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Using Public Opinion to Estimate Improvements in Economic and Social Dimensions of Sustainability

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Abstract. The responsible body preparing a building project often gets into the situation when they have to carry out a project influencing the public. Sustainable building objectives form an important issue for public awareness when a project is to be implemented, while other objectives and concerns presented by community, individuals or economic operators also may change the original project in some way. The projects in question were not viewed and accepted equally by each party as different effects on the stakeholders were expected and the project did not naturally resonate with everyone's views.

In the article we inform about a course of action of municipality when involving the public and other stakeholders to a building project that was required to be a sustainable one. The purpose was to lessen threats to sustainability paradigms from them, threats such as disagreements with the building project, consequential delays and future costs, caused by lack of information, by other parties' interference, or omission of unrecognized public and stakeholders' interests. Some figures are provided that document time change of public attitude, and an indicator that might provide a rough estimate on projects' sustainability aspects improvements or changes, prior to construction.

1. Dictum

When things need to happen, the right people are never idle [1].
It is a bad plan that admits no modification [2].

2. Introduction

This paper presents two cases of building projects that two municipalities dealt with. The municipalities were aware from previous cases that certain of the sustainable building aspects might not be optimal if not handled at proper time. Specifically, the public's requests and opinions, raised belatedly and not recognized earlier, affected two of the aspects. First, social aspects of sustainability paradigms are harmed by public-related project omissions perceived by public as unrecoverable omissions. Second, requests to belated modifications during construction or after completion are harmful for economic (resource) aspects of sustainability paradigms. The environmental aspect should preferably be a responsibility of professionals. Possible participation of public might be classified within social aspects.

This paper provides information on two practical cases where project modifications, and improvements (or changes) in sustainability aspects (social and implied economic), were treated in relation to public opinion changes. The focus is on variable(s) based on (changes in) the public opinion, on variable(s) that might be used to create indicator(s) for sustainability aspects improvements or



changes – variables derived from opinion polls. It raises a question whether the variable(s) or indicator used in the two cases might be equally used in other cases and under which conditions.

This paper does not deal with evaluations of changes in the qualitative or quantitative parameters of the project, either with respect to the public requests and opinion or with any other respect. Its intention is not to present new theory and/or verify it.

The general scenarios of the cases presented below are partly similar. The municipality or investor prepare a building project. The project must be discussed effectively by the public concerned. As a rule, the public is not too interested at the very beginning. However, municipality and investor have repeatedly experienced the fact that the public awakened their awareness only later. The public then raised objections, relevant as well as irrelevant. The objections were considered, some were accepted and resolved, others had to be rejected. This delayed the project, sometimes substantially, and if such a delay was unacceptable then the objections could not be considered properly.

Either way, unaccepted objections cause stronger adverse attitude of the public towards the municipality or investor, and towards the project itself. This creates a problem especially in case the relevance of the unresolved objections increases in the future, and thus, beside worsening the social aspects of sustainability, it worsens the economic aspects (induced additional expenses of the investor).

3. Methodologies, methods and indicators

3.1. Notes on current state

The current state of the art provides a large number of methodologies and methods for assessment of sustainability, e.g. [3] and [4] for overview with detailed references. The methods and indicators are often complex and complicated, their execution consumes substantial time, financial and human resources. While the complexity and depth of research is needed in other real-life cases and various theoretical [5] [6] and simulation [7] [8] [9] methods are developed and used to this end, it would be inadequate for the municipality purposes and the size of the municipality projects when compared to possibly delivered benefits.

3.2. Municipality requests and requirements

The municipalities used an approach intended to improve the project in social and consequently economic sustainability dimensions: “We have a project to carry out. We conduct a public opinion poll. The project is modified with respect to the poll evaluation. Then we conduct another public opinion poll based on the modified project and evaluate it.” This approach is a useful way for modification and improvements, based on information feedback, and is not the subject of exploration here. It is called “*pre-emptive strategy*” or just “*strategy*” hereafter.

The municipalities’ requests could be summarized like this: “We execute the pre-emptive strategy. Based on both polls data (i.e. data obtained during the strategy execution), we request an *estimate* on the improvements or changes in the project sustainability, especially in its social and consequently economic dimensions.” This *estimate* is conducted past the strategy execution, but is requested *prior* the construction begins, thus the project can be further modified if desired.

The investors intended to use experience and knowledge of similar projects accomplished elsewhere, if available and applicable. Getting public opinions should be performed by a hired agency acquainted with poll data acquisition and processing, and implication of desirable changes in project would be (re)calculated and evaluated using some of many existing standard methods (including MCDA methods).

3.3. Proposed and adopted procedures

No adequate comparable case and simple, brief methods were found, that were dealing in the desired way with rechecking the public opinion and project modifications. Then, some requirements were imposed on the values / indicator(s) evaluating the sustainability aspects with respect to public opinions (or as perceived by public): ease of understanding (“*Comprehensibility*”), possibility of evaluation in varying circumstances (“*Flexibility*”), and independence of actual project content and its modifications (“*Universality*”) (CFU-triplet). The standard deviation, which satisfied these requirements, was chosen.

Some arguments and assumptions, that were considered for the “indicator” selection, are presented in section 7. Active public cooperation.

The whole sequence is: Execute the *pre-emptive strategy*, then *estimate* the improvements/changes in (economic and social) sustainability aspects, using the above *indicator* (variables). The here emphasized words are used below with the meaning introduced above.

In the below presented cases the municipality or investor adopted such an approach. The public was to be involved pre-emptively [10], by the *pre-emptive strategy*, and approached by a questionnaire survey. During the survey the public was asked to comment on variants possibly reflected in the project. At the same survey the participants were asked to file comments and suggestions to the investor/municipality.

Another point of concern were “professional” complainers (and complainants). Some preliminary and preventive measures were taken to avoid damage and delay in the project caused by their intervention.

It should be mentioned that the municipalities had no previous experience in this field available. Taking the course of attracting public’s attention to the projects, however, was partly inspired by a similar case processed by another municipality.

4. Projects – the two case studies

4.1. Case study A – Road network reconstruction and maintenance

The investor together with the municipality of W were preparing road repairs project after the road is no longer used as a detour to the airport [11]. Parts of the road were in a reasonable state of repair and needed just a little more than usual maintenance. Other parts needed more substantial reconstruction [12] – these were located mainly within the urban area and the reconstruction was expected to cause significant impact on the population.

The municipality’s concern on attracting citizens’ awareness in the preparatory stage of project also took form of advertising the PPP in the project [13]. The questionnaire pushed forward topics in a way of “how do YOU prefer the repairs to be done”, “how would it suit to YOU...” or “what is YOUR opinion on how to avoid problems and inconveniencies in the project of reconstruction” [14]. By making it sound personal, the municipality hoped that the residents would be more easily involved.

4.2. Case study B – Cultural facilities, school sport and public leisure facilities

Municipality authorities in Ū were preparing school sport and public leisure facility project located on municipal land in the urban area. The usage of the facility was planned to host school sport activities in the morning, and afternoon and night leisure activities. The facility must get prepared and be in working order every morning for school requirements after the previous evening public activities are finished. Similar case was the cultural facility, although there was a difference in that the school wouldn’t use it on a daily basis.

Having been acquainted with other cases, the municipality assumed that the public had better be addressed already in the preparatory phase of the project. They expected to avoid delays from subsequent questions and complaints by the public, but also to make the project more responsive to public expectations, and thus improve the social and economic dimensions of sustainability.

5. With regard to public views and opinions

5.1. Questionnaire distribution and some survey data

In order to obtain a more complete portfolio of opinions and comments the municipalities distributed two sets of questionnaires. One type of the questionnaire was anonymous. It was intended to gather information that the questioned persons might be reluctant to bind themselves personally with. The municipality and the investor supposed that getting this kind of comments would also help decrease the number of objections raised later against the project and building process [15], [16].

The questionnaires were distributed to residents, were available at the municipal offices, and also could be accessed for on-line filling. Some responses were obtained by interviewing the citizens. The

number of directly interviewed persons was relatively small compared to the number of distributed questionnaires, but was about 26% and 19% of all completed questionnaires in case study A and B, respectively, prior to handling potential duplicates, fakes/dummies or distortions/biases. Residents were *encouraged* to fill the questionnaire repeatedly if they felt like that, and optionally to indicate this fact in the questionnaire.

In case study A, the number of questionnaires returned in the first survey was 923 including 26 inapplicable, and 798 including 22 inapplicable in the second survey. In case study B, the respective numbers were 644 including 12 inapplicable and 603 including 13 inapplicable.

5.2. Road network reconstruction and maintenance

The questionnaire survey was conducted twice at the beginning of the project, with a time distance of about a quarter of a year. Some of the questions requested to rate a given numeric property on a 7-point worst – best rating scale.

In the second survey, some questions were added based on evaluations of the first survey. This helped to better tackle the concerns of the public and avoid problems that were not originally thought of, due to their specificity of the location.

In the second survey, the respondents could also indicate whether they had changed their attitude to the questioned topics in a positive or negative direction, could comment on what caused the change of their attitude, and what other changes would be appreciated.

5.3. Cultural facilities, school sport and public leisure facilities

The questionnaire survey was conducted twice before the project, with a time distance of about seven months (more than half a year). After the first survey the objectives of the project could be partially redefined and refined.

In the second survey, the respondents were also asked to state if and how their opinions had changed since the previous survey. The respondents could also state – according to their *individual, subjective* opinion – if and what drawbacks or inconveniences of the project had been eliminated.

6. Hostile interferences

There were other subjects eligible to raise objections to the project, next to residents. The above pre-emptive strategy could not work in their case. These subjects act as hostile elements, by introducing non-essential arguments. They include competing contractors, or other groups. Impacts induced by such subjects would be primarily inevitable delays in the building process, and also – and maybe more important – negative moral impacts.

Having to handle them worsens the sustainability, namely in resources (economic) and social aspects – it takes time, delays the building process, and thus consumes resources among others. Having already notion of such actual subjects and their habitually posted concerns and objections, then the municipality might preventively address them with a request for opinion [17] in the preliminary phase of the project. To this purpose the same questionnaire given to public was used – this had the advantage of informing quietly the public about the imminent problem by the submitted questions. Depending on the type of hostile interference, some of the public could also have taken active part in respective action to eliminate it.

7. Active public cooperation

In both presented case studies, the municipalities used a similar strategy. The strategy was aimed on eliminating some problems in the project, problems originating from the fact that the public raised objections later, and the handling and resolving thereof consequently delayed the project. The main principle of the strategy was generally a simple one – to attract the public into the project long enough before too much binding decisions are taken. Viewed from another perspective, the municipality strategy can be partially defined as: do not try to present and explain the project to the public, let the public “explain” the project to itself. Allow the public to take partial responsibility for identifying and eliminating imperfections that affect the public.

There was a consent that measuring efficiency of the strategy directly would not be easy. It cannot and should not be measured by money or just by money. There was a consensus that the benefit also lies in the smaller number of subsequent comments and objections. However, neither this can be measured directly. Intuitively, more objections handled and resolved before the construction actually starts reduces their number in the subsequent phases. An assumption was adopted that the change in the structure of opinions between the first and second survey might testify well to the amount of subsequent objections. As an indicator for this was proposed a measure of opinion divergence, namely standard deviation. Should it decrease, it might indicate narrower consensus among the public (in these cases among the residents) was reached and the project could be easier modified to improve the resources (economic) and social dimensions of the project sustainability.

8. The survey and the questions

8.1. Questions evaluation

In the following **Table 1** and **Table 2** we summarize average values for the public attitude as determined during the two surveys. For the second survey, tendency of standard deviation of the responses is indicated where it makes sense (/– for decreasing /+ for increasing, in brackets (x) for slightly so, as compared to the first survey). It should be noted that some questions were rated on logarithmic scales, and this fact was reflected when calculating the deviations. Not all the questions in the questionnaire are listed here, some are aggregated and others were omitted on behalf of their irrelevance to monitored possible weaknesses of the project – delays and costs due to belated treatment of objections and comments, and impact on the sustainability dimensions of the project [18] [19].

The results of the evaluation were expected to be used also later, in other future projects preparation, to improve the communication with public, and to improve sustainability (e.g. reduced resources need for modification after completion) by eliminating some serious objections of the public.

8.2. Road network maintenance and reconstruction survey

The questions were on variants of reconstruction:

1. Convenient season (starting on Feb through Aug, 2–8)
2. Acceptable duration (3, 4, 5 months, 6 or longer)
3. Partitioning into phases (1 for no phasing, or up to 2 phases with winter interruption)
4. Postponed reconstruction and provisional maintenance (up to 5 years)
5. Combining with other municipal building plans (no-yes, 0-1)
6. Combining reconstruction with municipal networks renewal (no-yes, 0-1)
7. Allocating municipal money for accelerating reconstruction (mil. €)
8. Allocating municipal money for reconstruction improvements (mil. €)

Table 1. Roads reconstruction questionnaires evaluation.

Question	Survey #1	Survey #2
1. Convenient season (starting on Feb through Aug, 2–8)	xxx	xxx / –
2. Acceptable duration (3, 4, 5 months, 6 or longer)	3.31	3.72 / –
3. Partitioning into phases (1 for no phasing, or up to 2 phases with winter interruption)	1.38	1.77
4. Postponed reconstruction and provisional maintenance (up to 5 years)	2.41	2.58 / –
5. Combining with other municipal building plans (no-yes, 0-1)	0.61	0.80
6. Combining reconstruction with municipal networks renewal (no-yes, 0-1)	0.66	0.78
7. Allocating municipal money for accelerating reconstruction (mil. €)	0.31	0.42 / –
8. Allocating municipal money for reconstruction improvements (mil. €)	0.18	0.24 / +

Standard deviation contains no additional information as for questions #5 and #6. Most of the other questions show decrease in the standard deviation in the second survey.

Data for question #1 should be explained. The respondents could choose several options from the set of months {2,3,4,5,6,7,8}. The average for each respondent is difficult to interpret (choosing 2 and 8 produces average of 5 – but that is not an option quoted by the respondent). The average calculated over all the respondents is out of interpretability, too. However, it should not be concluded that the decrease in standard deviation – calculated first for each respondent and then combined for all respondents – cannot be due to 1) refined individual opinions 2) converged opinions or 3) some other so far unidentified cause.

There were two possible choices to question #3. If the respondent prefers the whole repair to be performed in one phase, the corresponding value was 1. If he was indifferent to whether the repair be performed in one or in two phases, the corresponding value was 2. Thus standard deviation also carries no information as is the case of questions #5 and #6 above.

8.3. School sport and public leisure facilities survey

The questions were about several features of the facilities. The culture-oriented facilities were not subject to these questions.

Only some of the non-quantifiable – i.e. using nominal or yes/no scales – questions (3, 4, 5) are listed here:

1. Opening hours (weekdays) for public – from
2. Opening hours (weekdays) for public – to
3. Clubs for kids, mothers, seniors
4. Other clubs, sport types, non-sport leisure facilities
5. Restaurant, eatery and catering
6. Admission charges (€/hour)

Table 2. School sport and public leisure facilities.

Question	Survey #1	Survey #2
1. Opening hours (weekdays) for public – from	3:40 pm	2:55 pm / +
2. Opening hours (weekdays) for public – to	10:05 pm	9:35 pm / –
5a. Restaurant, eatery and catering – open from	3:05 pm	3:30 pm / –
5b. Restaurant, eatery and catering – open to	10:10 pm	10:05 pm(–)
6. Admission charges (€/hour) (logarithmic scale)	€ 3.88	€ 4.43 / –

Only in **Table 2** listed questions can be evaluated numerically in terms of quantities obtained from respondents. Most of these questions, however, exhibit decrease of standard deviation in the second survey. One could argue that these questions and responses could have no significant direct influence on building part of the project. The responses were used indirectly – for example, each respondent's questionnaire was used to compare opening hour to facility types. As a simple example, late closing hours (opening hours – to) when occurring together with a desire for only clubs for kids and mothers indicated such request to be of lower importance.

The questions based on nominal and yes/no scales delivered data which were used mainly to design the facilities so as to comply with requests submitted via the questionnaire by the citizens.

The increase in standard deviation in responses to question #1 (opening hours – from) was somehow surprising when compared to (slight) decrease in question #2 (opening hours – to). The public was informed in advance about the usage of sport facilities by schools. After some analyses and re-checking, the conclusion was accepted that part of the residents tried to limit the schools in using the facilities in the early afternoon.

9. Conclusions

Having completed a project and then detecting its shortcomings within sustainability dimensions, under the focus of public, would not be comfortable. From this point of view, the “pre-emptive strategy” adopted by municipality (in both presented cases) yielded acceptable results.

The municipalities took great care that the surveys and project modifications (the “strategy”) be performed properly. Thus, the social and economic sustainability of the projects may be reasonably expected to be improved. The assumed sustainability improvement is in accordance with the opinion divergence indicator, namely with the decrease of standard deviation of opinions in the second survey.

There is only a small amount of data available from these two projects. If information in this paper helps to conduct other future projects and to obtain more data, those data might help to better support – or not – the conclusions. Nevertheless, the available although rather scarce data encourage the view that it might be worthwhile to explore opinion divergence indicator(s). And that indicators like standard deviation applied above, could be useful for improvement or rough estimate of social and economic (resources usage) aspects of projects sustainability.

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