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How Do You Find Out What Really Matters for Public Acceptance—The Case of Swine Production Sites in Rural Communities

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Abstract: Nine rural communities in Northeast-Germany in which an investor had proposed to build a large swine production site were analysed in order to detect the factors influencing the acceptance of individuals and the decision of the respective community councils. Quantitative and qualitative methods were applied independently. By carrying out a survey among all locals and subsequent regression and cluster analysis, it was detected that positive arguments (jobs, added value) influence attitudes more than counterarguments (environment, smell), and that 50% of the population were against the investment, 30% indifferent and 20% in favour. The acceptance of the community was negatively correlated with degree of information of the population. In-depth interviews with the mayors involved revealed other critical factors for acceptance: Popularity of the investor and the responsible administrative persons, experience from animal production from the German Democratic Republic and the size of the planned investment. As a conclusion it is suggested that quantitative research is more suitable for determining factors that are not conscious for participants in the decision process while by qualitative research one gets closer to factors that consciously move peoples' minds.

Table of Contents

1. Introduction
2. What Factors Can Influence Acceptance?
3. Methods
   3.1 Quantitative part
   3.2 Qualitative part
4. Empirical Results
   4.1 Quantitative part
      4.1.1 Ordered Probit Analysis
      4.1.2 Cluster Analysis
   4.2 Qualitative part
5. Summary and Conclusions
Acknowledgement
References
Author
Citation

1. Introduction

While many good arguments have been developed about the advantages of qualitative methods in social science (e.g. BILLIG 1994; BITSCH 2000; KERLIN 2000; KLEINING & WITT 2000), the existing attempts to systematically compare results between findings applying qualitative and quantitative methods don't provide a very clear picture yet. (PERREAULT, LEICHNER, SABOURIN & GENDREAU 1993; LEWIS, REES & WILLIAMSON 1995; BOOYSEN 1996; STUART & WILES 1997) Yet, studies on the acceptance of different forms of land use have either applied quantitative methods only and therefore been restricted to demographic analysis (SAUERLAND 1994) or they consisted merely in citing individual interviews (BECKER & OPPERMANN 1994). [1]

This paper focuses on public acceptance of an agricultural investment among local inhabitants. By applying qualitative and quantitative research methods at the same time, it is the aim to find possibilities of appropriately combining quantitative and qualitative methods so as to determine what different reasons for accepting or denying the investor's bid for the municipality and individuals exist. [2]

Recent attempts of a local government in Germany to canvass investors from abroad to install large pig production sites (8,000 to 10,000 pigs and 1,000 sows) provide the frame of this study. Villages involved were located in the sparsely populated province of Mecklenburg-Vorpommern which after Germany's re-unification suffered from a strong decrease in pig production. Fifty villages have been already considered by local government for an investment in pig production. For the purpose of our study, nine of those villages were chosen for further investigation. Municipality council issued a permit in three of the selected cases, showed interest in another three cases first and then rejected the investment opportunity and the rest rejected the investment from the beginning. [3]

This paper tries to identify patterns responsible for both individuals' and the municipality councils' behaviour accepting or rejecting the investment offer by both qualitative and quantitative methods. In Section 2, we elaborate hypotheses suited for an explanation of individual attitudes and local decisions. Section 3 outlines quantitative and qualitative methods applied for validating those influencing factors. Results are shown in Section 4 and impacts for the difference between findings in quantitative and in qualitative research are discussed in Section 5. [4]

2. What Factors Can Influence Acceptance?

It is the aim of this section to propose factors influencing attitudes on the issue of agricultural production and to link them to the methods suited to trace them. [5]

It is well investigated how attitudes towards animal production influence the demand for meat (e.g. FAWAZ, JÖRIN & RIEDER 1998). Concerning the acceptance of investments in pig production sites, less information is available about the role of individual preferences. It is therefore suggested that the

individual's attitude towards the investment bid can be traced back to attitudes toward agricultural production and rural development. It has as well to be checked what role socio-demographic characteristics may play in generating attitudes toward the investment decision. For the quantitative part, it is assumed that individual attitudes can be measured by a linear utility function using ordinal variables. [6]

The decisions of the communities involved can be based on two different explanations. The obvious explanation according to the theory of democracy (e.g. LELEUX 1997) would be that the residents' preferences shape the decision of the community council. An alternative hypothesis to be tested is that the community council decision could also be explained by the structures of the communication flow (ORTH & BECK 1998) and the varying level of involvement of groups within the community in the decision-making process (CRAIN & ROSENTHAL 1967). [7]

For the qualitative part of the work, it was assumed that mayors of municipalities involved are able to give insights in both questions. As individuals, they have their own attitude towards pig production in their village and will be able to discuss and defend that. And they can also well reflect the decision-making procedure in their municipality as they served as key persons in the relevant process. The underlying hypothesis was that crucial factors would be revealed in the interviews that were not detectable by quantitative analysis. [8]

3. Methods

3.1 Quantitative part

A survey of all households with a public phone number (n=1,390) in the nine communities was conducted in July 1999, of which a response rate of 25.3 per cent (n=351) was achieved. A socio-demographic analysis of the sample showed it being sufficiently representative in respect to the total population. [9]

Consistent with the factors suggested above, the variables to be explained were the individual's attitude towards the proposed investment (Y1) and secondly outcomes of the decisions of the community council (Y2):

$$Y1 = f(S, D)$$
$$Y2 = f(I, Y1)$$

where S is the attitude towards single issues, D are socio-demographic characteristics of respondents and I is the level of individual involvement. [10]

People' s attitude towards the investment in total (Y1) is measured on a five step Likert scale with help of the following question:

Variable	Question					
Y1	Please state on the scale below your attitude towards the investment in a large pig production unit in your community[1]					
	Very positive	Rather positive	Don't mind	Rather negative	Very negative	Mean
	1	2	3	4	5	3.80 n=339

Table 1: Measuring attitudes towards pig production [11]

To reveal the attitude patterns in detail, the respondents were asked to evaluate different pros- and cons-arguments related to pig production (S1-S10). These arguments had been under discussion during the debate on the investments on the local level.

Variable	Question					
S1-S10	Please state on the scale below, how you assess the following statements					
	Fully Disagree	Rather Disagree	Partially Agree	Rather Agree	Fully Agree	Don't Know
	1	2	3	4	5	O
Variable S1-S10	Statement					Mean
1. SML	Pig production sites have a bad smell					3.89 n=335
2. NAT	Pig production sites ruin our nature					3.40 n=324
3. INC	Intensive animal husbandry will keep an important source of income in the countryside					3.21 n=331
4. HOL	In an industrial production site, no animal friendly farming is possible					3.48 n=324
5. HEA	A pig production site in the village has damaging consequences for people's health					3.08 n=302
6. SIZ	Small pig production sites can rather be tolerated than large ones					3.71 n=325
7. REG	I prefer food that is produced in the region					4.22 n=339
8. BIA	Foreign investors can do more for the region than those from the community					2.16 n=306

1 The original text was in German. Current statements represent an English translation describing each addressed issue.

9. TRA	Traffic will considerably increase with a production site	3.40 n=322
10. LAB	A new pig production site generates labor in the region	2.63 n=326

Table 2: Arguments for and against pig production [12]

The socio-demographic characteristics (D1-D8) were measured by the following statements:

Variable	Question	Answer
1. SEX	Gender:	Male / female: 0 (215) / 1 (121)
2. AGE	Age:	Years (Mean: 50.0 years)
3. EMP1	Employment	Employed/ not employed: 0 (182) / 1 (44)
4 EMP2	Retired:	Yes: 1 (111)
5. EDU	Degree of education:	School until 9th grade/ until 10th grade/ high school/ university: 1 (88)/ 2 (146) / 3 (24) / 4 (64) /
6. DIS	Distance of the own home to the planned pig production site:	< 1km / 1-5 km/ > 5 km: 1 (56) / 2 (224)/ 3 (30)
7. FAR	Being a farmer:	Yes / no: 1 (97) / 0 (237)
8. CHI	Having children below 18 years:	Yes / no: 1 (142) / 0 (195)

Table 3: Socio-demographic characteristics [13]

The individual involvement was measured by the three following statements (I1-I3).

Variable I1-I3	Question				Mean
1. INV1	Did you know about this discussion?	Yes: 3	Hardly: 2	No: 1	2.28 n=351
2. INV2	Did you participate in this discussion?	Yes: 3	Hardly: 2	No: 1	1.60 n=350
3. INV3	Do you know, which result the discussion in your community had?	Right Ans-wer: 1	Wrong answer or don't know: 0		0.59 n=346

Table 4: Factors of personal involvement [14]

Y2 is measured by numbering the nine villages with 1 (agreeing), 2 (first showing interest, finally refusing), 3 (refusing from the beginning). Mean of Y2 is 1,82 (n=351). [15]

3.2 Qualitative part

In addition to quantitative analysis, the author and an assistant were carrying out a series of in-depth-interviews with the mayors of four of the nine communities. Mayors were chosen as interview partners for the reasons mentioned above as they were not only mayors but also residents and therefore were part of the relevant sample. [16]

Interviews lasted 30 to 60 minutes and were only recorded by writing in order not to intimidate the interview partners on the sensitive issue. The aim of interviewing was to receive additional information about the decision making process and the central arguments of the local debate. These interviews were only loosely pre-structured by an interview schedule in order to allow for differences in regional circumstances. [17]

The interview schedule began with the request to recall at which time the investment plan was introduced to the mayor. Subsequently, the history of the discussion between the mayor, members of the municipality council, the investor and the Land Society as his agent, and sometimes external participants as the regional government or environmental organisations was discussed. That included the question about key persons in the discussion. Then it was asked which arguments played a role in the local discussion and which eventually led to the decision. At the end of the interview, in villages that denied the investment it was questioned if a similar plan under different circumstances would ever have a chance to be realised and if the mayor would act differently if he had to choose again. However, during the interview it showed that even this rough manual sometimes had to be left from time to time as some mayors showed very deep emotions on one particular aspect and then desired to first talk about that. [18]

4. Empirical Results

4.1 Quantitative part

4.1.1 Ordered Probit Analysis

The interaction between the dependent (Y1, Y2) and the independent variables (I, S, D) was then estimated by Maximum Likelihood Ordered Probit Estimation. Ordered probit analysis, a substitute for regression analysis in case of a discrete dependent variable, has been preferred instead of linear regression analysis because the dependent variables are of discrete type and the size of the intervals could not assumed to be equal (LONG 1997). [19]

In order to avoid too many independent variables in one single equation, the impact of S- and D-Arguments on Y1 was tested by two separated equations:

Y1 = f (SML, NAT, INC, HOL, HEA, SIZ, REG, BIA, TRA, LAB)

Y1 = f (SEX, AGE, EMP1, EMP2, EDU, DIS, FAR, CHI)

Variable	Parameter estimate	Standard error	Probability
Bad smell (SML)	0.1757	0.0994	0.077
Damages of environment (NAT)	0.0834	0.1272	0.512
Investment generates income (INC)	-0.3372	0.0907	0.000
Animal welfare (HOL)	0.0297	0.0946	0.753
Health hazard (HEA)	-0.0329	0.0932	0.724
Small pig holdings preferred (SIZ)	0.1215	0.0831	0.144
Regional food preferred (REG)	-0.0522	0.1095	0.633
Foreign investors preferred (BIA)	-0.1902	0.0750	0.011
Traffic (TRA)	0.1350	0.0739	0.068
Investment generates jobs (LAB)	-0.5867	0.0897	0.000
Gender (SEX)	0.2162	0.1603	0.177
Age (AGE)	0.0018	0.0079	0.815
Education (EDU)	-0.0227	0.0752	0.763
Unemployed (EMP1)	0.3374	0.2427	0.164
Retired (EMP2)	-0.0094	0.2692	0.972
Distance to site (DIS)	-0.5425	0.1479	0.000
Farmer (FAR)	-0.2050	0.1746	0.240
Having Children (CHI)	0.2099	0.0079	0.271

Table 5: Impact of attitudes and socio-demographic characteristics on the acceptance of large scale pig production units [20]

Testing the impact of involvement and public agreement on the governmental decision (Y2 = f (I, Y1) was done in one step because of the low number of the independent variables:

Y2= f (INV1, INV2, INV3, Y1)

Variable	Parameter estimate	Standard error	Probability
Knowledge of plan (INV1)	0.0750	0.1035	0.468
Participation (INV2)	0.0462	0.0887	0.602
Knowledge of outcome (INV3)	0.7427	0.1831	0.000
Opinion (Y1)	0.0522	0.0452	0.247

Table 6: Impact of involvement and attitude of the population on the governmental decision [21]

The estimated functions (see Tables 5 and 6) lead to the conclusion that both the individuals' attitude and the council's decision could be traced back to some explaining factors. The belief in generation of income and labour by pig production as well as a preference for foreign investors improve significantly the overall attitude towards an investment in a new pig production site. These positive arguments seem to have a more powerful impact than counterarguments of which only smell and traffic seem to have a certain significance. Socio-demographic variables hardly play a role but show the importance of being affected personally: The nearer respondents are living from the planned site, the more they tend to be against the investment. [22]

Obviously, the council's decision was not correlated with the attitude of the municipality's inhabitants. There was, however, a significant influence of the level of public involvement. The more people were informed about the outcome of the discussion, the more likely it became that the municipality council would refuse the investment permission. This is understandable if one takes the overall negative attitude (3.80 on a 1 to 5 scale) towards the investment into account. It has to be mentioned, however, that all three involvement variables are for themselves significantly correlated with Y2. They show the problem of multicollinearity. [23]

4.1.2 Cluster Analysis

In order to test the homogeneity of the respondents in relation to their behaviour toward the investment offer (Y1) and the independent variables (I, S, D), respondents were grouped by the ordinal variables S1-S10 with help of Cluster Analysis (Ward's Minimum Variance approach). The method of clustering is suited to construct homogeneous sub-groups out of a heterogeneous sample. By Ward's approach, objects are collected to groups that minimise a defined degree of homogeneity. [24]

Clustering becomes sometimes difficult, because one has to decide which cluster variables, how many classes and what algorithm should be used. For that study it appeared to be useful to work with attitude patterns (S1-10) which showed the highest impact on individual attitudes. The results gained by using the variables D1-8 for clustering showed only weak differences between the obtained classes. Having this in mind it is assumed that the "optimal" number of classes will be

derived from an iterative procedure, which takes into account the degree of significant differences between class means of all variables (I, S, D) and the obtained information from looking at those differences. [25]

Table 7 reports the final results which were received by using four classes. The denotation of the four classes makes it easier to understand the obtained information:

Variables; for understanding refer to Table 2	Cluster 1 "strong critics"	Cluster 2 "sceptics"	Cluster 3 "moderate critics"	Cluster 4 "strong supporter"
N	144	33	108	64
Y1	4.70*	4.63*	3.55*	1.80*
SML	4.81*	1.63*	4.02*	2.62*
NAT	4.71*	1.52*	3.27*	1.43*
INC	2.54*	1.41*	3.72*	4.59*
HOL	4.67*	1.53*	3.32*	1.93*
HEA	4.52*	1.34*	2.75*	1.41*
SIZ	4.41*	3.13*	3.78*	2.33*
REG	4.20	3.33*	4.22	4.70*
BIA	1.80*	1.23*	2.57	2.75
TRA	4.12*	1.79*	3.36*	2.59*
LAB	1.76*	1.35*	3.07*	4.44*

Table 7: Results of Cluster Analysis (means denoted with * are significantly different on the 5% level from all other means) [26]

Cluster 1, called "strong critics", is the largest group, containing respondents with a very negative attitude towards the planned investment and consequently negative attitudes towards modern animal production. This is the group showing the greatest homogeneity because it remains stable during the whole iteration process. [27]

Cluster 2, called "sceptics", represents people who are also against the investment, but deny the arguments in favour as well as against pig productions. However, their attitude towards foreign investors is very negative. They are significantly the oldest group with a low educational level and live close to the investment site. [28]

Cluster 3, called "moderate critics", is second in size (n=108). Their attitude towards the investment is relatively near to indifference. The statements of

respondents in this cluster concerning single issues of animal production and their socio-demographic characteristics usually lie in between the extremes. [29]

Cluster 4, the "strong supporters", represents about 20 per cent of respondents. They agree that animal production would generate labour and an important source of income in the countryside. They strongly oppose environmental and health concerns. Strong supporters show to typically be well educated men, living rather far away from the planned investment site. [30]

4.2 Qualitative part

Four of the nine mayors involved in the decision process agreed to be interviewed, the mayor of Tinberg that accepted the investment bid, of Nidow that showed interest first and then refused to issue a permit, and the mayors of Dragendorf and Gniesen that outright rejected the investment (the names of the villages have been anonymised). From all statements, the ones giving most insights in the decision-making process and its determinants are recalled here. [31]

At first, mayors were asked to recall how they were approached with the investment plan. According to all four mayors, the office in charge, Land Society, started the procedure with a phone call in which they made an appointment with the mayor. However, the first informal differences already appeared at this stage. In Tinberg that eventually accepted the investment, the Land Society was already well known to all council members, which was not the case in the other three municipalities. In Gniesen, for example, the first appearance of two members of the Land Society was already seen partly as a threat, partly as foolish amateur play:

> Two young lads from the Land Society arrived with a field map and a title-deed and were like "We want to build a new pig production site in Gniesen. We are not gonna ask anybody." I almost felt sort of pity for them. I mean, they had their instructions, their map, some figures about low levels of animal production in our region, and that was about it. [32]

Another distinguishing factor in Tinberg was their experience with foreign investors. As stated by the mayor, this investor engaged himself in communal fire-brigade festivities and other regional events so that scepticism in respect to foreign investment had vanished. This statement was confirmed by the fact that Tinberg had the relatively highest approval rate (2.55) on the statement "Foreign investors can do more for the region than locals." [33]

The argument that dominated the debate in Tinberg was the necessity to have animal production in the countryside. "If you don't build pig production sites in the countryside, where do you want to build them? If everybody resists, what is going to happen? You don't want your pigs to be bred down in Bavaria." [34]

This seemingly altruistic statement did not play a role in Nidow, where the option to create some additional jobs dominated the positive attitudes in the beginning. Here it was the fact that the Land Society had to correct their optimistic estimations regarding the labour potential of the site downwards as well as a case of pig-fever in a village nearby that changed attitudes significantly to the worse. [35]

The dominating arguments in Gniesen and Dragendorf that outright opposed the investment were bad experiences with animal production in the past (the region belonged to the German Democratic Republic which engaged strongly in animal production and subsequently suffered environmental problems), possible competition with local farms, smell and environmental problems connected with slurry disposal in the soil. [36]

Nidow and Dragendorf decided during the decision-making process to involve all local citizens which is reflected by the two highest values for the level of information in these municipalities. Nidow called in a plenary session of all locals in which an election found 45 people against and five people in favour of the investment. In Dragendorf, council members collected signatures against the production site with only two people refusing to undersign. [37]

Of the three communities that were not realising a pig production site, two denied heftily the possibility to realise a similar investment in the future. Only the mayor of Dragendorf stated:

> Yes. Agriculture has to play an important role. People aren't against agriculture in general, basically they are open. I guess the main condition for a pig production site in Dragendorf would be that the holding wasn't so big. And outdoor farming would be a good possibility as well. [38]

When asked to define "not so big", the mayor suggested numbers up to 2,000 pigs per holding. [39]

5. Summary and Conclusions

The different decisions of nine municipalities which were approached to realise a new pig production investment provided the possibility to measure quantitatively and qualitatively patterns that determine different attitudes towards large-scale animal production and to compare findings between the two methods. A survey among all available households in the municipalities was evaluated by ordered probit and cluster analysis. In addition, interviews with mayors who were available were carried out. [40]

By this combination of methods, significant patterns how attitudes towards modern farming were formed could be determined. Ordered probit analysis showed at least two important results. The first is that arguments in favour of pig production apparently count more than negative arguments. Judgements on the potential of pig production sites to create labour and income and the abilities of

foreign investors influence the individual attitude towards animal production more strongly than environmental and animal welfare concerns. [41]

Secondly, the municipalities under investigation showed different ways of decision-making which seemingly influenced the decision for or against the production site much more than preference structures of local inhabitants. As attitudes towards the investment were negative on average, it is an understandable finding that an increased level of involvement led to a smaller probability that the investment was realised. On the base of public choice theory, it can be assumed that low levels of involvement were at least partially a conscious strategy of municipality councils which may have known that their interest differed from the majority's interest. [42]

Cluster Analysis showed that 40 per cent of the sample was very critical towards the investment for the reasons that were assumed, such as smell, environmental consequences and health. Another 30 per cent were more indifferent, but mildly argued in the same direction as strong critics. It can be assumed that people belonging to this cluster would be most susceptible to political campaigning for animal production. One fifth of respondents saw primarily income and labour opportunities in the investment and therefore had a very positive attitude towards a new pig production site. Another smaller cluster of mainly elder respondents had a negative attitude towards the investment, but statements in this case could mainly be traced back to a strong bias against foreign investors. [43]

Qualitative analysis provided some additional aspects, for example the influence of bad experiences with animal production in times of the German Democratic Republic. The utter importance of factor endogenity of the investment (the use of local capital and labour) showed particularly in the interviews with the mayors. Exogeneous investors and middlemen seem to have a lot more barriers to overcome in order to realise the investment compared with local actors. It could be confirmed that the labour argument was a very strong one which is not surprising in a region with unemployment up to 17 per cent. As soon as it became clear that intensive animal production relies on capital much more than on labour, even well-meaning partners lost interest in the project. [44]

It can first be concluded that qualitative research provides the best overview about factors that matter. By extensive face-to-face interviews with key persons, usually all aspects that seem to be of importance for the issue are likely to be recalled. In our case, the influence of past experience with pig production was only revealed in the mayor interviews. This is thus an example for a factor being conscious to the sample but not to the researcher. [45]

However, there are demographic factors that can only be revealed by quantitative research. A surprisingly clear grouping of locals in strong critics, sceptics, moderate critics and strong supporters cannot be provided by qualitative research. But what is more, there may be factors in the discussion process that may not be obvious for local participants. From our case study, there are two pieces of evidence for that thesis:

1. Most mayors would deny that economic arguments played a stronger role than environmental arguments. However, regression analysis proved the different weight of both kinds of arguments.
2. The adverse influence of public involvement on the realisation of the investment was never mentioned by any mayor. While it is possible that this aspect was barely withheld by interview partners, it is more likely that nobody was really aware of that factor. [46]

Overall, both sets of cases discussed in Social Psychology could be traced: Factors that were significantly influencing the attitude of the respondent which were perfectly conscious to respondents, so that they could be explored in a better way by carrying out a qualitative study. And, on the other hand, there were factors of which most or all respondents were not aware. After all, interrelations exist of which statistical analysis is the only way to find out about; qualitative research could hardly reveal them. One could argue, however, that qualitative typology construction tries to detect such interrelations, too. But it will be difficult to reveal interrelations in qualitative research if none of the respondents is aware of them and if you have a limited number of respondents only. [47]

Although important insights could be gained during the project, it would have be ideal to reverse the research design chosen for this study. It is hence suggested to start research about public opinion with in-depth interviews in order to find out influential factors that are conscious for the respondent but not to the researcher. However, subsequent large-scale standardised questionnaires which are evaluated quantitatively are suited to make factors conscious for the researcher that aren't for the respondent. [48]

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