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Housing organizations using social media in sustainable building operation – a review of eighteen Danish cases

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ABSTRACT

Purpose: This paper investigates whether and how housing organizations use social media in sustainable building operations. This paper is based on a study of the current use of social and interactive media in Danish housing operations.

Background: Social and interactive media represent new ways of communicating that could be a promising step towards sustainability on the societal level.

Approach; Theory/Methodology: The study is a hermeneutic qualitative mixed method study consisting of 3 parts: (1) qualitative interviews, (2) an internet survey to verify the findings and (3) a case study of 18 examples of current use of social and interactive media.

Results: The paper concludes that the use of social media for facilities management purposes is still limited; the cases vary in their strategic focus on top-down or bottom-up communications and possibilities of self-presentation. Virtual communities can give the residents a new chance to share knowledge, ideas, experiences, attitudes and opinions and could become learning environments that lead to more sustainable practices in a neighbourhood.

Practical Implications: This paper shows that social media have overlooked potential for involving residents in sustainable operations and maintenance in housing organizations. The results are not limited to a Danish context and are likely to be of use in other countries as well.

Keywords

Sustainable building operation, Social media, Residents' behaviour, Participation.

1 INTRODUCTION

The use of social media in facilities management is currently an understudied topic that is not yet found in current facilities management (FM) research articles. The idea that social media can support communication between facilities management organizations and the residents of local neighbourhoods regarding sustainable behaviour is also new. In the following, we argue why this subject is interesting for municipalities and facilities managers of residential areas. The state of the art is related to social media theory and facilities management theory of sustainable building operation. This section also describes the definitions of social media, housing organizations, and

the stakeholders in charge of sustainable change processes. Readers who want further information are recommended to study the full report (Knudsen and Nielsen, 2015), which is in Danish.

Recent research states that the energy consumption in newly energy-renovated homes varies by a factor of 2-3 due to residents' behaviour. (Gram-Hanssen, 2014) This means that energy-optimized buildings and renovations seldom achieve the calculated energy consumption or energy savings. One of the problems is that the Danish energy-calculation program BE10 operates with assumptions about indoor air quality and room temperature that do not correspond to the actual behaviour. Another issue is that residents' comfort needs and behaviours change when their flats or houses are easier to heat. With this in mind, it becomes essential to influence resident behaviour when the overall goal is to reduce energy consumption and CO₂ emissions for the housing stock. Resident behaviour also affects the supply and use of resources such as electricity, heating and water, the indoor climate, waste disposal and green areas. For the residents, sustainable building operation in residential areas has a significant impact on their everyday life, wellbeing and happiness, as it involves the management of their home.

In Denmark, there are 528,000 apartments or homes in the social housing sector, and there are 531,000 private rental apartments and approximately 1,500,000 privately owned apartments or homes (Statistics Denmark, 2015). The Nordic social housing organization, NBO, represents 2,500,000 homes in Denmark, Norway, Sweden and Iceland (Nordic Council of Ministers, 2013). Our investigation covers both the social housing organizations and the private property administrations. We have not covered homeowners' associations; because they are generally smaller with limited building administrations, we assume that they also might benefit from using social media. The focus of our study is housing organizations and their need to communicate with residents. What is the current use of social media? For housing organizations, what are the benefits and barriers to using social media? Is there a difference in the communication strategies among the identified cases?

2 STATE OF THE ART

Nielsen, Jensen and Jensen (2012) describe how various forms of ownership are connected with different strategic facilities management organizations (SFMOs), in this case, as social or private housing organizations. They argue that "facilities managers and building operators are key actors in implementation of sustainable measures in building operation" and that "the organization of housing companies has great importance for their environmental performance" (Nielsen et al. 2012). The facilities management organization of social housing consists of operation managers, who have responsibility for the operation of several housing departments, and local janitors, who take care of the housing areas (boiler room, building monitoring system, building information management system, gardening, waste disposal, cleaning etc.) Larger private administrations have the same organization or are structured so that the janitors refer directly to the owner of the housing estate.

Sustainable facilities management (SFM) is facilities management that aims to reduce the consumption of electricity, heating and water and to improve the management of waste collection for the benefit of the planet. In Denmark, SFM is related to the sustainability standard explained by the DGNB standard (Deutsche Gesellschaft für Nachhaltiges Bauen) which was adopted from the German standard and customized to a Danish context. According to the United

Nations' three pillars of sustainability, the DGNB standard addresses the social, economic and environmental values required for a building or urban area to be sustainable. According to Nielsen, Junghans and Jones (2016), "sustainability in the meaning of environmental impact is addressed in FM standard EN15221-7 on Performance Benchmarking (CEN, 2012), using the indicators for primary environmental ratios (e.g., total CO₂ emissions), primary energy, water and waste ratios and other environmental scores".

2.1 Stakeholders and different ownership

There is a significant difference between the primary stakeholder roles in social housing, owner-occupied or private co-ops and privately owned properties for private rental.

Social housing is administered by social housing organizations and is characterized by the residents' collective ownership organized by the local housing department. Therefore, it "is the type of ownership which provides the most integrated frame for common decision making" (Nielsen et al. 2012). In the case of private rental homes, the tenants have limited formal rights; the administrator and the owner represent two different organizations, and the local operation can be carried out by a third party, such as an external operator, caretaker or janitor. Private co-ops and owner-occupied dwellings are administered by self-administration or private administrators, which can vary from very small administrations to bigger private housing organizations. "The incentives and barriers to implementing sustainable facilities management are very dependent on the ownership" according to Nielsen et al. (2012). Their model of SFMOs in social housing and privately administered housing describes certain important actors': residents or tenants, administrators, owners and operators, who each have different roles. That study concluded that in social housing companies, administrators have a stronger commitment to sustainable issues, whereas the residents often feel little ownership of the housing department and have a short time horizon and no incentives for long-term investments. In privately owned homes and co-ops there is a strong connection between the ownership and the responsibility amongst residents and stronger economic incentives for investments, but at the same time limited in-house knowledge about sustainable solutions; and the administration is not committed to promoting sustainable FM. In private renting the owner has a strong focus on economic performance. The tenants feel little ownership and have short time-horizons on the return of investment.

One of the major differences between the various ownerships is the organization of the local operation staff (janitors or caretakers). In social housing the local janitors often are in-house and employed by the housing organization, whereas the privately administered co-ops or rental housing sometimes carries out the local property operation by external service operators (janitors). Then the local operators are not very closely connected to the SFMO and according to Nielsen et al. (2012), this has significant importance for implementing sustainable housing operation, where as mentioned above the local operators are key actors.

2.2 Virtual communities and participation

Social media is defined by Lipschulz (2015) as media that can support participation, and that invites the users to openly share their opinions with other users. Citing Tracy L. Tuten, he states that: "*social media refers to online communities that are participatory, conversational, and fluid. These communities enable members to produce, publish, control, critique, rank and interact with online content. The term can encompass any online community that promotes the*

individual while also emphasizing an individuals' relationship to the community, the rights of members to collaborate and be heard within a protective space, which welcomes the opinions and contributions of participants" (Lipschulz, 2015).

The social media researchers, Kaplan and Hanlein (2010) classify social media based on the following factors: 1: the richness of the medium and the degree of social presence it allows; and 2: the degree of self-disclosure it requires and the type of self-presentation it allows. "The higher the social presence, the larger the social influence that the communication partners have on each other's behaviour". "Social presence" is defined by the acoustic, visual, and physical contact that can be achieved with other people via the media, meaning that the media facilitates awareness of other people. Media richness is the medium's ability to support effective communication and decision making, which is higher in face-to-face communication than for telephone communication and higher for "chat" than communication by e-mail or forums. "Self-presentation" is based on the desire people have to make a nice or advantageous impression on other people to create an image close to their personal identity or self-understanding. "Self-disclosure" is the medium's possibilities for supporting how users can show personal information such as thoughts, emotions and opinions of what they like or dislike (Kaplan and Haenlein 2010).

Koh et al. (2007) studied 77 virtual networks, and they strongly recommended that there should be local opinion leaders in those networks raising questions of common interest and making other contributions of interest to the network. The opinion leaders should not tip the balance between users, as equal access and participation are important principles.

Because this paper investigates the possibility of using social media to improve residents' sustainable practices in their everyday lives, the medium's normative role becomes interesting. Marres (2012) discussed "the normative powers of thing" in her book "Material Participation" and argued that "political and social research much consider the *specific* normative capacities of non-human entities and the particular challenges this poses for specific normative concepts and ideals". When media are combined with, for example, visualization of energy and water consumption data from indoor climate metres, and when they are used to inform or transform normative values and affect users' environmental awareness, then media have normative capacities. One of the important parameters then is that different media have "variable normative capacities for engagement" in connection with the whole setting they are part of. Through their user interface, different social media have different possibilities for supporting residents' engagement and participation, and equal access or moderator rights also impact that. There could be different concepts, ideas and values embodied in different types of media, and it is important to consider how they contribute to the performance of participation.

Looking closer at the virtual community, it might be relevant to study whether and how the residents engage in different "communities of practice" (Lave and Wenger, 1991) on the media, forming various interest groups and sharing knowledge and opinions about common interests over time. The virtual community is not in itself a "community of practice", but a common subject of interest could be a group who wants to make a physical change in the neighbourhood. Accordingly, Lave and Wenger stated that situated learning takes place by participation in communities of practice. Members of various interest groups engage in learning processes characterized by "legitimate peripheral participation" where newcomers learn from more

experienced members. The processes are supported by a “shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice” (Lave and Wenger, 1991).

Social intranet media might support this shared practice by online FAQ, user manuals and online reification of shared repertoire. The housing organization can support the communities of practice’s engagement, skills/ knowledge, visibility/ storytelling and alignment (Knudsen et al., 2001)

3 APPROACH

This study has identified 18 cases where social media are in use, and the study sets out to answer the following question: How do private and social housing organizations experience the possibilities and barriers of using social media in operations management?

The study was carried out as a hermeneutic qualitative mixed method of FM organizations’ use of social media and their sustainability goals and consists of 3 parts: (1) qualitative interviews, (2) an internet survey and (3) a case study with 18 examples of social media use.

(1) Qualitative interview study: Initial interviews with key stakeholders, the two national housing associations BL Social Housing in Denmark and Property Federation Denmark, and the two large housing organizations Lejerbo and KAB established the overall themes of the qualitative study. Four other social housing organizations and three private housing administrations were selected for qualitative interviews. Interviews, case studies and analysis were carried out by architect Helene Hjort Knudsen, who has worked as a communications consultant and environmental consultant in the bigger social housing companies. The qualitative interviews were conducted with communication managers, operation managers (at the strategic level) and environmental managers. Open semi-structured interviews were conducted to identify the following:

- a: The typical communication between the housing organization and the residents.
- b: The use of social and interactive media, barriers and possibilities for its use, and identification of case studies.
- c: Environmental issues considered important by the strategic operation managers.

The inter-views were recorded on tape, and most of them were transcribed. A summary was sent to the informants, and the citations were sent later. A meaning condensation of the qualitative interviews was performed, and the survey further investigated the findings.

(2) Survey of social housing organizations and private property administrations: The qualitative study was supplemented by two surveys. One was sent out to ten large or medium sized private property administrations and 20 smaller administrations. Among the organizations answering the survey were eight of the large property administrations and two of the smaller one. The other survey was sent out to 14 of the large social housing companies that administrate more than 2,000 homes. Nine of those administrate more than 5,000 homes.

(3) Case studies: Based on the interviews and literature studies, 18 case studies were defined with particular values of interest as scholarly examples. The social media cases were described based on a literature study of the evaluation reports, through interviews and/or studying the media. In the following section, the different social media are placed in a system according to their ability to support residents' participation and/or residents' self-representation and self-disclosure with reference to Kaplan and Hanlein (2010). The cases represent various strategic priorities of the housing organization. In all cases, the social media support the organizations' communication with the residents of the administered housing areas, and the communication concerns matters of local operation such as energy and water consumption or repair work in the homes.

4 RESULTS

4.1 Sustainable operation management in social and private housing

The survey findings show that there is a greater focus on the sustainable operation of social housing than private housing. At the strategic level, the social housing organizations have overall environmental goals but might lack an operation action plan. Of the ten social housing organizations that answered the survey, only four of the organizations have a strategy for energy operation. Although five of the organizations monitor fluctuations in the consumption of electricity, heating and water, only one of the organizations has a strategy to influence the residents' behaviour. Only the larger private organizations take care of the operation and monitoring, and four of the larger administrations answered with the following: "No, we do not have a strategy concerning energy savings, corporate social responsibility or sustainability".

Based on the interviews, it can be concluded that the operation managers observe that the following two environmental areas are of greater interest than others: 1) The heating of apartments and 2) the proper ventilation of apartments connected with the indoor environment. Energy consumption for heating accounts for 80% of the total energy consumption of apartments. By monitoring the resource use in the building management system, the environmental manager from Boligkontoret Danmark observed that the heating consumption patterns in 50% of the apartments are not appropriate (Knudsen and Nielsen, 2015). There are apartments where all heating is turned off, apartments where only one thermostat is turned on, and apartments with huge heating consumption compared with others. For each degree the temperature in the apartment is lowered, there is a 7% savings on the heating bill; therefore, it is important to provide knowledge to the residents about more correct heating practices.

The local boards in Boligkontoret Danmark tell their operation managers, that they expect them to take the responsibility to inform residents about the correct heating practices: "The overall feedback from the boards is, 'We are not professionals, and we do not know when we have incorrect behaviour. Basically, we want you, as the professional administrators to take responsibility'", according to the Environmental Manager of Boligkontoret Danmark.

The conclusion from one of the projects, where the operations team conducted visualization of energy consumption is that "there is a need for information, professional guidance and specific instructions about correct user behaviour" (Exergi, 2014). Another conclusion is based on the interviews and the survey: the operation management and the local janitors are very important

stakeholders for influencing the residents' sustainable behaviour. They communicate about matters of operation such as indoor climate, energy consumption and waste collection. The main focus of the communication department in the housing organizations is what more generally concerns the residents. Following Nielsen et al. (2012), this difference is important for implementing sustainable operation. In the social housing sector, the local janitors can be seen as a resource when it comes to influencing resident behaviour as they have great knowledge of the residents, the residential area and data from BMS (Building Management System). The private co-ops and owner-occupied dwellings might lack those resources in the organization. Here, the local board is in charge, and they might need information and resources from outside the organization, e.g., from the municipality or non-profit NGOs.

4.2 Social media can support resident participation

The study presented 18 different social media cases defined by the type of social media in use:

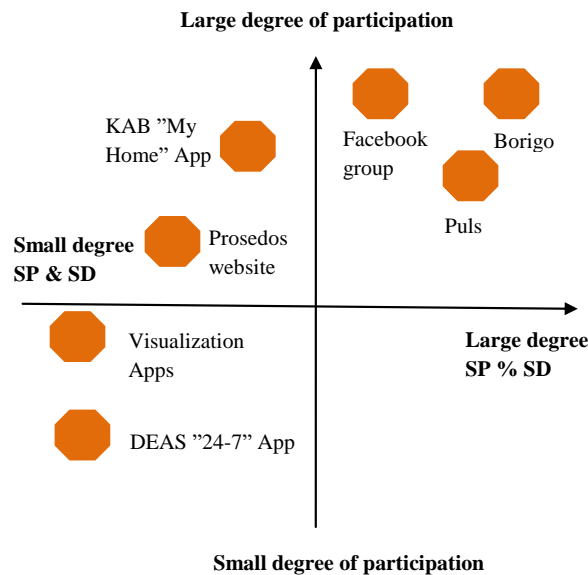
- A: SMS service communication from operation to residents (1 case)
- B: Web applications for visualization of energy consumption (8 cases)
- C: Web applications for supporting communication from residents to operation (3 cases)
- D: Facebook groups supporting neighbourhood communities (2 cases)
- E: Other social media supporting virtual communities (3 cases)
- F: Websites with social media features (1 case)

Of the 18 cases, 7 cases are elected as scholarly examples of various ways to use social medias. The 7 cases are described below:

- *Case 1: The visualization apps* (type B) affect energy consumption and are implemented on screens in the home. They do not support communities or activities among the residents and are more related to top-down communication to affect the residents' behaviour.
- *Case 2: The 24-7 mobile app* (type C) is an advanced "mail option" developed by DEAS that allows residents to contact the administration whenever it is suitable.
- *Case 3: The My Home app* (type C) was developed by the social housing organization KAB as a mobile app. The operation provides information about maintenance and advice about water and energy savings. The residents have profiles and can post messages and activities.
- *Case 4: Facebook groups* (type D) are used by the *KAB Bolig+* social housing departments. The groups are used for organizing operation activities among the residents, who have the obligation to keep the residential areas. The groups also support different social activities.
- *Case 5: Borigo-8book* (type E), which is used by the private housing estate *8-house* in Ørestad and administered by Boligexperten, is a social intranet media with profiles for residents, the local board, the housing administration and the local operations team. All members have equal editor rights.
- *Case 6: Puls* (type E) is used by social housing departments and was mainly developed to support residents' democratic participation in connecting with general meetings. Members have a personal profile and can make proposals for the general meetings and other postings.
- *Case 7: Prosedos website* (type F), which is used by the private housing cooperative "Købmandsgården" and administered by Boligexperten, provides personal profiles for the members, an activity calendar and the ability to create postings. The local board has more editing options than the residents.

Figure 1 illustrates a relative model of the social media cases. The placing is not based on coordinates but is estimated based on comparisons among the different media in the figure. Media that do not provide personal profiles are placed lower on the scale of self-presentation (SP) and self-disclosure (SD), and media without equal editor rights or where the options for resident communication are limited are placed with a relatively low degree of participation. The residents' communication in a Facebook group for the housing area or on Borigo-8book can be characterized as bottom-up communication, where residents impact their everyday life by communicating on the media. All subsites (walls) on Borigo are open to all users, as are the personal profiles, whereas they can be closed in a Facebook group if you are not "Facebook friends" with all of your neighbours. In that respect, there is more self-presentation and self-disclosure on Borigo-8book than in a Facebook group.

Figure 1 Model of Social Media Cases



At Puls, the operations team has more editor rights than the residents, and group sites can be closed to non-members. Therefore, the medium does not provide equal participation. The study shows that residents' participation is lower on the KAB My Home app, Prosedos website and Puls than on Facebook and Borigo-8book, which could be due to a lower degree of self-presentation and self-disclosure and a lack of user equality.

According to Lipschultz (2015) and Kaplan and Haenlein (2010), the level of residents' participation and sharing of knowledge depends on the design of the media interface and the degree of self-representation and self-disclosure. Equal editor rights and transparency for all users, as well as a trusting environment on the medium significantly impact the participation on the medium. Personal profiles and equal user rights are therefore important for social media to support resident participation.

4.3 Sustainable building operation with use of social media

According to Lipschulz (2015), residents do not use social media because they want to talk about operations matters or sustainable behaviour. They use social media for fun, relaxation, and excitement and to obtain information about the world. An example from this study is that residents in the 8-house in Ørestad formed 24 activity groups proposing projects such as a common fitness room, a common laundry, and workshops in the basement. In addition, all types of physical meetings take place. The interesting finding of our study is that when residents use Facebook or Borigo-8book, they also talk about operations, e.g., when the heating bill is sent out or when a resident recommends a new device such as the “Danfoss Eco Living” adjustable thermostat. Following Marres (2012), social media has the capacity to influence residents’ values and behaviours when they share knowledge of their heating practices and other daily practices. Normative processes take place in the discussions of the heating bill or the problems with temperatures in the hot water system. After being used for five years, Borigo-8book also supports “communities of practice” on different subjects, e.g., the “workshop group”, the “laundry group” and the “photo group”. Borigo-8book is searchable and contains a “shared repertoire” such as written advice on the use of different equipment in the homes. In this way, newcomers can search the media and learn about their neighbours, the property, and various topics that have been discussed over time.

Reports from three large social housing organizations using “Puls” shows, that digital general meetings increase resident participation and that residents develop more proposals about subjects concerning the local department. In two apartments in fsb, the participation increased from 7.65% to 56% and in another case from 17.2% to 35.7% using the digital platform (Knudsen and Nielsen, 2015).

Based on interviews with operation managers in the social housing organization KAB (KAB My Home app and Facebook groups) and the private housing administration Boligexperten (Borigo-8book and the Prosedo website), there are the following benefits of virtual communities in residential neighbourhoods: (1) Operation management obtains important knowledge of the residents’ needs and wishes for change and can understand whether an issue is a small problem or a big problem. (2) Administration time is saved when residents find answers to their operations questions on the social media. (3) The virtual community is an effective communication channel for the many residents when the operations team wants to test new ideas or actions. It provides instant feedback.

The barriers to using social media are the following: (1) Not all residents use social media; less than 50% of Danes over 50 years old are Facebook users. (2) In some residential areas, the residents have reading difficulties, and some active residents might be more confident in physical meetings than on the internet. The opposite can also be true. (3) The operations team must be prepared to meet critics on social media and must use time for being present and answering questions.

The aim of this study was to investigate the possibilities of using social media to support sustainable facilities management. The conclusion is that social housing organizations and municipalities that cooperate with local social housing organizations to achieve CO₂ reductions can

benefit from using social media in communicating with residents. Operations management obtains important knowledge of the residents' needs and wishes for change, and the virtual community is an effective communication channel that provides instant feedback. The use of social media can support resident participation, bottom-up communication and co-creation. The different media strategic capabilities are described in the above model and Figure 1.

With reference to Lave and Wenger (1991), this paper proposes that virtual communities can be platforms for *communities of practice on sustainability* when the residents chose to form an environmental interest group in the neighbourhood. Virtual communities provide the possibility of "reification" of a "shared repertoire" (Lave & Wenger, 1991) such as specific advice from operations, which can be visualized by video, and the shared advice and opinions of neighbours. The virtual communities provide an online platform for visualization of consumption in a media that the residents might already use on a weekly basis. Therefore, it provides a basis for a learning process where the less active and less environmentally experienced neighbours learn from the more active and experienced environmental frontrunners. There might even be some sustainability change agents in the neighbourhood. By sharing knowledge, ideas, experiences, attitudes and opinions, this learning environment might be able to support a normative change process over time that can lead to more sustainable practices in the neighbourhood.

5 PRACTICAL IMPLICATIONS

Housing organizations have strategies for saving energy and reducing CO₂ in their housing stock, and they want to influence residents' behaviour and social practices for heating and indoor climate. This paper shows that virtual communities offered to local neighbourhoods might be important platforms for resident knowledge sharing and co-creation of new, more sustainable practices to support neighbourhood communities of practice on sustainable behaviour.

Some of the abovementioned social media mostly support top-down communication from the housing organization to the residents, while the virtual communities in the upper right corner of Figure 1 support bottom-up communication and knowledge sharing among the residents. It is important for the social media to be an intranet for the neighbourhood with open personal profiles, equal editor rights and opportunities to form interest and activity groups with their own subpages and with features such as an activity calendar. It is also important for the member roles to be clear.

Social media cannot stand alone but must be supported by communication and a change process, which also includes physical meetings and information and knowledge sharing from the FM organization to the residents. The local janitors or caretakers can represent the housing organization on the platform. They are important stakeholders for supporting communication with residents as they have profound knowledge about the building stock, the heating system, the BMS, and the residents.

Housing organizations with various ownerships have different needs for municipal support. In private co-ops or owner-occupied dwellings, there might be a board with a strong incentive for a change process but also a need for proper knowledge, data, and support from the municipality.

Municipalities should focus on supporting private housing administrations or housing cooperatives with information and advice on sustainable operation and training for local caretakers and janitors.

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