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IFAC PapersOnLine 54-13 (2021) 669–674

Co-creators of wellbeing - smarter engagement of older residents

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Abstract: It is acknowledged that technological innovation could help in creating individual and social wellbeing, especially as a supportive tool for seeing the benefits of "sharing is sustainable" and collaborative actions for social sustainability. The challenge is on technology and on service transformation and improvement, and transparency of impacts for improving operational efficiency. Improving service quality requires participatory and synergetic processes that attract extra attention to the social and management aspects of the built environment. The more values a service contains, the better users engage with them. Facility Management (FM) has the required potential to fill this gap as management is a people-centre discipline. This requires the central involvement of FM in the planning and decision-making processes, therefore its role and impact should be enlarged and better communicated. This paper is evidence-based research, which shows how FM can extend its impact on the build environment and society by bringing the socio-physiological aspect and the community in the central of the planning and design process. It also shows the trend to serve a various group of residents, by developing smart and simple solutions. The communication between FM and people should be interactive and iterative, in which they both define problems/needs and co-create the relevant solutions.

Keywords: smart solutions, age-friendly environment, older people, facility management, sustainability, participation

1. INTRODUCTION

The United Nations (UN) Human Rights Council has developed a framework of principles on human rights that addresses the right to a healthy environment. It is stated that a safe, clean, healthy and sustainable environment is necessary for the full enjoyment of a vast range of human rights, including the rights to life, health, food, water and development. At the same time, the exercise of human rights, including the rights to information, participation and remedy, is vital to the protection of the environment. The Sustainable Development Goals (SDGs) also emphasize the importance of living in a safe and healthy environment. SDG 3—*Good health and wellbeing*—endeavors to ensure healthy lives and promote well-being at all ages as essential to sustainable development, while SDG 11— *Sustainable cities and communities*—advocates the future in which cities provide opportunities for all, with access to basic services, energy, housing, transportation and more. Tabrizia et al. (2020) reviewed safety and health promotion topics, their relevancy and determined significant matches, reflected in risk-groups' health and safety, child safety, disaster preparedness and response, home and buildings' safety and health, and healthy and safe urban planning and design.

Development of smart communities in lifetime neighborhoods (Rogelj, 2020a; Bogataj, 2020b) and ageing rural areas (Bogataj, 2020a; Rogelj, 2020b) may postpone or even prevent moving to a nursing home for large number of resident (Rogelj, 2018a; Rogelj, 2018b; Rogelj 2019). In smart communities ambient assisted living technologies and environments facilitate active ageing. Integrated health and care services for empower frail and disabled older adults to live longer independently and autonomous in community (Colnar, 2020a). Further research is needed regarding impact of co-creation of age-friendly neighborhood, its influence on events leading to ill and disability and demand for nursing services and nurses (Grah, 2019); and how knowledge management regarding co-creation of environment and care services can improve sustainable development of age-friendly communities and services for older adults (Colnar, 2019). The paper discusses smarter engagement of older population in co-creation process to achieve more sustainable and healthy age-friendly environments.

The increasing numbers of ageing inhabitants living in the community, may slow the process of estate renovation, or for a certain period even stop it, what can initiate the process of estate degradation (Ursic, 2005). Not only that the continuous delaying of renovation can result in the estate losing the economic and social capital (ibid) but can also manifest in an increase of health problems and injuries due to worse indoor and outdoor environment. The inhabitants' need for housing, FM, social and health services, etc., changes during the lifetime (Kobal, 2020). For inhabitant's independent living, housing and services are important prerequisites during their entire life (Temeljotov, 2015). FM integrates people, place, process, and technology in order to ensure the functionality of the built environment and to influence on the efficiency, productivity and economies of societies, communities and organizations as well as the

10.1016/j.ifacol.2021.10.528

manner, in which individuals interact with the built environment (Jensen, 2017). On the other side, FM practice is likely to be case-specific by nature, dealing with the diversities of facility, organization, business sector, surrounding environment and context, and circumstance (Chotipanich, 2004). From that perspective, Urban FM is very important to improve people' health and well-being, especially from the perspectives of healthy buildings, accessibility and services to the vulnerable population (Vukmirovic, 2021), and changing life-style (Novak, 2016). Using the community-based approach is important to recognize the risks, enable the enhancement and contribute to a healthier society. Similarly, understanding the needs requires engaging with users, leading to their empowerment to understand, recognize and report the sickness parameters, and consequently, to better support a healthy environment.

The need is for improvement of the quality of life for the citizens by stimulating and facilitating their synergistic participation in renovation processes and contributing to smart city development (Simonofski, 2019). Integrating the sustainability issues in design better meets the users' needs (Zileska, 2015). There is still a need to thoroughly understand the barriers to participation facing different groups in smart and sustainable development (Lindkvist, 2019). The barriers include, for example, a lack of effective tools for voicing citizens' concerns. The sustainable behavior has been changed in many areas (transportation, food habits, recycling), but barriers remain when addressing their individual property. Hauge et al. (2007) points social mechanisms that efficiently influence human attitudes and actions, e.g.: social norms, competition, praise and acknowledgement, social-identity, pilot examples, social learning, attention, etc. The urban element are the sites of social processes, interpreters of cultural and identity values of the society, and primary keepers of collective memory (Perović, 2021). From psychological perspective, 'every environment surrounding 'humanity' has certain features, characteristics that need special attention, because they are important for humans, their life, survival, living, leisure and work' (Temeljotov, 2005). All of these directed attentions of the citizen could be evaluated, both in the sense of satisfying their personal needs and other indicators e.g., economic. From the social sustainability, it was realized that participation of residents as stakeholders is important during the research (Zinoski, 2020), and clear presentations of the results by using estimation maps to represent different user group's opinions, positive and negative preferences about the place and cumulative emotional mapping results, based on the principle of clustering the data (Vukmirovic, 2020).

The current digital development has great advantages for many people, and smart cities offer plenty of opportunities. However, there is a downside to the digital development as well. The current increased digitisation, particularly, has negative effects for groups of citizens with diminished autonomy (Eubanks, 2018), among which the ageing population could be counted. Therefore, digital support systems for older adults and digital social infrastructure should be incorporated in the development of smart cities and communities. Digital technologies incorporated in products, services and systems which are providing support to older adults, form an important part of the emerging silver economy (Grum 2017; Bogataj, 2020; Rogelj, 2020), supporting the digital transformation of social infrastructure in ageing regions and the age management of the ageing society (Bogataj, 2019; Bogataj , 2020c; Grum 2020), also by giving them opportunity to be engaged in the decision making processes of sustainable renovation (Arnstein, 1969; Castellnovo, 2014; Temeljotov, 2021). By activating all generation in creative processes, the stronger attachment to the place could be reinforced and willingness to invest in better ambient assisted living condition in the environment where people live (Drobne, 2017).

Due to cost-efficient and multimedia-rich interaction opportunities offered by the Internet and the existence of online communities, various Internet-based tools are created and designed to enable people to actively participate and engage in co-creation activities. Thus, virtual co-creation has become a desired goal of creating social value and improving the overall success of FM (Temeljotov, 2020). By this way, people are invited to actively participate in the creation of new tools, in generating and evaluating new ideas while discussing and improving optional solution details. People can select or individualize the preferred virtual prototype, testing and experiencing the new features by running simulations and demanding information about or just using the tool (Fuller, 2009).

2. RESEARCH

2.1 Case study

The case study includes an urban area with seven blocks of flats from 1967 with a total of 315 apartments and large outdoor areas (Karolineveier). It is part of NBBL housing cooperative and TOBB as a FM company. It was taken as an opportunity for NBBL and NTNU to start cooperating, with the aim to motivate residents for sustainable regeneration of their buildings and neighborhood (fig.1).

Fig. 1. Karolinerveien area, Trondheim.

The work was organized in the summer school 2019, with the goal to *"Create a visualizing tool for sustainable communication, using Karolinerveien as a case"*.

2.2 Research process

The process was organized in three main phases: 1/ *conducting survey* to understand the background of the built environment and community; 2/ *action research/field work* to get people involved; 3/ *design the product*; 4/ *test the product*.

Conducting Survey: Students used the results of the survey conducted through cross-sectional questionnaire by TOBB, collected from 100 participants, followed by statistical analysis of the collected data. The aim was to identify the citizen's need for the refurbishment process. The questionnaire was sent out to occupants of all 315 apartments with one possible answer per dwelling, resulting in a collected sample of approximately 31,5% of the population. All typologies of apartments (Studio, 2-rooms and 3-rooms) from all 7 buildings were represented at least once in the results thereby meeting the criteria for representativeness in this case. The results showed: 1/ the bad quality of indoor environment, including the high humidity level, bad ventilation, and drafts from the windows and doors, causing also acoustic disturbance; 2/ the majority of the participants of the survey was young, between 25 and 35 years old. Based on the information the decision was taken to prepare technical solutions for the sustainable upgrading of the buildings, and to *design a digital tool with a playful interface,* which could be easily presented and discussed. The tool should be simple that all generation can use, *so a website* should be co-created, with the focus on visualization, communication and some technical 3D modeling solution for more experienced users.

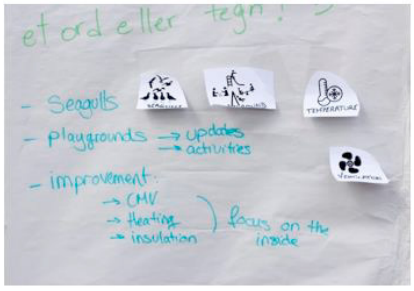

Fig. 2. Collecting residents' standpoints

Action research/field work: A field trips were organized as an observation of the area and conducting interviews. Immediately were spot technical problems such as a poor condition of the balconies' structures, the possible presence of asbestos, lack of gathering places and children playground. Through a use of creative action research techniques (posting pictures, maps, messages, key words, questions, etc. on the walls in Karolierveien) they initiated the dialogue with residents to present themselves and their project and ask questions about people's opinion.

Design the product: In order to attract the citizen's attention and willingness to use the Facebook page, an inspiring flyer was prepared with the name 'let's co-create Karolinerveien together' (fig. 3). To inform the citizens about the FB page, a business card was provided with the contact info. This new idea attracted the participants' attention.

Fig. 3. Karolinerveien flyer.

To ensure the collaboration stage of participation, an interaction tool was conceptualized as a virtual co-creative tool, which allows better understanding and enhancement of people's creative articulation (Errichiello, 2014). This required citizens to iteratively i) inform about their problems and needs, and to co-create solutions ii) being informed/learned about the technical and sustainable aspects and challenges of their apartments, buildings and neighborhood. It also enabled people to play different roles in the co-design process. In the ideation phase, they served as a resource, and the interactive multimedia tools, virtual brainstorming, or virtual focus groups can support the users/residents in creating new ideas. In the design and development phase, they took the role of co-creators, and tools such as Web-based conjoint analysis, virtual user design, Internet-based design competitions, tool kits, and so forth allow them to express their preferences and to design their own products. In the test and launch phase, IT tools such as virtual concept testing helped to provide valuable feedback on products (Nam, 2011).

A website was created to collect the resident's inputs regarding their problems and needs in an interactive and participatory way https://www.blimedoss.com/. It was important to design the logo with basic elements of the new tool, so 'blimedoss' includes both BIM (Building Information modeling) and OSS that stands for Our Sustainable Society.

This interactive website consists of three main visualization and informative parts:

- *3D model* of the present situation of the neighborhood is a simple BIM and google map, which allows the people to get more sense of the neighborhood. It is mainly used as an attractive tool to encourage people to participate in mini-game and learning tool. The model was built by using a CAD software based on technical drawings and documents available from the municipal archives combined with on-site observation and measurements. The level of detail for this model included immediate surroundings as well as a standardized version of the interior of the apartments to be used in the interactive tools exposed in the next section.

- *Mini-game '**Pick your Picto'***, which is designed for collecting the real problems, is divided in two parts. First, the people can find the typology of their apartments among 5 exiting alternatives. Then, they are asked to pick the pictogram, which illustrates their problem (drafts, cold, smell, noise, etc), and drag it to the exact place (fig. 4). They also have an option to give additional idea, suggestion or more details.

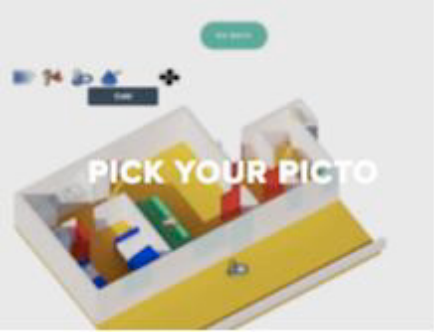

Fig. 4. Pick the picto model

- *Learning tool '**Click and Learn**'* aims at improving the technical and sustainable knowledge of people, to enable them to collaborate in 'co-solution making' (Jaccheri, 2018). Thereby we are empowering them for the co-design process and co-creation of their own neighborhood. It invites people to explore the picture of the building and the outdoor environment with a possibility to click on specific elements, such as facade, windows, playground, etc. and gain information about both the present situation and possibilities for future upgrades and benefits (fig. 5). In this way, citizens can be both users and sources of data, fuelling open data platforms (Williams, 2017).

- *Test the product:* The interactive website was presented to NBBL and NTNU to examine its practicality and improvements, before presenting it to the broader audience. It was successfully tested, some improvements were suggested, including new cost and value-oriented modules were suggested. On one of the workshops a digital and physical playbook with garden elements and children playground was prepared as an offer for co-designing the outdoor areas (fig. 6).

Fig. 5. Click and learn modul.

Fig. 6. Playbook with garden elements

At this stage, the IT-developers created a simple system to support communication, in which the results of people's interaction with the tool via the mini games (e.g. the 3D-models with pictograms and additional comments) was sent directly to an e-mail address accessible to the scientific team as well as the residential facility manager. This data was then compiled in folders based on the typology of apartments and their location in the residential complex to allow for comparison and synthesis of the most common issues encountered by residents. It was then agreed that the next step should include the Building Information Modeling technology to facilitate interoperability and cooperation between professionals.

This would become even more interesting and idealistic to involve people in the further co-design of the website. It is a new way of sharing information and coordinating everyone's behaviors towards a more sustainable development.

3. DISCUSSION AND CONCLUSIONS

This paper aimed at testing possibilities of real participation in FM field in response to the energy sustainable demand in an evidence-based practice, by involving all stakeholders' groups into the designing circle. The special challenge was to design an interactive tool, which is easy to use for elderly population (Eubanks, 2018) and to be interesting enough to involve younger generation as well. We have succeeded with co-designing a playful interactive website tool 'blimedoss'. It is shown that with 'blimedoss' interactive tool, it is possible to safeguard the long-term participation and to achieve all stages of ladder of participation (Arnstein, 1969): informing, consulting and involving people, collaborate and empower. By that, spatial quality of renovation could increase and consequently well-being (Acre, 2015).

The literature show that there is a risk that a co-design of an interactive tool leads to the exclusion of those, who do not have a required specific knowledge and creativity (Eubanks, 2018). However, our practice has proved that it is possible to ensure a real inclusiveness and complete democracy (Gohari, 2020) by involving and informing users/citizens before starting the process of co-design; and safeguarding their involvement through the whole process until the end.

In addition, co-design process should not be something to be done once, it should be continued. The website designed in the case of Karolinerveien can ensure such ambitions. This requires a stronger collaborative network, in which FM, academia, citizens, decision-makers and other stakeholders share knowledge, skills and responsibilities, expand their impact and commitment in assuring the sustainability in the built and urban environment.

We also witnessed that the involvement of students, as the future professionals and decision-makers, in such evidence-based research was crucial. This workshop gave them the opportunity to learn and experience the challenges and requirements of the real citizen participation in the sustainability practices. The open-minded, passionate, creative and responsive characteristics of students/ young researchers are something that can be learned for a success of similar co-design processes was very fruitful.

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