siting problem was grounded in economic analysis (O'Hare, 1977), the catchy nimby-label came a few years later1. This approach emphasises the divergence between cost at the local level and benefits to the general public or at the national level. The benefits for people confronted with a facility are usually small and defined as a public good; whereas the costs are borne individually and personally by the people in the community that hosts the facility. Because the aggregate net benefits of constructing the facility are assumed to be positive, economists presumably have a "handy tool" for solving the acceptance problem: one must simply redistribute the cost and benefits in an appropriate way (Frey and Oberholzer-Gee, 1997:747). Cost-benefit approaches result in compensation strategies (Groothuis et al., 2008; Caplan et al., 2007), or in sophisticated auctions during which communities may "volunteer" and receive reimbursement for hosting a facility (Inhaber, 1991; Quah and Yong, 2008). Seemingly, the only remaining question is to wait and see which community agrees at the lowest price. The policy option of compensation does not necessarily have to be financial (Claro, 2007). In one case investigated in this paper – Nieuwegein – providing a connection of the community to the highway system was offered as an incentive to stimulate the community to 'volunteer' for a facility. The result was that the municipal government accepted it, but the local community did not and the facility was never built.

Another economy oriented approach is based on the concept of 'transaction costs' and financial risk. The interests of residents are defined mainly as their investments in their house and land use (settlement, ownership, greenery, renovations etc.), and their primary motive is defined as the desire to 'protect their turf' (Dear, 1992). Resistance is viewed as a rational response to uninsured risk. According to Fischel (2001) the best way to mitigate such a risk is to create an insurance market for it. Decisions which create uncertainty about the future threaten the investments in house ownership. Residents hold property rights in goods that derive their value from the zoning of their surroundings, something the owners cannot control or only at a great cost, as facility siting is a public decision-making process. Since housing is inflexible (i.e. bound to a location and within a spatially fixed context) and the proposed waste facilities may create uncertainty - the only rational response is to resist such developments that create risk (Deng, 2003).

However, utility is rather one-dimensional, whereas local and individual costs are complex. The economy-oriented approach continues to label this problem in terms of space, property, and land use ("my backyard"); on the other hand, the cost-benefit approach does not consider the geographical and timing aspects of decision-making. Strategies which employ incentives to change the cost/benefit balance may easily undermine the motivation to co-operate and thus fail to produce the desired results (Kearney and Smith, 1995; Frey and Oberholzer-Gee, 1997; Gallagher et al., 2008). It can be easily perceived as 'bribing', a practice which disregards the individuals' self-esteem as law abiding citizens (Frey et al. 2004:389). Essentially, the economic analysis reduces resistance in location conflicts from a situation-determined response to the threat of 'vested interests'. This negative reaction may be expressed as a protectionist attitude towards technologies perceived as risky (Marks and von Winterfeldt, 1984) or towards people who are perceived as a threat (Takahashi, 1997; Wolsink, 2006a). Nevertheless, in the economic rationale the core of the resistance problem is the rational choice to defend one's interest and utility; i.e. opposition to facility siting is a reaction driven by selfish motives (Dear, 1992; Kraft and Cleary, 1991). However, the claim that the facility serves a wider public or national interest is rarely contested (Wolsink, 1994; Wexler, 1996). Furthermore, any evidence of the assumed selfishness is seldom provided. In fact, it is highly questionable to consider selfish motives as the principal stimulus behind the oppositional behaviour (Frey and Oberholzer-Gee, 1997).

Aim of this study

The selfishness-assumption has already been criticized effectively more than 16 years ago (Freudenberg and Steinsapir, 1991; Freudenburg and Pastor, 1992). Some still use the easy label of nimby, but these examples only suggest that such typecasting it is a valuable explanation of opposition to siting facilities without presenting any adequate investigation of the motives of the opponents (recent examples: Deng, 2003; Caplan et al., 2007; Gamboa and Munda, 2007; Groothuis et al., 2008). The presumptuous persistence of its application in planners' perspective has been illustrated elsewhere (e.g Snary, 2004) and hence will not be repeated here. Instead, we present empirical research accomplished in 2002 by Devilee (2002) that focused at examining the motives for residents' resistance in such a way that some of the basic assumptions that are shaping planners' perspective can be tested. Those assumptions are as follows:

Assumptions about rationality and faith in the public good among residents

An important argument for shifting decision-making power to national and regional authorities is that all citizens (and municipalities) are assumed to maximise individual utility and all act in the same selfish manner. This has often been empirically falsified, for example with regard to services such as social housing and psychiatric institutions (Piat, 2000; Zippay, 2007) and renewable energy facilities (Wolsink, 2007b). These studies reveal the significance of investing in good relations with the public by having an open mind for other motivations than utility maximization. Almost all reports on facility siting mention the large differences in the reactions of local residents, based on a wide variety of motives. Furthermore, unfounded assumptions may concern the residents' perceptions of the facility itself or of the public good the facility is to serve. The planners' perspective is ultimately based on the frame that the facility "has to go somewhere" as if "there were full consensus" about the need of it (Owens, 2004:103). This lack of doubt among investors and authorities runs parallel with technocratic assumptions concerning the ignorance and irrationality of the public (Brown, 1987; Inhaber, 1991; Maillebouis, 2003).

Criticism concerning the structure and administrative handling of decision-making processes
In the current systems of physical planning, other stakeholders are seldom given a proper role in the decision-making process. The planners' perspective still tends towards technocratic decision making that emphasises the application of technical knowledge, expertise, and techniques of problem solving, and it does not legitimately address local groups and local residents' risk perceptions (McAvoy, 1999). In decisions that attribute and distribute risk among communities, the lack of trust in responsible agents and authorities is always at stake (Slovic et al., 1991). Risk research and psychological risk perception research has often revealed the evidence for this in facility siting (Greenberg and Williams, 1999; Baxter et al., 1999). Opposition may emerge from such factors as perceived inequity and unfairness (Adger, 2002; Capek, 1993; Lake, 1996; Lober, 1995; Yandle and Burton, 1996). Hence, the critique on the attribution of backyard motives to people questioning the risks that are imposed on them also concerns the issues of injustice, equity, fairness and ethics (Wolsink, 2007a; Hermansson, 2007; Aldrich, 2008). An interesting link is the apparently existing dichotomy between "good" (supportive to policies and the proposed infrastructure) and "bad" participation (questioning policies) as perceived by authorities and planners (McClymont and O'Hare, 2008). The fairness issue goes far beyond the limited application in most planning systems of formal consultation and options to appeal. In general, it is not even about the techniques of how to apply participation, but on how to achieve a process that will be perceived as fair (Smith and MacDonough, 2001).

The relevance of the 'backyard' for the siting of waste infrastructure

Premise of the study: hypotheses

Several propagated strategies and policies aim to counteract the frequently emerging social resistance toward siting facilities. However, they often lack in-depth understanding of the conditions behind social acceptance and resistance to new facilities (e.g. Wüstenhagen et al., 2007). The premise of the research presented here is that individual reactions to (waste) facility siting exhibit a large variation in both motives and attitudes. The concept of nimby has only some explanatory meaning in cases where "the underlying activity is widely supported while the facility to do it is opposed locally" (Lober, 1995; Sjöberg and Drottz-Sjöberg, 2001). Obviously, attitudes may sometimes differ significantly from behaviour. The nimby logic implicitly interprets this difference by attributing very specific motives for resistance. As part of the research, we developed an indicator to measure the existence and the effect of these motives. The aim is to translate the planners' assumptions about the existence of backyard motives into a testable hypothesis. The first hypothesis is:

> H1: It is possible to create a consistent and reliable scale to measure the inclination to resist a waste facility based on motives that refer to one's backyard.

The term 'reliable' is methodological, as it refers to the possibility to develop an adequate and internally consistent indicator. In line with the critique on nimby, two more hypotheses are formulated. Although there may seem to be explanatory potential in the developed 'backyard-scale', its significance remains limited when compared to other factors. These primarily concern attitudes and perceptions of risk, and relate to the manner of distributing such risks in society. Risk perceptions are crucial in siting conflicts (Boholm, 2004); in the 'risk society' the distribution of such 'bads' as risks is the essence of political decision-making (Beck, 1992). If the claim that backyard motives are crucial in opposition to new waste infrastructure is valid, these motives should provide extra explanatory power of the intentions to resist (in addition to other attitudinal factors such as risk perceptions).

H2: The ‘backyard-scale’ (the scale measuring the tendency to reject facilities based on ‘backyard’ motives) is correlated with negative attributes (in particular perceived risks), and it provides additional explanatory power for behavioural intentions.

If H2 is not rejected, it will provide substantial evidence in favour of nimby motives; however there still may be an alternative. As the strongest nimby critique suggests, the distribution of risk within a society is what really counts; the people confronted with a proposed decision perceive inequalities in term of ‘fair’ or ‘unfair’. This fairness has two components: distributional fairness (related to equity) and fairness of process. These two can be separated analytically, but remain strongly connected in the public’s perception. The latter is often referred to as ‘procedural’, which is a misnomer suggesting that it concerns only formal institutions (such as mandatory consultation procedures). Instead, the perceived fairness concerns the actual process of decision-making (Smith and McDonough, 2001; Gross, 2008). The third hypothesis formulates the limits to the significance of backyard-motives under the condition of perceived fairness:

H3: The explaining power of the backyard motives for opposition to waste facilities will be largely reduced if the process is perceived as fair.

In order to reflect upon this hypothesis, our empirical focus is on waste facilities because in the Netherlands the so-called speed-up legislation (the ‘nimby-Bill’) was implemented with a strong reference to waste infrastructure (deJong and Wolsink, 1997). This was a major step in an ongoing trend, usually legitimised as “streamlining decision-making”, which ultimately produced a new planning system where higher tiers of government have more power to overrule municipalities (Wolsink, 2003). This legislation entered in force in July 2008.

Distinguishing backyard motives from merely negative attitudes

The nimby phenomenon needs to be distinguished from attitudes toward a facility and from oppositional behaviour. Its basic premises regarding behaviour, intention and attitudes is shown in Fig.1. The concept is the inclination toward oppositional behaviour based on backyard motives, whereas the attitude itself does not cause that behaviour. This inclination originates from specific motivational concerns, which reflect individual costs versus public good.

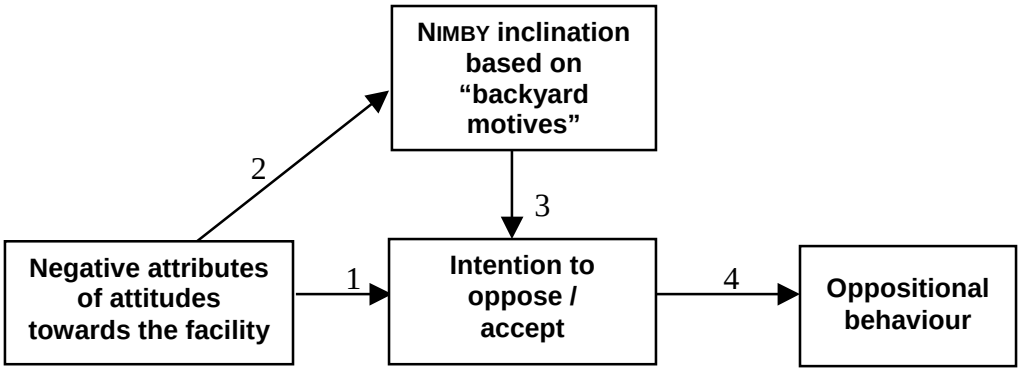


Figure 1. The conceptual position of the NIMBY inclination

Measuring this inclination by merely using indicators of behaviour or attitudes alone (e.g. Groothuis and Miller, 1994) is meaningless. Nimby would simply be synonymous with an unfavourable evaluation (Sjöberg end Drottz-Sjöberg, 2001), without indicating the motive (Relationship 1, Fig. 1). Nor can the inclination be measured indirectly by, for example, comparing the levels of rejection among persons living near the proposed facility with a control group or with a group living farther away from the facility (Lober and Green, 1994;

Marks and von Winterfeldt, 1984). Such a comparison might only show the aggregate effect at the level of sub-samples, whereas an indicator on the individual level is needed.
The measurement must concern all individuals; those who have the inclination toward rejection based on backyard motives, but also those who are not at all motivated to oppose. The Nimby argument usually focuses on opponents (as the unjustified planners' mindset is that public good is self-evident and undisputed) and ignores the supporters. The indicator is necessarily a bi-polar scale for the inclination to oppose a facility for specific reasons; it gauges the gap between the local and/or individual cost on the one hand, and the general/public benefits on the other. It reflect the individualist type of rationality which causes lack of support for public goods in the so-called social dilemmas. The original analysis of the phenomenon was already defined in terms of social dilemma theory, but that was limited to only the most rigid variant of the prisoners' dilemma (O'Hare, 1977). In a more sophisticated characterisation, the social structure of facility siting is seen as a "volunteer's timing dilemma", a game-theoretical situation which encourages not volunteering and waiting for others to act as strategic behaviour (Devilee, 2002; Weesie, 1993). The essential element is the recognition that only the population living near a certain site will be confronted with the cost of the facility, whereas others (the initiators, the investors or the society as a whole) enjoy the benefits. Because the public good as such is recognised, the resistance to the waste facility is accompanied by the inclination to shift the burden of the facility to others ("anywhere, but not here").
The use of the term 'backyard' usually contains a strong moral component. According to Parker et al. (1995) and Bratt (1999), in cases when behaviour has moral implications it is useful to include personal norms as an extension of attitude-behaviour models. Two types of personal norms are relevant in the social dilemma that characterises participation in decision-making on facility siting, namely personal norms about equity and personal norms about commitment (Kerr, 1995; Kerr et al., 1997). The equity norms refer primarily to perceptions regarding fairness of process and legitimacy of decision-making, eventually also extending to the distribution of costs and benefits in society (Adger, 2002; Gross, 2008). Within the social dilemma of facility siting, oppositional behaviour is a collective action which may fail if the number of active participants remains limited. This situation is also a typical social dilemma (Olson, 1965) as the commitment to others involved in those collective actions is very relevant.
The intention to oppose may be a result of unfavourable attitudes; however, they do not tell us much about the motives (Fig.1, Relationship 1). Motives concerning the "backyard" may also influence the willingness to oppose and this relationship (Relationship 3) reflects the impact of the NIMBY inclination. However, this does not mean that there is no relationship between attitudes and the NIMBY inclination. Hypothesis H2 defines a clear relationship, simply because there must be some recognition that the facility has negative impact. As the social dilemma is about the balance between costs and benefits, the costs must be recognised in the first place. This recognition (Relationship 2) only reflects the cognitive components (beliefs) of the negative attributes within the attitudes, but not the positive ones. However it is crucial for the planners' perspective of backyard motives that Relationship 3 is significant and substantial, i.e. the "backyard" motivated inclination should add significantly to the explanation of intentions and ultimately stimulate oppositional behaviour.

Methodology

The basic research design was a comparative multiple cases study, with in each case a questionnaire survey of the respondents living in the vicinity of a planned waste facility. Six cases were selected from a pool of 103 waste projects in the Netherlands that required a mandatory environmental impact report (Table 1). Selection was based on criteria such as size, type of facility, and duration of the decision-making process. All cases were processes

that lasted several years, (some more that 10 years (for example the Nieuwegein landfill that already started in 1989). Three cases did not come to fruition (the planned facilities were cancelled). The other three cases were selected from processes that also lasted several years but resulted in the building of a facility. The six cases concerned a variety of types of waste disposal (landfilling, incineration), waste treatment (recovery, composting) and combined waste management facilities.

Table 1. The six selected cases

Case	C: activity cancelled B: facility built	Subsample (Total 1855)
Zwolle	C landfill, recovery, composting	298
Nieuwegein	C landfill	281
Leiden	C processing and fermentation plant	259
Landgraaf	B landfill	251
Duiven	B composting plant (C incinerator)	259
Wijster	B extension composting plant	254
(Control) Gouda	No waste facility	253

The variation in type of facilities in our study remained limited to different types of waste disposal and treatment and to cases where planned facilities were built versus cases where the proposals have been cancelled. There was no planning process concerning any waste facility in the control case, Gouda, which is an average-sized city situated in an environment that is neither very urban nor rural. In one case the planned composting facility but not the incinerator was built, and in another case the composting plant was an extension of an existing composting plant and landfill. The design was chosen to compare public perceptions, decision-making processes, and beliefs among key-actors in those processes (Devilee, 2002; Wolsink, 2004). For the investigation of public perceptions random samples (table 1) were taken within a maximum radius of 5 kilometres from the facilities. These samples were compared with population figures resulting from geographic information system (GIS) data, which revealed no significant sample bias.

The questionnaire in the face-to-face surveys was designed according to the state-of-the-art attitude-intention-behaviour model known as the “theory of planned behaviour” (Ajzen, 1991, 2001). As noted, the term NIMBY contains normative or implicit interpretations about motives for opposition, and because of that “theoretical” distinction it must also be empirically separated from behavioural and attitudinal opposition (fig.1). Because definitions of NIMBY usually remain implicit and no literature concerning experience with indicators of the backyard motivation exist (Wolsink, 2006a), for this purpose a new scale to measure the individual’s inclination to motivate resistance with backyard arguments had to be developed. This was done in a pilot study with 137 respondents with a balanced variation of age, gender, and level of education. The pilot (also face-to-face) aimed at the development of a set of reliable indicators coming from 17 items (results in table 2), repeated for three types of waste management facilities: a landfill, a composting plant, and an incinerator.

Seven items were selected to measure the backyard-motivation in the main survey. After data collection the first step was to test the consistency of this scale, and then the relevance of the NIMBY concept is examined by relating it to the other important concepts, such as perceived risk, perceived negative consequences, and behaviour. This examination is based on structural equation analyses (LISREL; Jöreskog and Sörbom, 1996).

Actual political participation is usually a highly skewed variable (only a small part of the population is really taking any action) and because of that invariance, in most empirical

research active political participation is usually less correlated to all research variables than variables indicating psychological involvement (Cohen et al., 2001). Therefore, as also formulated in the hypotheses, the model primarily focuses on intentions (although participation in oppositional activities is included).
The full model of explanation of opposition to and support for waste facility siting includes a large number of variables and to avoid the deletion of too many respondents because of occasional missing data, the maximum number of respondents who delivered substantial information in the analysis is included[2]. The full model is described and tested by Devilee (2002).

Table 2. Items and factor loadings in the pilot study (PCA; n=134)

Items	Factor loading
It's quite stupid to accept a waste facility in your own neighbourhood.	.85
Because I don't think it's very necessary to bear a part of the collective burden, I don't accept a waste facility in my neighbourhood.	.78
It's completely logical for me that a waste facility should be sited in someone else's neighbourhood.	.74
If good arguments can be found to site a waste facility in my neighbourhood instead of in someone else's, I will accept such a facility.	-.74
I don't accept a waste facility in my neighbourhood, because I think that somebody else would not accept it in his or her own neighbourhood.	.72
Because a waste facility has to be built somewhere, I don't object in advance to it being sited in my neighbourhood.	-.68
Accepting a waste facility in your own neighbourhood means that you don't represent your own interests strongly enough.	.67
I don't feel like shouldering the burden of a problem that is also caused by others, by accepting a waste facility in my neighbourhood.	.66
As far as I'm concerned, a waste facility should be sited in somebody else's neighbourhood.	.63
Life is competitive: if a waste facility is sited in someone else's neighbourhood it is not sited in mine	.60
The costs resulting from waste facilities should be borne by all of us.	-.54
It's only common sense not to object in advance to a waste facility being built in your own neighbourhood.	-.50
With respect to the location of a waste facility, I certainly want to contribute in one way or another to solving a problem that is also caused by others.	-.43
Whoever wants to make the profits also has to bear the associated burden: A waste facility may cost me something.	-.37
As long as a waste facility is not built in my neighbourhood, I don't object to it.	.33
I'm willing in some way to pay extra in order to contribute to the costs of building a waste facility in another municipality.	-.14
As a matter of fact, I don't think it's fair to saddle another municipality with a waste facility.	.06

Pilot study

Items for the backyard-scale must be variants of the recognition that only the population living near a certain site will be confronted with the cost of the facility, whereas others (the initiators, the investors or the society as a whole) enjoy the benefits. The items should reflect the component of the assumed tendency to frame the issue in terms of (economic) rationality

and utility maximization, which can be summarized as "citizens demand the completion of such projects, but refuse to have them located in their vicinity" (Frey and Oberholzer-Gee 1997:747). A wide variety of formulated items indicated the inclination to demand the completion of the projects elsewhere, including the shift of the burden to others ("anywhere…") and refusing them in their vicinity ("…but not here"). On the other side of the scale we must find those individuals that would accept the burden as soon as they recognise that the facility creates a public good. As the pre-selected items (table 2) should be indicators of one latent variable that represents the concept of an inclination toward NIMBY behaviour, a first check on the consistency of the items in the pilot study is carried out. In this one factor PCA (principal component analysis) high absolute factor loadings (close to 1.0 or to -1.0) indicate high correlations with the communal factor (Eigen value = 6.2). The factor loadings in this PCA are shown in Table 2.

The strongest indicators seem to be the hard-boiled, individualist utility-maximizing items ("I don't think it's very necessary to bear a part of the collective burden …") reflecting the supposed economic rationality ("It's quite stupid to accept ..." and "it's completely logical …."), versus the willingness to accept individual cost in support of the public good ("If good arguments can be found …."). Items that tend to express a preference to balance the costs and benefits with a reference to other actors ("Whoever wants to make the profits also has to bear the burden") or locations ("I don't think it's fair to saddle another municipality…") do not load. However, some items with general elements of commitment to equity and fairness ("The costs resulting from waste facilities should be borne by all of us") moderately load on the first component. These were taken into consideration in the subsequent phases of the research.
In the second step items with the highest loadings (|factor loading|> .50) were selected from table 2. Out of the twelve criteria, three were used for further selection including: a) diversity in content, b) diversity in the direction (positive/negative), and c) sufficient test reliability. Finally, this resulted in scale of seven items that was very reliable in the pilot study (α = .84) with the fifth, and the sixth item, which are formulated positively (acceptance, even in one's own backyard) recoded for the reliability test. This scale included only items that improved the reliability (Table 3) and it was robust, as it did not lose its reliability for different levels of education. Analysis of variance revealed that there was no need to differentiate the scale with respect to the type of waste facility (Devilee, 2002). In addition to performing the component analysis and the reliability tests, the respondents were interviewed about the interpretation of the formulation of the items in order to find and restore unintended meanings of particular formulations.

The reliable 'backyard motivation' scale

To test the H1 hypothesis, six scale items in Table 3 included in the field survey questionnaire. The item which receives the most extreme score is not included, in order to prevent an overly skewed variable. The reliability test of the NIMBY items in the survey confirms the results in the pilot study, and it shows that a very reliable scale could indeed be constructed (Table 4). Hence, hypothesis H1 seems to be supported, but further analysis shows that this conclusion has to be nuanced; the inclusion of two new items in Table 4 clearly reveals the special normative element in the NIMBY inclination.

Table 3. Items selected for inclusion in the survey (α= .84; n=134)

Item	Mean	α if item deleted
The costs resulting from waste facilities should be borne by all of us. (-)	1.85	.83
As far as I am concerned, a waste facility should be sited in someone else's neighbourhood	2.23	.84
I don't accept a waste facility in my neighbourhood because I think that somebody else would not accept it in his or her own neighbourhood.	2.37	.82
It's quite stupid to accept a waste facility in your own neighbourhood.	2.43	.80
If good arguments can be found for siting a waste facility in my neighbourhood instead of in someone else's, I'll accept it. (-)	2.44	.81
Because a waste facility has to be built somewhere, I don't object in advance to it being sited in my neighbourhood. (-)	2.50	.82
I don't feel like shouldering the burden of a problem that is also caused by others, by accepting a waste facility in my neighbourhood.	2.95	.82

Items scales range from 1 (fully disagree) to 5 (fully agree)
(-) Item recoded: 1 (fully agree) to 5 (fully disagree)

As explained in the section on principles of item construction, specific personal norms may be significant in cases concerning the shift of a burden to others. Following Kerr (1995), we included items in the questionnaire to measure personal norms about commitment (to others) and personal norms about equity. The two items included in the final scale (Table 4) are added as indicators of the personal norm about equity in social dilemma situations: "I don't consider it (= siting the waste facility here) fair" and "It is in conflict with my ideas about equity". Including these items in the scale improved its reliability, resulting in very reliable scale (α = .86). The findings do support hypothesis H1; however, the scale clearly does not primarily reflect the supposed economic rationality, the foundation of the 'backyard' items. Obviously, norms about equity are at stake when local residents develop an inclination to resist unwanted activities in their neighbourhood. The residents apparently recognise the connection between waste facility siting and environmental justice. The personal norm of equity prescribes a balanced input and output in the social dilemma, and the backyard-motivation scale (NIMBY-inclination) is an indicator of that norm. It does not indicate values for selfish economic rationality, which has consequences for hypothesis H3.

The item means (recoded for three items) indicate the preferences in the social dilemma. On average, the respondents slightly disagree with most of the statements, although this should be interpreted carefully. The items indicate an inclination that might be considered socially less acceptable and there may be reluctance to voice such attitudes. Within the context of this study, it is not the central tendency (the average support) what counts, but the differences between individuals (in methodological terms: not the mean, but the variance). All items have a substantial variance and the scale has clear potential explanatory power, as the next sections demonstrates.

The statements with the highest means were: "Because others would not accept (the waste facility) either" and "I don't feel like shouldering the burden of a problem that is also caused by others." The item: "Site (the waste facility) in someone else's neighbourhood" was the one that the respondents disagreed with most strongly. Overall the scale indicates that there is still a substantial minority who prefer not to volunteer in the social dilemma, and a much smaller minority who also want to shift the burden to others.

Table 4: Final 'backyard-motivation' scale (NIMBY-inclination; N = 1525; α = .86)

Item	Mean	α if item deleted
As far as I am concerned, a waste facility should be sited in someone else's neighbourhood.	1.95	.86
It is in conflict with my ideas about equity. (Eq)	2.11	.84
If good arguments can be found for siting a waste facility in my neighbourhood instead of in someone else's, I'll accept it (–)	2.26	.85
Because a waste facility ultimately has to be built somewhere, I do not object in advance to it being sited in my neighbourhood. (–)	2.31	.85
It is quite stupid to accept a waste facility in your own neighbourhood.	2.35	.83
I do not consider it fair. (Eq)	2.44	.83
I do not feel like shouldering the burden of a problem that is also caused by others, by accepting a waste facility in my neighbourhood.	2.68	.84
I do not accept a waste facility in my neighbourhood because I think that somebody else would not accept it in his or her own neighbourhood.	2.89	.85

Items scales range from 1 (fully disagree) to 5 (fully agree)
(–) Item recoded: 1 (fully agree) to 5 (fully disagree)
(Eq) Item originally formulated as indicator for commitment to equity

Backyard motives related to attitudes

In addition to the NIMBY inclination, the following concepts were included in the model:

- *Perceived benefits:* 7-item scale (α = .79); (source of employment, efficient use of raw materials etc.);
- *Perceived costs:* 9-item scale (α = .83); (ugly, noise annoyance, nuisance from birds etc.);
- *Risk perception:* 7-item scale (α = .81); (frightened of potential for accidents, installation is 'not dangerous', installation is a 'time bomb' etc.);
- *Personal norm about commitment:* 2 items (α = .65); ("I promised others to reject"; "they expect me to disapprove.");
- *Intention to accept:* single item 5-point scale from strong opponent to strong proponent;
- *Opposition to the waste facility:* 9 dichotomous items combined in one strong cumulative scale (Loevinger's H = .50, from "signed petition" to "contacted a lawyer").

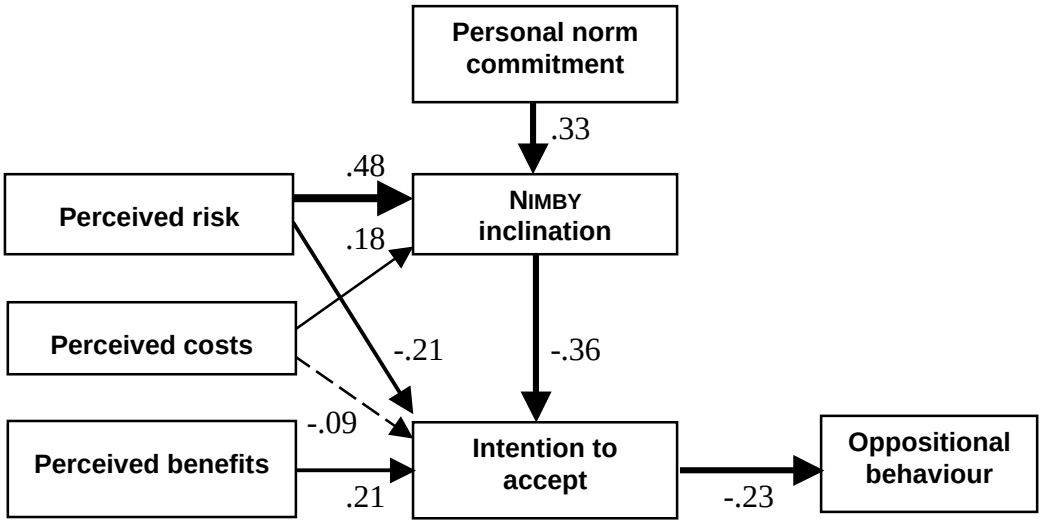
In the theoretical model *perceived health consequences* were included; however, this 3-item scale (α = .83) was later discarded after the test revealed that its relationships with the other variables in the model were not significant ($p > .01$). Perceptions of potential health consequences were clearly related to the intention to accept the facility, but there was also a rather strong correlation with perceived risk. As a result of this phenomenon, methodologically known as multicollinearity, perceived health consequences did not add significant explanation beside the fact that there existed a perceived risk.

As in other studies measuring actual political participation (beyond voting), we find oppositional behaviour to be a very skewed variable - 86% had taken no action at all. Variables indicating psychological involvement, such as the willingness to oppose, can relate

much better to the other research variables than the active political participation variable can. This observation by Cohen et al. (2001) is clearly valid, as the variable "oppositional behaviour" is explained only to a limited degree (8%), mainly due to its invariance (only a small percentage had actually taken any steps). However, the full model explains 66% of the variance of the "NIMBY inclination", and 45% of the "intention to accept." The joint effect (.42 in the full model) of the direct and indirect paths of perceived risk is much stronger than the effect of the NIMBY inclination. "Perceived risk" is the crucial factor with respect to the intention to accept a waste facility. This finding follows prospect theory, which asserts that in assessing new situations the avoidance of risk generally carries more weight than the possible benefits do (Tversky and Kahneman, 1992). Below, the final two models are examined by comparing the differences between the sub-samples of cancelled and built waste facilities.

Model of cases where waste facilities were cancelled

Attitudes and perceptions easily shift once facilities are actually built (Wolsink, 2007b), which implies that their interdependence may also change. Figure 2 presents the structural model for residents in cases of cancelled waste facilities. The model of the sub-sample of the first three cases (Table 1) explains 63% of the variance of the NIMBY inclination, 48% of the intention to accept, and 5% of the opposition. The correlation between "perceived costs" and "intention to accept" is insignificant ($p > .01$). What is very salient in the model is the correlation perceived risk has with the NIMBY inclination ($\gamma = .48$) and also with the intention to accept ($\gamma = -.21$). Perceived risk has a total effect of -.38, combining the effects of direct impact risk and the indirect effect via NIMBY. When assessing the intention to accept a waste facility, risk perception is the crucial factor.



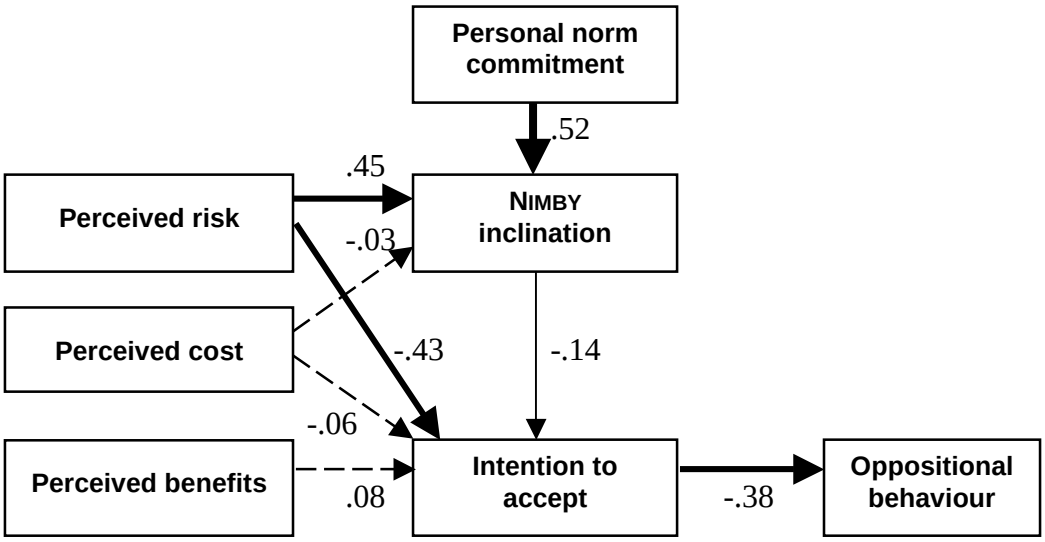
[GFI=.921; AGFI=.907; RMR=.044]

Figure 2. Explaining support of and opposition to cancelled projects (n = 793)

Apparently the avoidance of risk is the main reason for rejecting a waste facility, but it is only partly linked to "backyard" motives. This supports the first part of hypothesis H2. There are two paths to the intention to accept a waste facility. The direct paths in Figure 2 from "perceived risk" ($\gamma = -.21$) to the intention to accept represent a reason for opposing a waste facility without any reference to the backyard. The perception whether or not the facility will create benefits adds to this intention, but this variable has no relationship with the NIMBY inclination (also supporting H2). The direct paths represent to what extent local residents

oppose a waste facility; the reasons are directly associated with a waste facility and not with the position taken in the volunteer's timing dilemma.
Policy makers view the NIMBY inclination as the most direct influence which generates opposition. Following their argument, it is logical that local residents immediately put the problem in a social dilemma context and decide to oppose a waste facility. The indirect path via the NIMBY inclination represents the validity of this line of reasoning. The relationship between the NIMBY inclination and the intention to accept is clearly significant (β= -.36). This shows that at least a substantial part of the population living in a neighbourhood where a planned facility was cancelled was clearly motivated by the perception that they had to carry the burden for others. However, as shown in the previous section, this opposition is not a result of selfish economic rationality, but rather due to the perceived (lack of) fairness of the decision-making. Furthermore, beside this impact of perceived risk, the NIMBY inclination is also affected by personal norms about commitment. The NIMBY inclination is strongly affected by personal norms, which is an adaptation of hypothesis H3. The "backyard" motive does influence the acceptance of waste facilities, however only in so far that it is influenced by the norm about commitment to others. On the other hand, the scale reflects norms about equity and fairness instead of economic and rational based utility-thinking.

Model of cases where facilities were built
In the model for the three cases where the planned facilities were actually built (Figure 3) the relationship between the perceived costs and the NIMBY inclination is not significant (p > .01). This is a clear difference from the model for cancelled waste infrastructure (Figure 2). The same holds for the relationship between the perceived benefits and the intention to accept, which is not significant. The fit of the model is slightly better for this sub-sample than for the cancelled facilities sample.



GFI=.926; AGFI=.912; RMR=.044

Figure 3: Explaining support and opposition in cases where facilities were built (n=718)

Risk perception is even more prominent in this model. The negative consequences seem to have boiled down to only considering perceived risk. The perceived risk concerns safety and accidents, while the perceived costs are negative consequences such as smell, attraction of birds, etc. The perceived risk also contributes to the NIMBY inclination; however, contrary to

the previous correlation, this is important because of the weak relationship between the NIMBY inclination and the intention to accept (β = -.14).
In these cases, the residents were able to gain some experience with existing waste facilities and information processing, measured by a strong cumulative scale and controlled for the significant effect of the facility type [(F [1595,2] = 16.3; p<.01)] appeared to be significantly higher in cases where the facilities were constructed that in case where they were cancelled (F [1595,1] = 97.6; p<.001; Devilee, 2002:146). Therefore, risk perception should be seen as a relatively stable and very important explanatory factor in conflicts over siting waste facilities. The relationship between the personal norm about commitment and the NIMBY inclination is even stronger (from γ=.33 to γ=.52). Apparently, the feeling that one should commit to explicit or implicit agreements in one's own neighbourhood has become more important. However, its impact on intentions to accept remains limited as the NIMBY inclination no longer adds much explained variance to the intention to accept. The two most important differences between the models for cancelled and built facilities are the decreased significance of "backyard" motivation and the fact that risk perception was the only remaining salient attitudinal factor which explained the intention to accept. At locations with waste facilities, the most important indicator of potential resistance is the direct path from the perceived costs, perceived risk, and the perceived benefits via the intention to accept to the reported opposition. The direct impact of perceptions was more important, at the cost of the indirect path via the NIMBY inclination.

Conclusions and discussion

This paper demonstrates that it is possible to construct a reliable scale to measure "NIMBY". This scale is useful when trying to understand the reactions of local residents in the various phases of decision-making waste facilities. The comparison between the structural models for constructed and cancelled facilities indicates that NIMBY motives do play a role predominantly in the planning phase of a decision-making process.
However, as the scale clearly demonstrates, the most important finding is that local opposition cannot be explained by selfishness. In fact, the hypothesis H1 and H3 melt together, as there is no separate influence of norms about equity and fairness. Instead, in the residents' mindset the backyard motives seem to be synonymous with these norms. Furthermore, the scale measuring backyard motives not only reflects norms about equity and fairness, it is also clearly informed by norms of commitment to others. The difference between the models for constructed and planned cases suggests that normative evaluations are influential, especially in the planning phase of waste facilities. The crucial factor is clearly not that residents have strong intentions to shift the burden to others, but that they consider it unfair that others, the decision makers, are placing the burden on them. Therefore, the crucial factor in infrastructure siting issues is not selfishness, but rather: fair decision-making, not causing injustice, and applying ethical principles in the distribution of risks (Hermansson, 2007).
A point of concern is the imprecise and simplistic way the term 'backyard' is still used by some academics and policy makers. As previously discussed, scholars are increasingly rejecting the validity of the entire NIMBY concept. At most, it can be viewed as only one possible framing and usually one that is inferior and should be avoided because of scientific invalidity as well as political ineffectiveness (Freudenburg and Pastor, 1992; Futrell, 2003; Wolsink, 2006a). Similar criticism has emerged regarding social infrastructure, such as special housing projects (Piat, 2000; Zippay, 2007). This seems to support the claim that now there is a "widely accepted realisation that public concern about environmental risk cannot be characterised in terms of NIMBYism and is linked fundamentally to wider psycho-sociological factors" (Snary, 2004:51; also: Pol et al., 2006). This observation is congruent with the concept of the 'risk society' and with post-modern politics of governmentality. The argument

of NIMBY is used as a justification to avoid deliberation in the process of assigning risk in facility siting; however, deliberation is essential in risk management, as it is a process of assigning responsibility in managing risks to those who will be affected by the potential consequences (Renn, 2006).

Furthermore, it is not only risk that counts; the perception of unfair treatment may be connected more to the location, in particular when people have strong feelings of place identity (Wester-Herber, 2004; Van der Horst, 2007). Nevertheless, some researchers continue to use the term and policies continue to follow the strong (faulty) assumptions about local opposition. The recent hierarchical changes in the new Dutch planning system, which are legitimised as "streamlining", follow this line of thinking (Wolsink, 2003). Similar ideas about 'streamlining' that propose to enhance the power of hierarchy exist in other countries, such as in the UK (Cowell and Owens, 2006). The findings of this research imply that the national governments base this hierarchical speed-up legislation on faulty policy theory.

The other often discussed argumentation, concerning economic compensation, has already been criticised because it tends to undermine ("crowding-out") social motivation for co-operative behaviour (Frey and Oberholzer-Gee, 1997). A good policy theory should acknowledge the complexity of a planning situation, rather than simplifying it on the basis of questionable assumptions. In social-dilemma situations, such as our volunteers-timing dilemma of waste facility siting, Ostrom (2000) suggests that governments should be more concerned with designing institutions which can enhance citizen participation, not ones that crowd it out. Unfortunately, the planners' perspective primarily uses the frame which presupposes a full consensus about the need for the facilities (Wolsink, 1994; Wexler, 1996; Owens, 2004). The proponents' frame is TINA – "there is no alternative" – and the ultimate question behind environmental conflicts about infrastructure is how to expand the frame to "what are the alternatives if it doesn't go anywhere?" (Owens, 2004:110). The risks associated with waste infrastructure (framed by the public) need to be elaborated in deliberative processes and not in technocratic appraisal procedures. The acceptance of such innovations would require essential institutional changes (Petts, 2004; Wüstenhagen et al., 2007). A striking example of such institutions is the prevailing economic approach, which is considered almost self-evident and is all too easily applied to complex decision-making regarding spatial distributions of risk. Criticising this practice, Frey et al. (2004) propose to enrich economic theory by including the procedural utility produced by the individuals' possibilities to participate in social and economic decision-making: "The rights to participate in political and economic decisions are important characteristics of modern societies" (p.397).

Remarkably, when it proves impossible to site a facility, sometimes after struggles lasting more than a decade, the proponents of the TINA-frame suddenly show more flexibility. Examples of such new surprising alternatives in the Netherlands can be found in the siting processes for mineral excavation and water issues (Wolsink, 2006b). Examples of cases when the pressure of not securing an adequate site resulted in changes of waste policies can be found in Canada (Kuhn and Ballard, 1998).

It is remarkable that most authors using the backyard-label are not very specific about the exact nature of NIMBY, both in the literature and at the policy level. There is a tendency to label all opposition to spatial development as NIMBY opposition. "'Not-in-my backyard describes the organised resistance of communities to the siting of controversial land uses and facilities" (Takahashi, 1997:119). The fact that the inclination toward NIMBY behaviour can be measured is important, particularly as NIMBY is often put forward as a flawed explanation of all problems the authorities and other agents face in their efforts to site their facilities. This is nearly always the case in issues related to waste infrastructure. With a properly designed research this effect can be investigated and adequately measured. The significance of this conclusion is that simple references to NIMBYism as the primary explanation for public

opposition, without proper evidence of the existence of such motives, are in fact academically unacceptable.

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Notes

1. Christian Science Monitor, 4 November 1980, "Hazardous waste". This apparently first documented use of the term NIMBY already refers to name-calling by the waste industry.
2. Because the imputation should not affect the differences between the sub-samples, missing data were replaced by corrected item means (CIM), in which a missing value on an item is imputed by the sub-sample mean corrected for the other scores of the respondent on the same scale (Huisman, 2000). This leaves structural differences between sub-samples intact. The reliability of all scales was tested before the imputation.

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