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# Citizen Complaints about Environmental Pollution: A Survey Study in Suzhou, China

Xianbing LIU, Yanli DONG, Can WANG, and Tomohiro SHISHIME

**Abstract:** This paper discusses environmental complaints made by citizens living close to industrial polluters in China. Data collected from a questionnaire survey in Suzhou City is used for the analysis. The results confirm a marginal level of citizen environmental complaints in the study area at present. Meaningful findings include the fact that citizens have a tendency to complain collectively, and that perception of the level of environmental information provided by companies significantly determines a citizen's likelihood of lodging environmental complaints. Therefore, the disclosure of corporate environmental information must be emphasized continuously; citizens must be encouraged to correctly understand the environmental performance of companies so that they might make appropriate complaints. Governments need to show their support for citizen-led environmental complaint initiatives. The successful cases would convince them to keep a closer eye on their neighbouring polluters.

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**Keywords:** China, Suzhou, environmental complaint, citizen

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## Introduction

The continuous and rapid growth of the Chinese economy has improved the material well-being of the Chinese people and has led to rapid urbanization and industrialization. However, coinciding with those changes, environmental degradation has been significant. The severely polluted environment has adversely affected human health (OECD 2006). The Chinese government has made great efforts to implement countermeasures in the past two decades and has developed an integrative regulatory and institutional framework of environmental management to help curb environmental deterioration. At least 24 laws focusing on pollution control have come into effect since 1989. A number of new laws on the environment were enacted and updated between 2000 and 2008, such as the Law on Environmental Impact Assessment, the Law on Cleaner Production Promotion and the amended Environmental Protection Law (Lin and Swanson 2010). Nevertheless, the current Chinese environmental policies are still dominated by command and control instruments, which generally suffer from weak capacity in environmental enforcement, in particular at local levels. According to the OECD (2006), urban and state-owned enterprises are inspected 8.6 times per year on average by municipal- and national-level Environmental Protection Bureaus (EPBs). The environmental inspection frequency is higher in cities (approximately 12 times per year) and lower at the county level (with an average of 5.5 times per year). Owing to the lack of monitoring capacity or the constraint of pragmatic enforcement, a considerable proportion of the township and village enterprises (TVEs) cannot be inspected regularly. In reality, a number of inspections are triggered by citizen complaints regarding pollution incidents in China.

A great deal of literature on traditional environmental policy advocates that government regulators act as sole agents for the public environmental interest, and that controlling large stationary pollution sources should be the first goal of regulators (for example, see Bell and Russell 2002). However, it is rather difficult for the regulators to monitor small and dispersed polluters, which individually make modest contributions to pollution but which may collectively have a serious environmental impact. It is also challenging for the regulators to find illegal “midnight discharging”, as these emissions are unobservable. Naturally, the regulators solicit complaints from citizens or communities who are affected by such pollution. Meanwhile, the people who engage in direct negotiations with polluters can enhance their bargaining positions by threatening to

complain to regulators (Dasgupta and Wheeler 1996). Empirical studies have identified that pressures from a company's related stakeholders, including neighbourhoods and community groups, play significant roles in determining the company's environmental performance (see, for example, Henriques and Sadorsky 1996; Zhang et al. 2008). Prescriptive regulations combined with stakeholder participation are particularly essential for developing countries like China where monitoring capability is usually insufficient.

There are some researchers questioning the usefulness of citizen complaints in creating more efficient environmental enforcement. For example, Weersink and Raymond (2007) argue that environmental complaints lodged by the citizenry may be skewed due to differences in demographical characteristics. Citizens with higher education and income levels may understand the harmful effects of pollution better and have a stronger desire to improve the quality of their surrounding environment. Dasgupta and Wheeler (1996) also worry about using citizen complaints in the enforcement process since the complaints may not be directly associated with environmental violations. Citizens may lack the knowledge to distinguish between nuisance emissions and true hazards. Nevertheless, Huang and Miller (2006) view the reporting of violations by local citizens as a cost-effective method of targeting illegal emissions, since polluting companies are usually transparent to their neighbourhoods. Using China's environmental statistics data set at a national level, Dong et al. (2011) present an analysis of the relationships between citizen environmental complaints, pollution densities and socio-economic characteristics. Their results confirm that environmental complaints can provide valuable information for regulators to efficiently allocate inspection resources despite the fact that the information may be inaccurate sometimes and that the complaints are more likely to arise from wealthier and more educated regions.

In spite of the usefulness of citizen environmental complaints as a popular form of public participation in environmental management, there are few studies that measure the actual complaints raised within Chinese communities with high proximity to companies. It is also unclear what factors determine the complaints of individual citizens regarding environmental pollution. With the aim of filling the existing research gap, in August of 2009 we conducted a questionnaire-style survey among people living close to the polluting companies. This paper summarizes the survey results and mainly discusses three topics:

- the current status of environmental complaints made by companies' neighbouring residents as the actual or potential victims;
- the factors determining citizen environmental complaints; and
- methods for encouraging future citizen environmental complaints.

Suzhou, a representative city of Jiangsu Province in China, was selected as the survey area. The urban citizens living near the industrial companies were personally interviewed to collect necessary data for this analysis.

## Citizen Environmental Complaints in China and the Survey Area

Before 2007, Chinese citizens could file complaints regarding environmental pollution by means of either writing letters or directly visiting the environmental agencies at different levels. Subsequently, telephone hotlines were gradually established as an additional way for the citizens to easily report environmental non-compliance. Overall, people are not satisfied with the environmental behaviour of their neighbouring polluters. As listed in Table 1, different levels of EPBs received approximately 67,000 letters complaining about air, water, solid waste and noise pollution in 1996. Plaintiffs visited provincial and local EPBs at lower levels approximately 47,000 times in the same year. The number of letters expressing environmental complaints increased considerably, exceeding 600,000 as of 2006. Likewise, the number of visits regarding environmental complaints increased to over 70,000 in the same year (SEPA 1996-2007). Most complaints from citizens concerned air and noise pollution, accounting for 39.3 per cent and 42.7 per cent, respectively, of citizen complaints in 2006, while letters of complaint regarding water pollution accounted for only 11.9 per cent. After an unusual decrease in the number of both letters and visits for environmental complaints in 2007, the number of environmental complaints by letter reached a record high in 2008 (MOEP 2008). In spite of unclear reasons for the sudden decrease in statistical data in 2007, an interesting finding may be observed from the historical change of environmental complaints by visits: The number of complaints by visit reached a peak in 2002, at which point a decreasing trend emerged. The decrease has been more dramatic since 2006. This fluctuation correlates roughly with changes in major pollutant emissions in China. Using COD (chemical oxygen demand)

and SO<sub>2</sub> as examples, the emissions volume for both pollutants kept increasing until 2005. Since 2006, COD and SO<sub>2</sub> emissions have started to decrease. In 2008, the total volume of COD emissions decreased by 4.4 per cent, and SO<sub>2</sub> emissions decreased by 5.9 per cent compared to the previous year (MOEP 2008). This shows that environmental complaints by visit may work as an indicator of pollution intensities, an idea confirmed by the statistical analysis of Dong et al. (2011). Along with the gradual improvement of environmental quality, citizens may refrain from the time-consuming visits but still use the easier ways, letters or phone calls, to complain about pollution.

**Table 1: Number of Environmental Complaints by Letters and Visits in China**

Year	Number of letters	Responses to the letters	Number of visits	Responses to the visits
1996	67,268	64,457	47,714	42,671
1997	106,210	101,254	29,677	26,908
1998	147,630	142,367	40,151	36,141
1999	230,346	220,424	38,246	36,070
2000	247,741	237,753	62,059	61,205
2001	367,402	349,454	80,329	75,036
2002	435,020	413,880	90,746	74,221
2003	525,988	503,333	85,028	72,939
2004	595,852	574,293	86,414	70,735
2005	608,245	541,121	88,237	68,718
2006	616,122	576,151	71,287	62,166
2007	123,357	116,149	43,909	42,832
2008	750,127	660,665	43,862	40,748

Source: Authors' own compilation.

Nevertheless, it was disappointing that numerous claims could not be resolved since the environmental participation rights of civil society are still not fully supported in China. For instance, the existing legislation does not clearly define the procedures for public involvement in environmental lawsuits, and almost all environmental complaints lodged by citizens are reported only to environmental agencies. The environmental authority at the national level recently announced its intention to encour-

age public environmental participation, including complaints about pollution, by incorporating environmental information disclosure strategies. However, the available environmental information can hardly satisfy the actual needs of the public to correctly understand the environmental behaviour of polluters. Chinese people are mainly informed by public media like TV, radio, newspapers and the Internet, which provide only limited and general information on the environment (CEAP 2008).

The historical changes in citizen environmental complaints in the survey area, Suzhou City, are shown in Table 2. We are limited by data availability, and can only use data from 2002 to 2007; furthermore, we cannot distinguish between complaints by letter and visit (SZEPB 2002-2007). Overall, citizen environmental complaints in Suzhou increased until 2004, and then decreased starting in 2005. It is obvious that the proportion of citizen complaints regarding water and air pollution decreased, while the ratio of complaints on noise pollution increased rapidly between 2002 and 2007. This may reflect gradually improving water and air quality in the study area in the same period.

Table 2: Historical Changes in Citizen Environmental Complaints in Suzhou

Year	In total		Water pollution		Air pollution	
	Count	%	Count	%	Count	%
2002	4,271	100.0	864	20.2	1,919	44.9
2003	7,080	100.0	1,349	19.1	2,332	32.9
2004	9,404	100.0	1,580	16.8	3,300	35.1
2005	3,386	100.0	240	7.1	457	13.5
2006	3,465	100.0	302	8.7	600	17.3
2007	3,308	100.0	164	5.0	291	8.8

Year	Noise pollution		Others	
	Count	%	Count	%
2002	1,286	30.1	202	4.8
2003	3,158	44.6	241	3.4
2004	4,084	43.4	440	4.7
2005	2,281	67.4	408	12.0
2006	2,380	68.7	183	5.3
2007	2,744	83.0	109	3.2

Source: Authors' own compilation.

## Methodologies

### Analytical Framework for this Study

Existing literature explains the formulation of the environmental behaviour of citizens mainly from two perspectives. One is rooted in traditional economic theory, which links an individual's decision-making to the logic of interests in the actions. The other explanation discusses this topic from a social-psychological perspective. The social-psychological studies identify environmental attitudes and behaviours as multidimensional phenomena. It is suggested that environmental attitudes and behaviours are related to values (Poortinga 2004). Stern, Dietz, and Guagnano (1995) showed that social values are significant in distinguishing different levels of environmental behaviour. Some other social-psychological factors also have significant influences on an individual's environmental practices. Seguin, Pelletier, and Hunsley (1998) found that perception of a threat of environmental deterioration greatly increases the level of people's environmental efforts. Many studies have indicated that feeling personally able to make tangible changes has significant impacts on environmental behaviour patterns (see, for example, Roberts 1996). Perception of responsibility is another important factor, since the lack of personal responsibility is unlikely to motivate sustainable behaviours (Nancarrow, Smith, and Syme 1996-1997). Besides the social-psychological factors mentioned above, Chan (1998) argued that social influences and subjective norms are particularly significant to visible environmental behaviour. The ability to pay the selective costs of environmental behaviour is related to the availability of the money, time and civic skills necessary for effective participation (Brady, Verba, and Schlozmann 1995). In turn, the availability of money, time and skills is associated with the demographic variables usually considered in research on environmental behaviour. The general understanding is that well-educated, higher-income, younger, female and non-minority citizens are more likely to support and practise environmental behaviours (Samdahl and Robertson 1989).

Hirose (1995) presented a general determinant model for the environmentally friendly behaviour of individuals, in which the decision-making process leading to such an action is assumed to operate in two phases. In the first phase, the general attitude or "goal intention" is formed, while "behavioral intention", such as the intention to take a

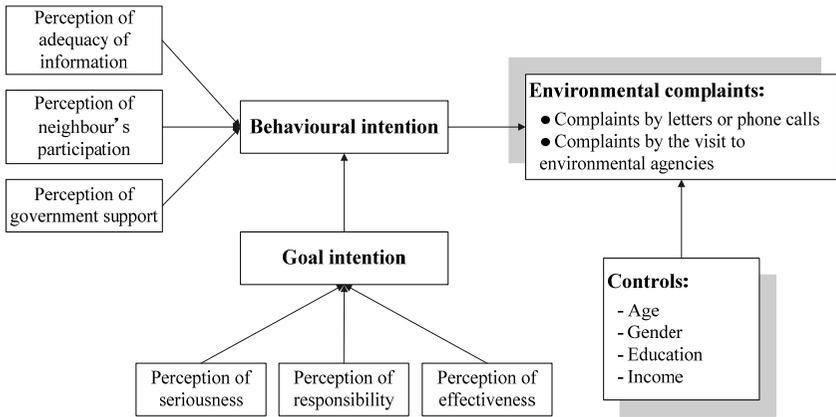
specific action, is formed in the second phase. Three types of perceptions of the environment are defined as predicting factors of “goal intention”:

- “perception of environmental risk” (a sense of crisis due to environmental contamination);
- “perception of responsibility” (a sense of responsibility for the cause of environmental contamination); and
- “perception of efficacy of action” (the awareness that environmental problems would be tackled if personally appropriate actions were to be taken).

As further determinants of “behavioural intention”, Hirose (1995) added “feasibility assessment” to judge whether people have sufficient skills to act in a manner friendly to the environment; “profit and cost assessment” to estimate how personal profit and cost would change if people really acted; and “social norm assessment” to check whether such actions satisfy the expectations of the reference group. There are several examples of cases where Hirose’s model was applied (for example, Nonami et al. 1997; Matsui, Tanaka, and Ohsako 2007). The results of these studies supported this model in general.

Modified from the general model of Hirose (1995), the analytical framework for this study is developed and depicted in Figure 1. This study focuses on environmental complaints made by citizens living close to polluting companies. Two forms of citizen environmental complaints that are common in a Chinese context are defined as the dependent variables in this model. In particular, complaints by letter or phone call refer to the reporting of pollution by citizens to different levels of EPBs either by posting a letter or making a call. Complaints by visit refer to the reporting of pollution cases by directly going to the environmental agencies and talking with the officials there. Regarding the predictors of intention of citizen environmental complaints, “perception of adequacy of polluter’s environmental information” and “perception of government support” are selected as key antecedents, since these two aspects affect the citizen’s valuation of the feasibility of raising complaints. “Perception of neighbours’ participation” is added as the third predictor representing evaluation of the consistency of complaint actions with social norms. The demographic characteristics of citizens, such as age, gender, education level and income, are defined as control variables in this study.

Figure 1: Analytical Framework Used in this Study



Source: Modified by the authors based on general model of Hirose 1995.

## Outline of the Questionnaire-style Survey and the Samples

In order to collect necessary data for this analysis, we conducted a questionnaire survey in August of 2009 in the selected study area: Suzhou City of Jiangsu Province. Suzhou is located in the Yangzi River Delta, where the economy is relatively developed. The city has a land area of 8,488.42 square kilometres and a population of over six million. The per capita GDP (Gross Domestic Product) increased to 91,297 CNY (approximately 12,000 USD) in 2007 (SSB 2008). The better economic background of Suzhou compared with other regions provides us with a higher feasibility of testing the formation process of environmental complaints of citizens living in the city. Since it is not easy in present-day China to collect questionnaires from citizens by posting letters (due to the low response rate), this survey was carried out by direct and random interviews with citizens in the target group. A total of 343 valid responses were obtained. The questionnaire format consists of four main components: basic information about the interviewee; sources and adequacy of environmental information of neighbouring companies available to citizens; citizen environmental complaints and the degree of identified predicting factors; and optional measurements for encouraging citizen environmental complaints on the neighbouring polluters.

Table 3: Distribution of the Respondents by Demographic Characteristics

Variables	Options	Count	Percentage	Cumulative percentage
Gender	Male	178	51.9	51.9
	Female	165	48.1	100.0
	Total	343	100.0	—
Age	< 18	20	5.8	5.8
	18–30	234	68.2	74.0
	31–40	39	11.4	85.4
	41–60	37	10.8	96.2
	≥ 61	13	3.8	100.0
	Total	343	100.0	—
	Education	Under junior high school	11	3.2
Junior high school		56	16.3	19.5
Senior high school		116	33.8	53.4
Undergraduate degree		156	45.5	98.8
Graduate degree		4	1.2	100.0
Total		343	100.0	—
Income (CNY/month)	≤ 1,000	70	20.4	20.4
	1,001–2,000	122	35.6	56.0
	2,001–3,000	92	26.8	82.8
	3,001–5,000	42	12.2	95.0
	≥ 5,001	17	5.0	100.0
	Total	343	100.0	—

Source: Authors' own compilation.

The representation of the sampling was checked by statistically analysing the background information of valid respondents. The distribution of the usable samples by demographic characteristics is summarized in Table 3. Most of the respondents (79.6 per cent) are 18 to 40 years old. Nearly 80 per cent of them have received senior high school or undergraduate educations. It is obvious that the distribution of ages and education levels of respondents differs somewhat from the structural distribution of the population of the city as a whole. This is probably because we conducted the interviews through random selection. Young people

and those with higher education levels participated in our survey more actively. The difference in certain demographic variables of the respondents from the averages of the study area may generate some bias in the results of this study. Nevertheless, factors such as individual income and gender of respondents are evenly distributed and can be said to reflect the overall situation of the city. The gender distribution of respondents was roughly even. Citizens with incomes of 1,001–3,000 CNY/ month accounted for 62.4 per cent of the total.

## Valuation of the Variables

As mentioned in a previous section and listed in Panel A of Table 4, two types of environmental complaint are defined to show a citizen's involvement in reporting pollution in China at present. These are abbreviated "COMP<sub>L&P</sub>" and "COMP<sub>V</sub>". The interviewees were asked to check whether they have practised either of the two forms of pre-classified environmental complaint. A value of 1 is given to the item if the answer is "YES" and 0 otherwise. Thus each respondent achieves a score of 0 or 1 for COMP<sub>L&P</sub> and COMP<sub>V</sub>. The score presented for each type of environmental complaint is used to analyse relationships with the classified determinant variables.

The predicting factors are listed in Panel B of Table 4. A five-point Likert scale is used to measure the strength or value of each factor, with 1 being "not at all"; 2 being "a little bit"; 3 being "moderate"; 4 being "relatively high"; and 5 being "very high". The score assigned to each factor is used to analyse the relationships defined in the analytical framework.

Table 4: Definition and Valuation of the Variables in this Study

Variable	Description of the item and its abbreviation	Valuation					
		0	1	2	3	4	5
<b>Panel A: Items of environmental complaints</b>							
Environmental complaints	By letters or phone calls (COMP <sub>L&amp;P</sub> )						
	Direct visits to environmental agencies (COMP <sub>V</sub> )						
<b>Panel B: Predicting variables</b>							
Perception of seriousness	Recognition of surrounding environmental severity (SERIOUSNESS)						
Perception of responsibility	Sense of responsibility for better environment (RESPONSIBILITY)						
Perception of effectiveness	Roles of personal efforts for better environment (EFFECTIVENESS)						
Goal intention	Readiness of environmental efforts (GINTENTION)						
Perception of information adequacy	Adequacy of company environmental information (INFORMATION)						
Perception of neighbour's participation	Degree of neighbour's environmental complaints (NEIGHBOUR)						
Perception of governmental support	Degree of governmental support following the complaints (GSUPPORT)						
Behavioral intention	Readiness to make environmental complaints to polluters (BINTENTION)						

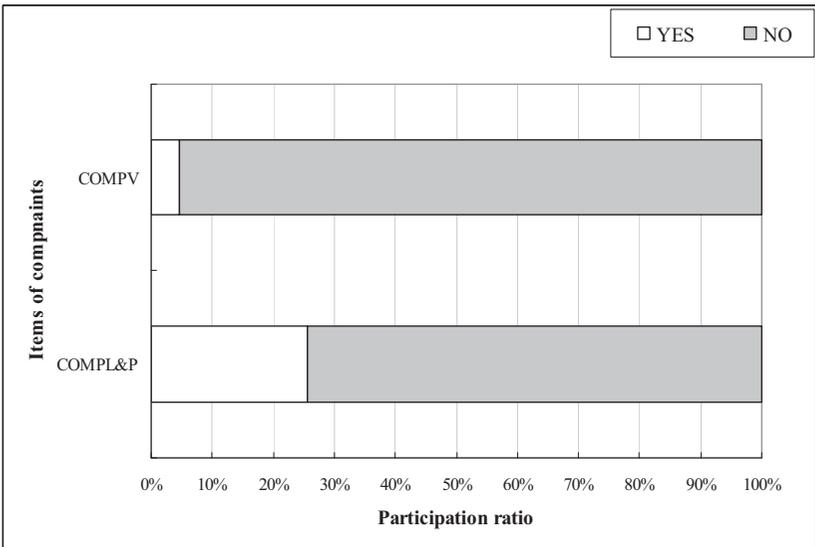
Source: Authors' own compilation.

## Results and Discussions

### Statistical Summary of Citizen Environmental Complaints

Figure 2 gives the distribution of  $COMP_{L\&P}$  and  $COMP_V$  of citizens interviewed in the study area. It is obvious that the involvement of citizens in environmental complaints is still very low. The citizens behave differently for the two different items of environmental complaints.  $COMP_{L\&P}$  achieves a participation ratio of 25.7 per cent, while  $COMP_V$  obtains a much lower ratio of 4.7 per cent. This result is consistent with the intuitive understanding that citizens prefer to raise environmental complaints in an easier manner such as by writing a letter or just making a phone call to the local EPB. They are unwilling to directly visit the environmental agencies for complaints as the visit is usually time-consuming.

Figure 2: Ratio of Citizen’s Participation in Environmental Complaints (N=343)



Source: Authors’ own compilation.

## Descriptive Statistics of the Predicting Variables

A descriptive summary of the predicting variables defined in the analytical framework is shown in Table 5.

Table 5: Statistical Summary of the Predicting Variables

Variable name	Obs.	Mean	Std. dev.	Min.	Max.
SERIOUSNESS	343	2.90	0.81	1	5
RESPONSIBILITY	343	3.64	0.90	1	5
EFFECTIVENESS	343	2.76	0.98	1	5
GINTENTION	343	4.13	0.89	1	5
INFORMATION	343	2.66	0.81	1	5
NEIGHBOUR	343	2.66	0.88	1	5
GSUPPORT	343	3.14	0.91	1	5
BINTENTION	343	3.89	0.91	1	5

Source: Authors' own compilation.

A mean of 2.90 for SERIOUSNESS indicates that the respondents think that the quality of their surrounding environment is not too bad. A lower score (averaging 2.76) is attributed to the role of environmental complaints in maintaining a sound environment (EFFECTIVENESS). This shows that at present, environmental complaints are not viewed as an effective way to motivate polluters to improve their environmental behaviour. Many residents believe that raising environmental complaints is their responsibility, with the variable of RESPONSIBILITY achieving an average value of 3.64. Certain barriers do exist for citizen environmental complaints. Less environmental information is available for them to appropriately judge the polluter's environmental performance, as a low value is given to INFORMATION (with an average of 2.66). A mean of 3.14 for GSUPPORT confirms moderate support from the government for environmental complaints made by residents. Nevertheless, the respondents score relatively higher in the categories of "goal intentions" and "behavioural intentions" to make environmental complaints, with GINTENTION and BINTENTION achieving respective averages of 4.13 and 3.89.

## Multivariate Analysis Results and Discussions

The analytical framework, described in a previous section, is applied to figure out the cause and effect relationships between the predicting variables and citizen environmental complaints by various regression analyses. All the predicting variables in this study are measured with a five-point Likert scale and a quantitative data set of them can be constructed using the questionnaire survey results. Citizen environmental complaints are the variables at the end of the cause-effect chains in the model, and are classified into two categories,  $COMP_{L\&P}$  and  $COMP_V$ . As explained earlier, both  $COMP_{L\&P}$  and  $COMP_V$  are dichotomous variables. Therefore, ordinary least squares (OLS) regressions are performed on  $GINTENTION$  and  $BINTENTION$  against all the related predicting variables identified in the analytical framework. Logistic regressions are conducted by using  $COMP_{L\&P}$  and  $COMP_V$  as dependent variables individually to clarify relationships with related predicting factors as independent variables. The results of multivariate regression analyses are listed in Tables 6 and 7.

Table 6: OLS Regression Results of  $GINTENTION$  and  $BINTENTION$  (N=343)

Variable entered	Coefficient	t-statistic	P-value
(a) $GINTENTION$ as dependent variable			
$\beta_0$	3.357	12.184	0.000
SERIOUSNESS	0.042	0.693	0.489
RESPONSIBILITY	0.130	<b>2.448</b>	<b>0.015</b>
EFFECTIVENESS	0.064	1.294	0.197
F-value		3.021	
R <sup>2</sup> (adjusted)		0.017	

Variable entered	Coefficient	t-statistic	P-value
(b) BINTENTION as dependent variable			
$\beta_0$	1.390	4.647	0.000
INFORMATION	<b>0.117</b>	<b>2.089</b>	<b>0.037</b>
NEIGHBOUR	0.090	1.739	0.083
GSUPPORT	0.064	1.267	0.206
GINTENTION	<b>0.424</b>	<b>8.553</b>	<b>0.000</b>
F-value		21.475	
R <sup>2</sup> (adjusted)		0.193	

Source: Authors' own compilation.

The OLS regression result shows that there is a significantly positive relationship between one of the attitudinal components, RESPONSIBILITY, and GINTENTION (with a coefficient of 0.130 at a significance level of 0.05). However, no significant influences on GINTENTION of the other two attitudinal factors identified in the original framework – namely, “perception of seriousness” and “perception of effectiveness” – could be confirmed. The behavioral intention, BINTENTION, is significantly under the influence of two factors, GINTENTION (with a coefficient of 0.424 at a significance level of 0.000) and “perception of adequacy of environmental information” (weighting at 0.117 at a significance level of 0.05). This implies that providing adequate environmental information regarding polluters will largely increase citizens’ readiness to raise environmental complaints.

Table 7: Logistic Regression Results of COMP<sub>L&P</sub> and COMP<sub>V</sub> (N=343)

Variable entered	Coefficient	Std. Err.	P-value
(a) COMP <sub>L&amp;P</sub> as dependent variable			
INFORMATION	<b>-0.456</b>	<b>0.168</b>	<b>0.007</b>
NEIGHBOUR	<b>0.613</b>	<b>0.156</b>	<b>0.000</b>
GSUPPORT	0.129	0.144	0.369
BINTENTION	-0.101	0.143	0.479
LR chi		23.33***	
Pseudo R <sup>2</sup>		0.060	

Variable entered	Coefficient	Std. Err.	P-value
<b>(b) COMP<sub>V</sub> as dependent variable</b>			
INFORMATION	0.055	0.259	0.832
NEIGHBOUR	0.213	0.233	0.360
GSUPPORT	-0.067	0.234	0.774
BINTENTION	-0.340	0.210	0.106
LR chi		3.18	
Pseudo R <sup>2</sup>		0.017	

Source: Authors' own compilation.

As indicated in Table 7, there are no significant correlations between the complaints by visits, COMP<sub>V</sub>, with the determinant factors identified in the analytical framework. Nevertheless, we find that the complaints by letters and phone calls, COMP<sub>L&P</sub>, are significantly affected by the variable of NEIGHBOUR (with a coefficient of 0.613 at a significance level of 0.000). This implies that the citizens would like to act collectively when complaining about their neighbouring polluters. The variable of INFORMATION shows a significant but negative influence on COMP<sub>L&P</sub> (with a coefficient of -0.456 at a significance level of 0.01). This means that an increase in awareness of a company's environmental information would reduce the likelihood of citizens making environmental complaints through letters and phone calls. It may be inferred from this finding that environmental complaints so far mainly originate from the subjective judgement of citizens rather than being based on an accurate understanding of the company's actual environmental performance. This may explain, to a certain degree, why many environmental complaints are too misleading for environmental authorities to efficiently allocate enforcement resources. An additional meaningful result of this analysis is that there is no significant correlation between COMP<sub>L&P</sub> and BINTENTION. This indicates that readiness to lodge environmental complaints does not necessarily generate actual complaint practices. The possibility of raising environmental complaints is largely determined by evaluation of controls for the complaints by citizens.

## Variances of Citizen Environmental Complaints by Demographical Variables

Table 8 gives a summary of distribution of samples by demographic variables and types of environmental complaint (COMP<sub>L&P</sub> and COMP<sub>V</sub>). There is very slight difference between male and female respondents in raising environmental complaints. The ratio of experience of environmental complaints was higher for males than for females (both for letters and direct visits). People between 41 and 60 years old have a slightly higher tendency to complain regarding neighbouring polluters. Individual income is slightly correlated with environmental complaint activities. Overall, citizens with a higher income are a little bit more likely to become active in environmental complaints by letters and phone calls. On the contrary, the citizens with higher incomes become relatively reluctant to complain by visiting the environmental agencies. This is probably because the complaints by direct visit are time-consuming and would cost more for people with higher income levels. Due to the correlation between education level and personal income, education has a similar effect on COMP<sub>V</sub>.

Table 8: Summary of Environmental Complaints by Demographical Variables

Variables	Options		Complaint type		
			COMP <sub>L&amp;P</sub>		In total
			Yes	No	
Gender	Male	Count	51	127	178
		% within gender	28.7	71.3	100.0
	Female	Count	37	128	165
		% within gender	22.4	77.6	100.0
Age	< 18	Count	7	13	20
		% within age	35.0	65.0	100.0
	18–30	Count	51	183	234
		% within age	21.8	78.2	100.0
	31–40	Count	12	27	39
		% within age	30.8	69.2	100.0

Variables	Options		Complaint type		
			COMP <sub>L&amp;P</sub>		
			Yes	No	In total
Age	41–60	Count	14	23	37
		% within age	37.8	62.2	100.0
	≥ 61	Count	4	9	13
		% within age	30.8	69.2	100.0
Education	Under junior high school	Count	4	7	11
		% within education	36.4	63.6	100.0
	Junior high school	Count	15	41	56
		% within education	26.8	73.2	100.0
	Senior high school	Count	32	84	116
		% within education	27.6	72.4	100.0
	Undergraduate degree	Count	37	119	156
		% within education	23.7	76.3	100.0
	Graduate degree	Count	0	4	4
		% within education	0.0	100.0	100.0
Income	≤ 1,000	Count	21	49	70
		% within income	30.0	70.0	100.0
	1,001–2,000	Count	26	96	122
		% within income	21.3	78.7	100.0
	2,001–3,000	Count	24	68	92
		% within income	26.1	73.9	100.0
	3,001–5,000	Count	12	30	42
		% within income	28.6	71.4	100.0
	≥ 5,001	Count	5	12	17
		% within income	29.4	70.6	100.0

Variables	Options		Complaint type		
			COMP <sub>V</sub>		
			Yes	No	In total
Gender	Male	Count	16	162	178
		% within gender	9.0	91.0	100.0
	Female	Count	11	154	165
		% within gender	6.7	93.3	100.0
Age	< 18	Count	1	19	20
		% within age	5.0	95.0	100.0
	18–30	Count	19	215	234
		% within age	8.1	91.9	100.0
	31–40	Count	2	37	39
		% within age	5.1	94.9	100.0
	41–60	Count	5	32	37
		% within age	13.5	86.5	100.0
	≥ 61	Count	0	13	13
		% within age	0.0	100.0	100.0
Education	Under junior high school	Count	1	10	11
		% within education	9.1	90.9	100.0
	Junior high school	Count	6	50	56
		% within education	10.7	89.3	100.0
	Senior high school	Count	6	110	116
		% within education	5.2	94.8	100.0
	Undergraduate degree	Count	14	142	156
		% within education	9.0	91.0	100.0
	Graduate degree	Count	0	4	4
		% within education	0.0	100.0	100.0
Income	≤ 1,000	Count	9	61	70
		% within income	12.9	87.1	100.0
	1,001–2,000	Count	8	114	122
		% within income	6.6	93.4	100.0
	2,001–3,000	Count	8	84	92
		% within income	8.7	91.3	100.0

Variables	Options		Complaint type		
			COMP <sub>v</sub>		
			Yes	No	In total
Income	3,001–5,000	Count	2	40	42
		% within income	4.8	95.2	100.0
	≥ 5,001	Count	0	17	17
		% within income	0.0	100.0	100.0

Source: Authors' own compilation.

### Availability of Environmental Information of Polluters

We assumed that providing accurate and reliable environmental information on companies would assist the citizens in making environmental complaints appropriately. This hypothesis was partly confirmed in the multivariate analysis. With the aim of measuring the perception of polluters' environmental information among citizens, several additional questions were listed in the survey document to monitor the respondent's concerns regarding environmental information and optional information sources. The result is summarized in Table 9.

Panel A of Table 9 shows the citizens' areas of concern regarding a polluter's environmental information. The respondents obviously pay a great deal of attention to the impacts of pollutant emissions on the surrounding environment and corresponding risks to public health, with both items achieving similarly elevated ratios of "YES" answers (approximately 57 per cent). Less than 30 per cent of the residents care about the other aspects of the environmental performance of companies. There is a large gap between citizens' concerns over a polluter's environmental practices and performance information, on one side, and the amount of information actually available, on the other. Voluntary reporting of environmental information by companies is in its infancy in China (Guo 2005). According to Liu and Anbumozhi (2009), even the environmental information disclosed by Chinese listed companies, which usually operate on a large scale and have sufficient capacity for environmental management, is still marginal. The companies are in particular reluctant to show their adverse impacts on the surrounding environment through information on aspects such as emission types, volumes and destinations.

**Table 9: Citizens' Perceptions of Polluter's Environmental Information (N=343)**

Description of optional items	Percentage of total answers	
	Yes	No
<b>Panel A: Polluter's environmental information: areas of concern for respondents</b>		
a. Firm's environmental management strategy and goals	25.7	74.3
b. Overall environmental management and compliance status	20.1	79.9
c. Consumption of resources and energy	25.9	74.1
d. Types and amounts of pollutant emissions	29.2	70.8
e. Impacts of pollutant emissions on surrounding environment	57.4	42.6
f. Risk of pollutant emissions to people's health	57.1	42.9
g. Construction and operation of pollution control facilities	12.5	87.5
h. Investment in and cost of pollution control	13.4	86.6
i. Volunteer environmental activities	6.4	93.6
j. Environmental information related to the products	25.9	74.1
<b>Panel B: The sources of polluter's environmental information to the respondents</b>		
a. Corporate environ. performance rating and disclosure programme operated by local EPB	18.7	81.3
b. Onsite visit and direct observations	14.9	85.1
c. Public media such as television and newspapers	74.1	25.9
d. Corporate environmental information disclosed by NGOs	22.4	77.6
e. Website of local EPB (environmental protection bureau)	15.2	84.8
f. Website and annual environmental report of the companies	11.1	88.9
g. Hearing from the neighbours	39.4	60.6

Source: Authors' own compilation.

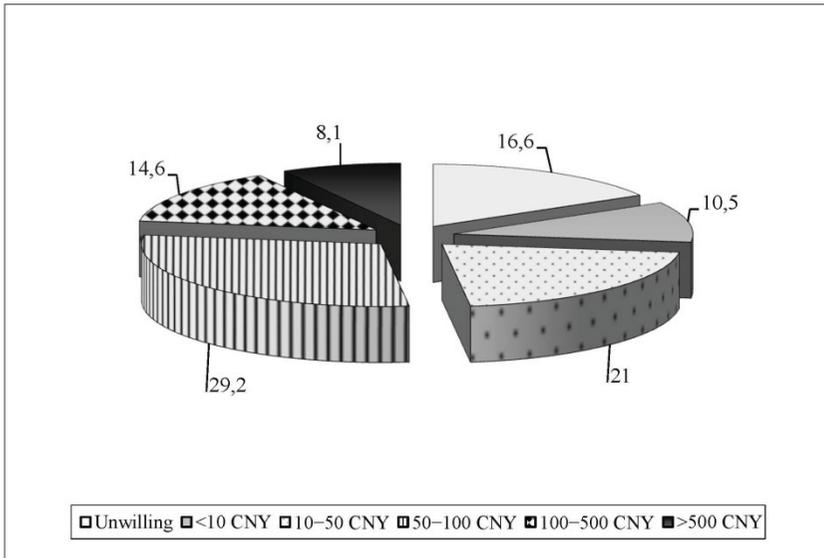
Panel B of Table 9 shows the sources from which residents get their environmental information regarding neighbouring polluters. Consistent with the results of a previous survey (CEAP 2008), 74.1 per cent of the respondents obtain environmental information regarding companies from public media such as television, radio and newspapers. Less than 20 per cent of respondents get their environmental information from the government or directly from the companies. Residents are unwilling to collect environmental information through visits and observations of

their own, with a ratio of 14.9 per cent of “YES” answers for this option. Practically, the residents lack the ability to distinguish between nuisance emissions and those that are truly hazardous. Colorless, odorless toxic substances and heavy metals may be neglected by citizens.

### Willingness of Citizens to Pay for Environmental Complaints

During our survey, the willingness of citizens to bear the cost of participating in environmental complaints was also roughly measured. The result is depicted in Figure 3.

Figure 3: Percentage of Respondents by Range of Cost of Complaint (N=343)



Source: Authors' own compilation.

It is obvious that lower costs are more acceptable for citizens. Approximately 77.3 per cent of respondents would like to pay less than 100 CNY for environmental complaints. By simply using the average wage of Suzhou City in 2008 as a converter, this result implies that nearly 80 per cent of the respondents would likely spend less than half a day making

an environmental complaint. Of this 80 per cent, 16.6 per cent would not like to take any time to do so. The low willingness among citizens in the survey area to spend time complaining confirms the marginal level of environmental complaints, especially for complaints by visit, which require spending a lot of time.

## Conclusions

This paper develops an analytical framework for exploring environmental complaints among citizens with high proximity to polluting companies. The data collected by direct interviews with the citizens of Suzhou City in China's Jiangsu Province are used for this empirical analysis. This study not only provides a descriptive summary of the involvement of citizens in environmental complaints, but also clarifies the cause and effect links between the identified predicting factors and the two different types of environmental complaint by various multivariate regressions. The study indicates that the environmental complaints of respondents are very marginal at present. A personal feeling of responsibility significantly influences the formation of an intention to improve environmental quality by making complaints regarding pollution. Providing companies' environmental information would largely increase readiness to make environmental complaints. Perception of participation by neighbours also greatly increases the likelihood that citizens will actually make environmental complaints themselves. This implies that environmental information disclosure strategies will increase citizens' willingness to lodge environmental complaints. However, environmental information availability does not necessarily lead to actual complaints by citizens. The government needs to responsively support people's environmental complaints efforts, as successful cases will greatly convince the citizens to be more critical of their neighbouring polluters.

There are some limitations to this study. Relatively few usable samples were collected and used for the statistical analysis. Certain demographic variables of the respondents are not perfectly in line with the overall status of the study area. In addition, a similar analytical model may behave differently for people living in different areas due to the national disparity of economic, social and cultural backgrounds. Subsequent studies should attempt to close these gaps by expanding the survey scope. It is also necessary to analyse the changes in environmental complaints by modifying some explanatory factors with significant influ-

ences. This kind of evaluation may show the possible effects of specific measures and therefore support the development and implementation of effective policies.

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