

Who loves sewage? Matching expectations in communication between households and sanitation professionals

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ABSTRACT

In Swedish municipalities, householders are addressed as important actors in the efforts to improve the quality of sewage sludge. Householders and sanitation professionals are regarded as integrated and active co-producers of the sanitation system, while limited by the functions offered by the technical and organizational structure. Through interviews with both householders and sanitation professionals, recognition of interdependence was identified in both groups although more communication with counterpart was asked for. If the aim is to increase sustainability in the sanitation system, regardless of technical changes, we argue that two-way communication between householders and sanitation professionals needs to increase and embrace not only advice about choice of products and ways to carry out water related activities, but also planning of activities, feedback on results and other aspects of interest.

INTRODUCTION

There is presently a renewed ambition to increase sustainability within the urban sewage system in Sweden, with aims to recycle phosphorus to cultivated land. As a consequence of this, municipal sanitation professionals increasingly address the roles and responsibilities of households. At the municipal sanitation offices, different tools are used to communicate with households concerning their use of the sanitation system. The aim is often to inform about desired types of household chemicals or unsuitable liquids and other products in the sewers. The communication tools are developed according to the professionals' expectations on the households' level of engagement and knowledge. In the households, on the other hand, individuals express their concern through practical activities having consequences for the sanitation system, including washing, dish washing, bathing and cleaning. Their daily routines are also developed with respect to their expectations on convenience and trust for the treatment facilities.

It has been found in previous studies that the design and function of the infrastructural system to a large extent take part in shaping relations between different groups of actors in the system. It is therefore interesting to see how the professionals and households manage to act

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and communicate within or beyond the borders of the existing sanitation system.

AIM AND RESEARCH QUESTIONS

In this particular study, the aim has been to relate the views within two groups of actors; sanitation professionals and households, concerning their responsibilities and the communication between the two groups. What do sanitation professionals expect from households? In what ways do they try to communicate their expectations? What do households expect from sanitation professionals and the sanitation system? How do they regard the communication strategies? How do they (respectively) perceive their own role in the system?

BACKGROUND AND RELATED RESEARCH

The point of departure in this study is that professionals, users and the technical systems for water and sanitation provision are connected and influence one another. The design of a technological system both enables certain behaviors and informs the user about the importance of doing it this way [1]. A prerequisite for a large technical system like the sewage system is that most users manage their parts in a way that make the system possible to maintain [2]. If large solid objects were flushed in the toilet, blockages would inform the user of the unsuitability of this action. At the same time, users plan and act depending on the services provided by the system, and this will in turn have effects both on the technological system in itself and the resulting outcome in for example quality of sewage sludge.

Professionals within the sanitation sector depend on households and industries to provide a wastewater that is possible to treat and that does not cause poisonous discharges to receiving waters. In addition, the sewage sludge is wanted for fertilization of land, which poses requirements for less harmful substances also in the solid matter. It is difficult to trace certain chemicals to specific users, and therefore, the sanitation sector put great effort in trying to convince users in general to refrain from misuse.

In the 1990's, pilot projects in Sweden aimed for alternative sewage technologies, primarily urine diversion toilets [3]. The nutrient-rich urine is suitable as fertilizer, due to low content of other substances. These technologies have not spread, due to high costs but also distrust in user acceptance among housing companies. The size of the sewage system and its well established routinized functions imply a certain momentum and resistance towards changes [2]. The use of technology as a conveyor of expected usage has thus not been practiced in the sanitation sector to any significant degree. The professionals are left with the option to address users of the conventional sewage system.

It is not our purpose to propose correct householder behavior from a moral perspective, although the idea of sustainable development involves active and conscious citizens and professionals. However, there are specific aims in the Swedish sanitation sector to increase the quality of outgoing water as well as sewage sludge in order to reduce pollution and to create an attractive fertilizer for agricultural use. This has been on the agenda for a long time, and has been brought into renewed focus due to the recent Swedish regulation for recirculation of phosphorus from sewage sludge [4]. These aims have created new demands on the sanitation sector from within as well as from the Government.

The focus of professionals

“Engineering is not as much about technology as we tend to think. ... The really difficult considerations are not technical. It is more about understanding the task, realizing the context... in short – to take responsibility for your practice” [5; our translation].

The pressure on urban infrastructure is high today. Growing cities and a growing demand from each household, as well as calls for environmentally sustainable solutions turn the focus away from increase in provision towards demand management in sectors like electricity, roads and water supply [6,7]. Demand management can involve for example financial incentives to minimize use during peak hours, technical innovations that redirect drivers away from busy streets or negotiations with users about alternatives. Within the sanitation sector, the problem is not so much about volumes as about content. With ambitions to recycle nutrients in the sewage and minimize harmful substances to recipient waters, there is a desire to influence the demand of households for certain chemicals used for cleaning, washing etc. This has led to an increased need for communication between sanitation professionals and householders about the (proper) use of the sewage system.

When studying the move from “predict-and-supply” technological development towards demand management, Evans et.al. [6] distinguished between two alternative ways. The common approach was predict-and-prevent management, which retains the technology in focus. Instead of supplying increasing technological capacity to meet demands, prevention of shortages or congestions was achieved through innovative technical solutions like water-saving devices, traffic information systems etcetera. Evans et.al. promote the second alternative; participatory demand management, in which the users or potential users are involved in planning and practical activities. Their argument is that this approach has greater chances of reaching a robust and sustainable solution. In failed (predict-and-prevent) projects, it is most often not technology but social organization that cause problems. When intended users are involved, user aspects and local knowledge can be taken into account in the planning. In participatory demand management, the statement quoted in the beginning of this section is actualized. Engineers' work is not primarily about technical problem solving.

Reflection-in-practice has been advocated by Schön [8] as a way to define the work tasks not only within the technical realm, but also to be prepared for re-defining the boundary for the work. As was argued earlier, the structure of the technical system as well as the specific organizational structure within which an engineer works can be more or less permissible towards redefinition of boundaries. Other criteria that appear to define the action space available include access to resources, communication with users, arena for participation and conflict management, legislative and political support and the presence of enthusiasts or initiators [9]. If these criteria in a specific case are supportive of pilot projects and other experimental methods or activities, it is far more likely that innovative ideas become reality, especially when several different actors need to collaborate.

Households and their action space

The focus on individuals and households to take environmental responsibility has increased in the latest two decades, both as a conscious aim promoted by the UN system and national governments as well as market actors, and as a complement to ongoing regulation and control of industrial impact on the environment. Chemical substances available for use in households increase in number and volumes, making the householders' choices more complex but significant. The complexity of this situation makes it appropriate to identify the structures within which different actors, including householders, are able to act. Individuals are not free to act according to their moral and attitudes regardless of enabling/hindering technical, societal or political structures in which they are embedded [10]. On the other hand, it is not possible to solve all environmental problems with technological installations, as householders' use and habits have an influence on the outcome of the technology-in-use.

Spaargaren et.al. [10] define this Social Practices Approach in which human agents are regarded as knowledgeable and capable actors within a social and technological context influencing them. Skill [11] develops the arguments around householders' responsibility for environmental issues as situated within an ecological action space, built by their habits, attitudes, moral beliefs as well as the societal, practical and political structure. A decision to recycle materials like paper, plastic, metal, glass and organic matter in households does, for example, not only depend on personal beliefs but also on waste collection fees, distance to a recycling collection site and space available for storing in the household [11,12].

The invisibility of the sewage system contributes to householders' low priority, compared with the separation of solid waste for recycling purposes. In this case, each householder engages in visible separation of materials, and it is also possible to trace misbehavior to individual houses, which may be motivation enough [13]. In the case of sewage, whatever is flushed away disappears and is not possible to trace back to individual households. The motivation to avoid unintended use must therefore be more abstract except for physical blockages in the pipes.

The recognition of householders as active partners in shaping the technical system and its functionality has brought their motivation and knowledge into focus. Meaningful communication between professionals and householders need to consider these aspects. Householders interviewed by Skill have a few different strategies for their environmental actions. Some rely on experts (including eco-labels and recommendations from municipal officials). Others request more detailed information in order to understand the importance and consequences of their actions. Others again ask for more feedback on the effects of certain activities in order to find motivation to comply with asked-for behavior [11,14].

Bringing the two together

The preparedness to integrate environmental considerations in householders' decisions depends to a large extent on how the householders regard the importance of their own actions, the (assumed) willingness of others (neighbors) to do the same, and on the interpretation of the necessity, due to trust in the technical systems to cope with their waste [12,13,15]. In other words, householder environmental action must appear meaningful and decisive if extra effort should be considered.

The well established trust in infrastructure technology to take care of the waste is a result of earlier efforts by government and municipalities to handle environmental degradation through legislation and advanced treatment processes [16]. This trust might however not reflect the real, limited capacity to handle complex sewage water at the treatment plant. Trust in the technology might reduce willingness to prioritize change of habits, since a variety of substances are supposed to be taken care of.

On the other hand, *lack* of trust, in for example municipalities or retail stores to provide proper products, information or services can also hinder the sense of meaningfulness in taking action from a householder perspective. Lack of professionals' trust in householders might also reduce the efforts among professionals to establish communication and provide diversified information material.

The extent of municipal communication with households is not regulated and standardized, and therefore differs between different municipalities. As a minimum, most Swedish municipal sanitation offices have a web site with information to households and give written

information yearly in municipal handouts [17] In her study in four municipalities, Skill [11] concludes that the municipal efforts to reach out to householders takes the form of pleas for voluntary (change of) behavior such as driving less, buying eco-labeled household chemicals and recycle waste materials. Skill argues that there seems to be a limitation in the municipalities to what the professionals feel is proper to interfere with in households.

It has been argued, as mentioned earlier, that the involvement of householders or citizens in planning and decision making in a participatory approach has advantages over technoscientific approaches [6]. If those setting standards and giving information trust consumers to be able to handle complexity, they can involve consumers in discussions and identification of priorities both when defining standards and when communicating their content. This can in turn build a more advanced level of “reflective trust” between stakeholders [18, see also 8]. Empowered consumers invited to take part in defining standards are able to deal with the temporary character of sustainability for products or activities. Boström and Klintman [18] takes their arguments from studies of eco-labeling, and they advocate a focus on consumers with some interest and knowledge rather than trying to reach out to all citizens at once. With this focus, it is relevant to change from simplified information campaigns towards more complex and diversified information as well as to open up for communication and dialogue

The environmental outcomes of participatory processes may not always be possible to anticipate, but the empowerment of citizens has democratic advantages even if it only engages a number of interested people [18]. Building a more advanced level of “reflective trust” between empowered consumers and reflective professionals open up for process thinking.

METHODS

The study consists of two different cases in two Swedish municipalities. The two cases were selected as examples of ongoing municipal pilot projects to improve the quality of household sewage. In both cases, the municipalities had selected a geographically well defined area to be able to analyze the quality of the sewage from the specific households taking part. Feedback from chemical analysis of the specific sewage flow from the area was thus possible. Both areas were homogeneous residential areas with approximately 100 households, primarily detached, privately owned houses. In the first case, there were also a small number of apartments.

The two cases represent a trial with alternative technology and a trial with intensified information. The first case, referred to as the Grinder case, was an alteration of the technical features in the households, with a grinder in the kitchen sink for organic waste connected to separate collection of toilet waste water (blackwater). A pilot treatment plant just outside the area had been put up for experiments with nutrient extraction from the blackwater. Information had been given to potential buyers and upon moving into the houses about proper use of the grinder and the toilet sewer. The second case, referred to as the Folder case, was a pilot project with intensive, location specific information in folders delivered to households using the conventional system about car wash, tooth paste, medicines, paint and household chemicals. The folders were delivered every 3-4 weeks for about eight months. An information tent was set up on one occasion. Chemical analysis was done to follow effects of specific information folders. The specific residential area had been subject to specific information campaigns earlier as well, concerning solid waste and phosphate free washing powder.

In each case, focus group interviews have been done with female and male household

members as well as sanitation professionals (see Table 1). In total, 7 focus group interviews were done. Each focus group interview was approximately 1,5 hours long, was recorded and transcribed in full length. Two researchers took part in each of the interviews. Some water related household activities are clearly gender divided [19], and to open up for gender differentiated discussions and knowledge sharing, the householder interviews were done with women and men separately.

Table 1. Details of interviews made in the two case studies

Case	Specific features	Interviews
Case 1: Grinder	Technical installation: separate toilet waste water collection with organic waste disposer in the kitchen sink. Experiments in a pilot plant. Information to buyers.	<ul style="list-style-type: none"> • 6 women in apartment house (GW1-6) • 4 women in detached houses (GW7-10) • 5 men in detached houses (GM1-5) • 4 sanitation professionals working with the project and with municipal information, including a senior engineer (GP1-4)
Case 2: Folder	Conventional system in use. Intensive information campaign to households during eight months about water-related activities and their effects.	<ul style="list-style-type: none"> • 4 women in detached houses (FW1-4) • 3 men in detached houses (FM1-3) • 4 sanitation professionals working with the project, including information expert and senior sanitation engineer (FP1-4)

The questions have covered communication strategies, expectations from households on professionals and vice versa, concern for (ecological) sustainability, responsibility for environmental impact etcetera. The interview material guided us towards an analysis of agency, roles and trust within the system, as well as responsibility for sustainable development within the sewage system. Interviews with both householders and professionals were used to get a richer picture of the roles and the implications of these roles, but also to discuss possibilities for increased dialogue and citizen involvement as a sustainability factor.

In the results section below, quotations are translated from the interviews made in Swedish.

RESULTS

Agency and resistance. Sanitation professionals' identity on the limit

The municipal sanitation professionals related to the concept of sustainable development within their sector, referring to their work with natural resources like water and energy. In the folder case, the work tasks were defined in broad terms, from agricultural policy to servicing pumps and pipes. In both municipalities, the professionals regretted that issues relating to sustainable development, for example medicine residuals entering the sewer system, in many cases fell between different departments in the vertical structure that is common in the organization of municipalities. This “departmentalization” seemed stronger in the grinder case, which is a larger municipality. *“Sustainable development - the institutional structure is not made for that, there is a drainpipe structure and with sustainable development, issues falling in between arise” (GP1).*

Related to this discussion, professionals in both cases referred to collaboration with other municipal offices as well as national or regional partnerships and, in some cases, producers of

specific products having an effect on the sewage. In this sense, it became evident that the work situation involves a variety of communication and meetings with different actors, although water sampling and technical development were also mentioned.

In the folder case, run in a smaller municipality, one of the professionals claimed that they were improving the pro-activity and the collaboration with other municipal offices in their efforts to reduce harmful chemicals entering the sewage system. She claimed they need to do more than just follow the regulations. *“We could do much more together with the other municipal offices, ...they [the other offices] are a bit afraid ... we should just follow the regulations and that is it [according to them]. But there is improvement going on. We must not give up” (FP1)*. At one occasion, the professionals in the folder case had been criticized by one of the politicians for being too normative in promoting eco-labeled washing power, but they continued to believe in taking a clear position as municipal professionals.

Although the professionals were aware of the importance, they also expressed reluctance towards taking responsibility for the reduction of harmful chemicals or harmful use of the sanitation system. *“Why should it be the responsibility of the sanitation sector? It is not logical, but it ends up here and that is why we take on responsibility ... It becomes our problem, but it is not really our responsibility to influence users on how to use the system” (FP2)*. While they identify the problem of issues falling between, where no organization takes responsibility, they also argued that they were not capable of dealing with these “side issues”. In some cases, the sanitation sector had decided to take action, as when the Swedish Water and Wastewater Association entered public debate about silver in washing machines. The professionals argue that they cannot solve this kind of problems on their own, but only take part together with other actors.

Sanitation professionals relate to households

In the interviews, the sanitation professionals were relating to the households as important agents in the sewage system. Especially in the folder case, they seem to spend a fair amount of their time to handle issues relating to households, from sampling of household chemicals in effluent water to tracing these chemicals in stores and products, informing the households and, in some cases, retail stores about the importance of using less harmful chemicals.

The format of the communication seems to be mainly one-way, written information about which washing power, toothpaste etc. that are better and/or worse for the sewage system, and where to wash the car and dispose of harmful chemicals and medicine left-overs. In the folder case with an intensive information campaign, the professionals were also available and present in the residential area for questions and discussions at some occasions. In this focus group interview, the professionals stated the need for continuous information about simple matters, in order to reach the goals; *“if you really want to achieve something, you really have to repeat information on a certain issue, you must not give up” (FP3)*. They also put efforts into this work, communicating with households as well as retail stores and industry on a regular basis and in collaboration with the municipal environmental office. In the grinder case study, the professionals admitted lagging behind with information that ought to have been handed out. They were also hiring staff from outside to man stalls on markets, since their own time was not enough to do this.

The professionals paint a picture of householders as rather uninterested, and generally, this is not considered a problem. *“I think they have forgotten that this [the grinder] is connected with the toilet --- luckily they have other things to think of in life” (GP2)*. The professionals

assume that the householders simply want the system to function with water provision and sewage removal. Therefore, the professionals take on a large responsibility, and they also discuss ways of trying to convince shops to stop selling certain products like antibacterial toothpaste or washing machines with silver. As we will see below, the assumption that householders lack engagement in the sanitation system does not fully match householders' interests.

When asked about the information that the technology in itself exposes to the householder, there were long discussions about what kind of information the households needed to use the technology in the assumed way. Only one professional in the grinder case mentioned that the kitchen waste grinder might remind the user about something being special.

Households defining their role

Initially, the interviewed householders in both cases said they were satisfied with the sewage system bringing away what they wanted to get rid of. This was one main concern. There were different levels of engagement in the sanitation system, but most of the householders said they paid attention to what they were supposed (not) to throw or pour into the toilet and the sink. They referred to solid products like Q-tips that could cause blockages, but also chemicals like Chlorine, shampoo and car washing water, which could be harmful in the treatment process. One woman who took medication raised worries about the effects from this, although there was nothing she could do about it. Allergies also limited the choices or products for several householders.

While the professionals ignored/diminished the role of technological design (see above), householders discussed their responsibility in relation to the separated system in the grinder case. *"I realized that it was two different systems and that you should not put this in that one or this in the other one. So yes, there is a need for some knowledge"* (GM1). Other, unintended technical features like frequent blockages in grinders or in pipes in low-lying houses also affected the householders' use of the system. The system was therefore said to require some specific knowledge, and especially the female householders took on the responsibility to inform visitors to use the system in the assumed way. *"When we have visitors I have to inform. Not about the grinder because they seldom go there. But they do go to the toilet. That they should not flush for example cotton pads or whatever. .. I usually inform every time there is a new [visitor]"* (GW7). During the interviews, the women discussed the use of the grinder in length, and also learned from each other during the interview how to handle banana peels, onion peels etcetera to avoid blockages.

It was evident in all the five interviews with householders that they expect to receive information from the professionals in order to keep alert. *"If it is possible to do something for the environment, I could consider being active. But then you want some kind of input and response to that. If you lose that aspect, you just want it to function, then you do not want to be engaged."* (GM1)

The householders wanted information both about preferred products to buy, and about the (chemical) results of their household activities. *"It would be interesting to get recommendations from environmental and sewage treatment plant perspectives. These products are good, use them"* (GM2). Taking responsibility was primarily connected to immediate effects, which was evident in a discussion about blockages in the pipes in the folder case.

Increased societal ambitions to keep the sewage clean have been noted, causing some level of

bad consciousness for not complying fully in practice. *“It still seems to be a tricky balance, between environment and functions you want – clean laundry, white teeth...”* (GM3). Women in the grinder case said they paid more attention to environmental effects when buying food and household chemicals when their children grew older, since they had more time and money to spend than with small children at home. However, they expressed a wish that regulations and producer responsibility should reduce the number of less environmentally friendly products to choose from in the shops.

Do you know you are special?

In this study, we have focused on two cases of specific municipal intervention aiming at improvements of the sanitation system. In the grinder case, the professionals took pride in presenting the system as “normal”, not placing special requirements on the householders apart from the normal “only urine and feces in the toilet”. In the folder case, on the other hand, the households were targeted with a number of information sheets to remind them about several household activities that required thoughtful behavior. This included car washing as well as recommended choice of products like washing power and tooth paste.

In the grinder case, the householders in the interviews recognized that their system was special, but they said they had not received any information since they moved in, neither advice for purchases/behavior or feedback on results. *“I worry about when new people move in if they do not get the right information”* (GW7). The enthusiasm among householders had decreased due to lack of response, but the women said they were still keen to take their responsibility, buying eco-labeled products and/or abstain from flushing down solid or harmful waste in the toilet; *“there is much more environmental thinking since we moved here”* (GW1). The householders appreciated the grinder, which reduced the weight and smell of solid kitchen waste and which they therefore did not want to loose even if the project was closed.

In the folder case, the interviewed men said they were always exposed to pilot projects like this. They were aware of the repeated information and claimed to have changed some of their behavior according to the recommendations. *“So every time I get this information, usually I think I would have thrown it if I just received it and did not know we are in a pilot project. But now I read it and I learn something every time”* (FMI) The householders showed a positive attitude towards the information folders delivered, since they were nicely designed and contained useful information about different activities and household chemicals of interest. Several of them had for example changed habits from pouring cooking fat into the sink to pouring it in the yard and wiping the pan before washing after receiving information about the problem of blocked pipes. The householders claimed they were probably more aware of the sewage system than citizens in other areas because of the campaign. *“We have become more and more conscious about what we put in the sewer the latest year”* (FM2).

In both cases, the male householders compared the sewage system with the solid waste recycling that has been in place for about ten years. To separate waste had become a habit, but the men said the sewage was less visible and hence, less easy to address for improved environmental behavior. There is no possibility for feedback to individual households, as with garbage bins in detached houses.

Levels of trust

The householders seemed to have a solid trust in the sewage system. *“I assume that those who work with it know what they are doing and that they solve it in the best way for all”*

(FW2). It was also said that as urban householders, *“we are totally dependent on this system”* (FM3). The householders in both cases also assumed that the professionals know what they are doing, diminishing the need for active householders to engage more in the sanitation system. However, there were also some doubts whether the increasing flows of chemicals were actually possible to treat at the sewage plants. *“We don't know, I mean, it works for me, but I don't know what it is like in the other end”* (FW1).

The opinions of whether the professionals should be more active/visible were divided. One man in the grinder case was content to leave it to the professionals to handle whatever they got *“It is their task to treat what comes out, so to speak. They do not have the mandate to regulate what we pour in the sewer, really. They can have an opinion, but...”* (GM1). Another man in the same interview was disappointed with the lack of contact *“In the beginning, I felt [expectations from the sanitation professionals], but now it does not feel as if anybody cares about what happens”* (GM3). Thus, the trust in the professionals to do the technical work tasks seems more established than the trust in their communication work.

In the grinder case, householders commented that the professionals have low trust in the householders; *“It is rather low expectations, I think... like that we do not flush down things we are not supposed to”* (GW8).

The expectations of professionals on householders seem rather limited. Most of the professionals do not expect householders to know (in detail) what happens in the sewage treatment process, as long as they accept information and adopt consumption habits and behavior in accordance with information given. *“There is a big difference between what I wish and what I expect [from the households]. ... The expectation is simply that they do not flush down the really dangerous stuff”* (GP3).

DISCUSSION

Obviously, none of the interview participants claimed that they loved sewage. The sewage system is appreciated for being invisible and well functioning, but not something you think of and long for dealing with. Professionals, though, may show care and attention for the technical system they are responsible for.

During the focus group interviews, it became evident that the householders taking part in the interviews were aware of being part of a pilot project, making them more aware of how they use the sewage system. The householders in both case studies expressed positive reactions to the pilot project they were part of. We found that the technology spoke to the householders in the grinder case, although the professionals were not aware of this. In both cases, the householders requested feedback from the municipality on how they succeeded in their efforts to do what they were supposed to.

We are aware of the fact that the discussions and interests among householders may vary depending on age, family structure and social situation. In this study, the interviewed householders were middle-aged and older, raising or having raised children. This means they had rather well established routines and knowledge around household matters.

In both municipalities, the understanding of communication was to a large extent limited to one-way information from municipality to households on correct behavior (do's and don'ts). The focus on sanitation systems as part of nutrient recycling has caused increased information from municipalities to households about proper use. Feedback on chemical analysis,

information about what happens if..., or two-way-communication was rare. Householders in all interviews asked for more communication about consequences.

Skill [11] identifies an action space within which the householders can act towards sustainable practices. The sewage system is a non-negotiable system for urban households in the way it is installed in each specific house. It is generally assumed that solid waste is collected separately from wastewater disappearing in underground pipes to a centralized treatment plant. The action space open to households is the frequency of activities, selection and dosage of household chemicals, the use of waste bins for solid matter, and the amount of water consumed. This action space is limited by alternatives available, economic possibilities to choose and allergies as well as environmental consciousness, as was evident in the interviews. As some householders argue, the action space can even be regarded as too wide when it comes to alternatives available in shops with long lists of chemical content difficult to interpret for an average consumer.

It is our understanding that there is a (limited) action space also for the professionals. The municipal structure and definitions of work tasks shape frames within which the professionals work. In a smaller municipality, it might be easier to establish contacts with other offices, but the dependence on individual enthusiasts is also evident. There is ambivalence about how much responsibility sanitation professionals ought to take for the retail market and products available in shops. In the interviews, professionals felt they had no choice but to be active, although it was not really part of their commission. The formal structure with governmental bodies responsible for legislation and political negotiations also limits the possibility for municipalities to act. In our study, we find pockets where negotiations of the professional role take place, especially in the folder case.

We found ambivalence among sanitation professionals agreeing with Skill's research [11], about the extent of the mandate each municipality has to influence households' actions. The traditional role of technical offices in a municipality has been to provide technical solutions. Negotiations take place right now aiming towards a broadening and a shift of the work tasks in order to include communication with households as well as other actors affecting the processes in for example sewage treatment plants. It was evident in the folder case that the professionals had adopted a broader view on their work task, trying to integrate different municipal offices and also prioritizing information efforts. In the grinder case, the professionals struggled to remain in the technical realm. On a higher policy level, the professionals saw collaboration with other actors as a way to address sustainable development issues.

It was found in our interviews that householders as well as professionals were rather content with their role as receiver and provider respectively, although persons in both groups expressed confusion and doubt that the counterpart is really able to do their part. They therefore were aware of the need to take on responsibility within their realm and also expressed wishes for increased and broader communication.

In line with Evans et.al. [6] as well as Boström and Klintman [18], we argue that lessons from research into the relation between householders and professionals point towards a promotion of increased citizen participation in planning processes with aims to increase sustainable practices in the municipality. This was, as mentioned, not requested by the interview participants, but may still be called for in the move towards more sustainable infrastructure systems. A first step in this direction is a higher priority for communication, including feedback and explanations of consequences of different actions.

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