DEVELOPING THE SOCIAL ASPECTS OF SUSTAINABLE FACILITIES MANAGEMENT –A MULTI-COUNTRY SUMMER SCHOOL PROJECT

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Abstract: The introduction of sustainability asks for complex solutions and requires multidisciplinary competences that Facilities Management educations have to integrate. Whereas research has demonstrated that FM can play a central role in implementing sustainable solutions, it appears that practitioners don't have sufficient access to knowledge and tools to develop their practice efficiently. In particular, methods to integrate all the stakeholders and above all the users, indispensable to the success of these initiatives, seem missing. This paper presents the assessment of a summer school aiming at providing 35 students from three Scandinavian countries with a holistic understanding of sustainability including the users' perspective. We discuss the pedagogical challenges related to this kind of event as well as their potential contributions to develop tools of relevance for both educational and professional purposes. The summer school concept is building on Project-Based Learning. The supporting staff includes academic teachers, researchers and practitioners. The challenge is to create a pedagogical platform merging both academic and professional interests, methods and criteria for success. The material for this qualitative study are gathered through participant observations formal progress and assessment sessions. The summer school took place in March 2017 in Trondheim Norway, here we present our preliminary results

Keywords: Education, Facilities Management, Pedagogical Tools, Project Based Learning, Sustainability, Users

1. INTRODUCTION

The potential of Facilities Management (FM) in implementing sustainable solutions and reducing energy consumption has been widely recognized as operation and maintenance of buildings require a large amount of energy and material. Their contribution on social aspects of sustainability has also been underpinned (Elmualim et al. 2010). Whereas there is a general consensus on the necessity to engage in sustainability, the concept itself is subject too many definitions encompassing different dimensions and applications strategies (Sarpin et al 2016). Whereas standards and certifications constitute a working frame and define environmental and often measurable targets, they don't perform as well to address the challenges of social sustainability especially as its social dimensions may contain internal tensions and contradiction (Buser and Koch, 2014) Integrating the multiple users' needs and behaviours is therefore a challenge for the industry (Sarpin et al 2016). Most scholars agree that the combination of environmental, economic and social objectives requires multidisciplinary competences. Besides, they also have demonstrated that in order to achieve sustainability targets, FM practitioners need to overcome organizational and cultural barriers and develop new competences and knowledge (Elmualim et al., 2009, Sarpin et al. 2016). Sustainability concerns have created new demands regarding the collaboration between facilities management providers and their customers. Where previously service delivery could be described as a "one-way" distribution, the realization of sustainable goals to be successful demands the active participation of the users to be achieved. However, integrating the users is

quicker said than done, and FM managers in various sectors are struggling to find innovative solutions and motivate their users to participate in their implementation of sustainability.
We present here a summer school, proposed to bachelors and master students in construction engineering and facilities management, and aiming at creating awareness around the lack of users' attention and participation. Our goal is to assess the summer school in term of pedagogical and professional relevance as well as to discuss its potential to be translated into generic teaching material.

2. TEACHING SUSTAINABILITY

There is an increasing interest in construction sector to employ sustainability trained graduates. To answer this demand, many universities are now offering sustainability related education; however, most of them either address environmental and engineering topics or build on normative managerial approach (Lozano et al. 2015). Still, in order to integrate fully the social dimension of sustainability, the students should learn to take into account and engage stakeholders to participate to the process. This can only be done through collaborative activities across disciplinary and professional boundaries. However, this engagement by universities with societal stakeholders in teaching and learning for transformation towards sustainability, remains a challenge (Trencher et al. 2015). Wilson and Pretorius (2017) underline the learning potential in practitioners' engagement in education programme which both enhances student engagement with sustainability issues and allows the co-creation of knowledge addressing both the academic and practitioners 'interests. To draw attention and to document the users related issues encountered by facilities managers, our project integrates the participation of practitioners and the use of real life situation (Mauser et al. 2013). In order to integrate these FM practitioners' experiences and contexts, the summer school builds on the stream of Project-Based Learning (PBL). PBL is a comprehensive approach to classroom teaching and learning designed to engage students in investigating authentic problems (Blumenfeld et al., 1991). It aims at students acquiring a deeper knowledge through active exploration of real-world challenges and problems. Characteristics of PBL include the following: the students must take the responsibility for their own learning; the problem delivered to the students' needs to be "ill-structured" and allows them the possibility of free enquiry; learning should be integrated from different disciplines and topics; collaboration is essential; a closing discussion and assessment of self-learning is essential at the end of the exercises (Savery, 2015). The summer school builds on four ongoing FM projects dealing with challenging sustainable developments in Denmark, Norway and Sweden.

2.1 The context of the summer school

The creation of this summer school is financed by Nordic built. Nordic Built is a Nordic initiative aiming at accelerating the development of sustainable building concepts, initiated by the Nordic Ministers for Trade and Industry. Its purpose is to bring together companies, public administrations and researchers within the Scandinavian countries for collaboration and the realisation of concrete projects. Accordingly, the goal of the summer school is to develop new teaching material supporting a Scandinavian model of FM incorporating sustainability.

As sustainability concerns are shared globally by many members of the facilities management industry, it can be uneasy to identify a pure Scandinavian model of FM. The purpose of the present paper is not to discuss whereas these qualities are uniquely Scandinavian or if they are

put into practices by practitioners. Rather, we focus on the constitutive elements of these criteria which also appear in the chart of Nordic Built, who finances the summer school we discuss here.

Whereas, FM can take different forms depending on the organization and target countries (Tuomela and Puhto, 2001), and that every Scandinavian country has at least several peculiarities emerging from the local laws and traditions (Maliene et al 2008), there are still some common denominators in what can be called Scandinavian FM. In particular, the focus on user-based management that can contain all the facility services and tasks from the strategic to the operational level can be seen as a specific feature (Maliene et al 2008). Elle et al. (2004) have defined this Scandinavian FM as opposed to a "traditional way", mainly USA and UK, as: including all the phases of the building process following a life cycle model; as encompassing not on the interest of a single organisation but the interests of society in specific area; as focussing on sustainability, participation and holistic principles in top of stakeholders' management and economical perspective. These criteria are constitutive of the summer school basic assumptions, whereas not all case studies have integrated these criteria, they all appear punctually in one or the other.

2.2 The summer school concept

The summer school is a single event which took place at NTNU in Trondheim Norway in March 2017. The educational institutions' (NTNU, Chalmers, KEA and VIA) goal is to develop educational materials and a learning method that can be applied in the Nordic countries. Working with problem based pedagogic and real case projects, the students develop new and innovative solutions through access to expertise from research and practice. Scandinavian attribute can also be found in the choice of languages for the summer school, most of the documentations and exchanges are expressed in either Danish, Norwegian or Swedish; English is only used to few common sessions.
Forty students from three Scandinavian countries were invited for a week to deepen their understanding of sustainability in relation to FM. The students are presented with "real" situations: a project in a concrete context with its stakeholders, limitations, challenges and possible contradictions. By integrating "real world" cases, we expect to enhance students' motivation and engagement in working with sustainable issues but also to confront them with the existing conditions and practices of professionals active in this development. The students are engaged to reflect, discuss and work in groups to develop innovative solutions to "real-life" sustainability challenges.

According to Lozano (2014), one key element to design and build the content of such course, is learning outcomes, which need to include the demonstrable acquisition of specific knowledge and skills and reflect the institution's objectives and graduate attributes. Once the learning outcomes have been agreed upon, the strategies for teaching and assessing these outcomes must be chosen accordingly. In our case, the learning outcomes have been developed to answer the challenges identified in the literature, the ones pinpointed during a workshop gathering more than forty professional both practitioners and academics working with sustainability and facilities management. These have been matched with the deficiencies that the four teachers leading the project have identified in their own education. The learning outcomes are the following:

- The students should be able to develop sustainable FM projects from strategic level to implementation
- Identify and evaluate positions, needs, concerns and dilemmas of the diverse organizations and actors engaged
- Identify, select, implement and assess solutions including both technical, economic, environmental and social aspects
- Understand the complexity of projects that has a goal to develop sustainable operations of buildings in practice

2.3 The project teams

The project partners include two professional schools in Denmark: KEA in Copenhagen and VIA in Horsens; two universities Chalmers University of Technology in Gothenburg Sweden and the Norwegian University of Science and Technology in Trondheim Norway. The project has been initiated and is managed by the Danish Association of Building Experts, Managers and Surveyors, Konstruktørforeningen (KF).

Chalmers, Göteborg Sweden, and NTNU Trondheim Norway
Chalmers University of Technology and the Norwegian University of Science and Technology (NTNU) are offering bachelor, master and PhD education in engineering. The selected audience for the Summer school is the Master students studying Design and Construction Project Management (Organisering och Ledning i Bygg och Fastighetssektorn). The students are trained in the skills needed to manage construction projects involving project management methods, financial accounting methods, BIM, logistics, environmental management, strategic management, facility management and sustainability. To prepare the students to demands of the construction industry, where projects are done in temporary and interdisciplinary project organizations supported by networks of colleagues, training and knowledge are provided on organizational culture, leadership, communication, group- and team work, decision making, collaborative relations, and knowledge and learning. Whereas the students at NTNU can graduate in both construction and facilities management, this is not possible at Chalmers where they can make their master thesis within sustainability FM topics in relation to companies but not graduate in FM or sustainability. Whereas students are informed and trained in management topics, they lack more concrete confrontations to the practical aspects of what leading FM sustainable project implies, such as the contact and management of the different stakeholders and in particular the users.

KEA Copenhagen and VIA Horsens, Denmark
Copenhagen School of Design and Technology (KEA) is an Academy of Higher Education which offers over 30 different educational programmes at Bachelor degree and Academy Professional degree levels. The students targeted by the spring school are the constructing architects, enrolled in "professional" bachelor. Constructing Architects are primarily engaged in design of building and infrastructure, but they are also employed in other companies related to the construction industry, eg in state and municipal, residential and management companies, banks and credit unions, and technological institutes. Their education is technically oriented and they do not develop a holistic approach to sustainability, they may need further training and develop competences in communication, finance, planning, communication, users' behaviours and participation, technology understanding, organization, process understanding, law, and empathic understanding.

VIA university College Horsens is a young institution, similar to KEA but situated in Jylland. VIA offers professional bachelors. The target students are here as well the construction architect. VIA however is working closely with practitioners to run their educations
The choice of different types of educations related to facilities management is done to mirror the setting of professional practices where different educational backgrounds meet in enterprises and in projects. The participation of the different Nordic countries builds on both the similarities between the participants, the Scandinavian models usually refers to flat hierarchy, well organized labour, social values (Sandberg et al. 2013) summarised in the chart of Nordic Built; and the particularities of each of the nations in term of culture, educational models and philosophy.

Each institution is represented in the project team by one teacher/researcher, but several participants for each institution have participated in the different activities of the project. The team gathered multi-disciplinary competences (architects, engineers, sociologist). Besides, FM practitioners, representing the client in our four cases, are joining the summer school to contribute with knowledge of the specific project, concrete experiences of collaborating with stakeholders and competences in working with FM. They have two concrete tasks, the first is to answer students' questions relative to the project, the second to assess the quality and feasibility of the students results at the end of the summer school. The group of practitioners includes two social housing companies, a contractor and a facilities management company.

2.4. Teaching concepts

Building on the PBL philosophy of teaching, the summer school focuses mostly on students' project work introduced by a few academic lectures and case presentations from professionals working with sustainability. Merging both the learning from academic research and professional expertise, the goals of the presentations is to draw the attention of these engineer students away from focusing only on the design of technical solutions towards more social aspects such as the roles and the competences of stakeholders and the needs and behaviours of the users.

The cases build on written descriptions of the companies' profiles: size, portfolio, competences, location and the characteristics of the specific project: buildings physics and conditions, actual issues, profile and types of users, budget. These written documents are completed by technical drawings, and pictures video of some of the stakeholders involved in the project (janitors, inhabitants, technic providers). The cases are presented in plenum and the students are introduced to different challenges, they then are distributed in small workshops where two groups of four students work separately on the same case. Each case is attributed a supervisor who provides support to the students' process. Contact with the professionals working with the case are organised so that the students are able to seek information or test the feasibility of their ideas. During the three days of the spring school, the groups work mostly independently. However daily meetings with other students allow a reflection not only on the designed solution but also the methods the groups have chosen and the process they follow as well as their eventual interrogations and doubts in carrying the project.

Most of the cases includes technological improvements for the building. However, the focus is on designing solutions adapted to the specific users and easy to maintain. The results of the groups are presented to the practitioners working with the specific case and the referent teacher.

3. METHODS

The framework of understanding builds on an interpretive sociological approach appreciating a strong empirical orientation and uses a mix methods approach (Bryman and Bell, 2007). The paper draws on different assessment carried during the summer school as well as a day debriefing including 5 members of the project team two weeks after the summer school. A questionnaire with 25 questions distributed to all students at the end of the week gives a quantitative description of the participants' evaluation of school, the answers rate is 34/35. The qualitative part of the evaluation comprises: two qualitative individual assessments carried the first and the second day of the group work where all students were asked to give their impression focusing on their own process and their team progress; two common sessions joining teachers and students at the end of the first and the last day to assess and discuss the process and progress of the different groups as well as the setting of the school. Process book of each of the 8 groups documenting the steps the students have taken to solve their tasks. Observation of group works done by the seven teachers participating and the diary 5 of them kept during the summer school. Last, the participation of the practitioners has been observed during the 1 to 2 hour questions sessions between the students and the companies' representatives, the students' presentation to the companies and finally a short informal assessment with the practitioners after the session. The different feedbacks were discussed by the project members during the debriefing. We present here the first assessment of the results.

4. SUMMER SCHOOL ASSESSMENT

In the following we present briefly the tasks, the students, the teachers and practitioners assessment of the summer school.'

4.1 The tasks

Building on the PBL philosophy of teaching, the summer school focus mostly on students' project work introduced by a few presentations from professionals working with sustainability. Merging both the learning from academic research and professional expertise, the goals of the presentations is to draw the attention of these engineer students away from focusing only on the design of technical solutions towards more social aspects such as the roles and the competences of stakeholders and the needs and behaviours of the users.
The student work is based upon on the base of four ongoing projects aiming at bridging the three aspects of sustainability and taking place in the Scandinavian countries:

1. A Norwegian project, case 1, dealing with the luxury renovation of an Hotel built in 1870;
2. A Swedish project, case 2, aiming at engaging the users of a retrofitted university building to act and use the building according to the new specification
3. A Danish project, case 3, a social housing retrofit focusing on inner climate and on engaging the residents to act accordingly to new standards
4. A second Danish project, case 4, a new built eco housing area which goal is to motivate the residents to take responsibility, operate and maintain the buildings and surrounding

The cases describe the companies' profiles: size, portfolio, competences, location and the characteristics of the specific project: buildings physics and conditions, actual issues, profile and types of users, budget. These written documents are completed by technical drawings,

pictures. The case problems are presented by the teacher to the two groups of four students working separately on the same case. Each case is attributed a supervisor who provides support to the students' process. Contact with the professionals working with the case are organised so that the students are able to ask further information or test the feasibility of their ideas. During the three days of the spring school, the groups are working mostly independently. However, daily meetings including all the participants to enable a reflection not only on the designed solution but also the methods the groups have chosen and the process they follow as well as their eventual interrogations and doubts in carrying the project.

Most of the cases include technological improvements of the building. However, the focus is on designing solutions adapted to the specific users and easy to maintain. The results of the groups were presented to the practitioners related to the case the last day of the summer school.

The table below (table 1) is indicative and summarises shortly the cases features and related solutions proposed by the students.

Table 1: Summary of the cases

Case	1 Hotel, Norway	2 University, Sweden	3 Social housing, Denmark	4 Eco housing, Denmark
Context	Large ambitious renovation of a hotel built in 1870	Retrofit of a university building, the creation of small open offices and new meeting area	Designing retrofit for social housing targeting inner climate issues	New built of sustainable housing, users participation in operation and maintenance
Goal	How to integrate sustainable solutions including the hotel's guests	How to engage users (students and employees) to behave according to the sustainable goals integrated in the building	To solve inner climate issues and engage the residents to act accordingly to new standards	To motivate the residents' association to take responsibility, operate and maintain the buildings and surrounding
Client	Contractors	Facilities management company	Public housing company	Public housing company
Challenges	To create a luxury hotel which builds on sustainable principles and engage clients to behave accordingly	To create an attractive environment that inspires and supports the interaction between researchers, students and companies.	To engage and motivate residents to take an active role	To motivate the residents to do self-management and operation of housing and common areas
Students contribution	App technology: Smart intelligent rooms Adapt prices to sustainability contributions sustainability: demonstrate how guests can contribute to save energy by choices of different prices in the booking	Apps and smart technology for the FM unit: Monitoring use of space Room booking BIM for all buildings Information Operational planning Training program Motivation/points User: Social zone with a green garden with fresh vegetables Gaming café	Formation and monitoring tool that affects the behaviour of the residents: Inspiring information What is expected when living here Social events Surveys Professionals to handle technical installations	Organize tasks and inform the residents in what task they are expected to engage in Information channel Clear Incitement's for doing the tasks and consequences for when the maintenance tasks Yearly maintenance day for fellowship and common good

4.2 The students' assessment

The number of seats for students of each institution was limited to 10, forcing teachers to prepare a selection process to choose the participants. However, the challenge of choosing was spared to the teachers as only a limited number of students applied to join even if their participation was free of charge. Only five Norwegians, who did not share the prospect of

travelling to another university or country took finally part to the Summer school. It seems that, though students were interested in the topic, it is difficult for many to extract themselves from their daily routines for a whole week.

However, for the ones who joined, the summer school was a success and they unanimously praise their experiences. Looking at the students' assessment, our four learning outcomes seem to have been achieved in a large majority. The results of the questionnaires (table 2) shows that most of the students feel they have increased their understanding of the social aspects of sustainable FM implementations. The pedagogic setting has also been celebrated by the audience. *I have really appreciated to have the freedom of choosing on what and how we would work together, that was really cool (Danish female student).*

Table 2. Results of the students' questionnaire

Scale / Questions	Very good	Good	Fair	Bad	Total
What is your assessment of the SuS	19	15	0	0	34
Does the SuS contributing to your education	15	15	4	0	34
Do you have a better understanding of the social aspects of sustainability challenges after the SuS	10	19	4	1	34
How do you assess the participation of the professionals to the setting	14	12	6	1	33
Do you feel you participate constructively to the group work	19	15	0	0	34
As the SuS improve your understanding of the two other national cultures	22	11	0	1	
Would you recommend the SuS to other students	26	3	1	0	30

The possibility to work on "real" cases and interact with practitioners has clearly being a very important motivation factor. The only frustration expressed by a few students is related to the quality of the interaction with a few companies' participants (table 2). As some of the Danish practitioners could not be present in Trondheim, the discussion had to take place over skype. This situation was perceived as very challenging by the non-Danish speaking students.

The use of a mixture of Scandinavian languages though creating doubt and frustration at the beginning of the process has proved to be a well mastered challenge which has unexpectedly contributed to the knowledge sharing process. As expressed by one of the Swedish student: *it is incredibly frustrating not to be able to take over the project and to control it as I would usually do at home. Here, I have to be sure that we can understand each other and understand the task. We take a lot of time to explain to each other how we interpret the case. But this great because I learnt of lot about myself and about the others… what we have explained to each other we do share. We never take the time home to check if we have the same understanding of what need to be done, we take it for granted (Swedish female 24).*

A common observation to the teachers was the unexpected degree of attention of the students for each other in, for example, the care taken is assuring the integration and contribution of all the members of the groups. According to the answers to the questionnaire (table 2), the goal of creating bridge between the participating countries is achieved. This is also underlined by the two following quotations. *This was a wall breaker I have learnt more about Danish people during this week that I will during the rest of my life. I made real friends here (Swedish male student). This experience has given me envy to go and work in other of the Scandinavian*

countries, I would never have thought of it before (Danish male student). However, the observation tends to show that when participating to social activities outside of the project, the grouping tended to respect the national boundary.

4.3 The teachers

Engaged in both the organisation and the evaluation of the summer school, the seven teachers were kept fully occupied during the whole week. Though, the cases and the supervision of the groups were formatted to offer similar conditions to all the groups, a certain interpretative flexibility was exercised in dealing with the students' supervisions. Some teachers would stay with the students and facilitate their process others would only pop in in their room from time to time. The orientation of the cases was also dealt with differently, a very clear and narrow issue in case 3 and very open and broad topics in case 2. However, these differences were perceived as an advantage as they illustrated the diversity of situations and practices and therefore participated to the learning process of the school. The students have too expressed diversity in assessing the teachers' contributions. However, the main critic to the teacher performance is directed to the lack of alignment between the teacher and the practitioners regarding the interpretation of challenges of one case and not the style of supervision.

The variety of teachers' experience, understanding and professional background also appear in the assessment of the summer school: for some the cases material represents the added value of the week, for other it is the pedagogical setting which is the validated outcome. This diversity of interpretations could be an issue when the project team will have to agree and provide a common material for sustainable FM which is the main outcomes of the Nordic built project. It also reflects and underlines the complexity of having multi-disciplinary team working together as the participants tend to prioritise their own field and teaching practices. Similarly, the lack of criteria precise enough to evaluate the students' performance and assess the achievement of the learning outcomes made the nomination and reward of the best projects impossible. Whereas this was not perceived as a problem seeing the diversity of the projects and the great effort provided by the students during the summer school, it is nonetheless a challenge the project team has to meet to develop credible teaching material.

4.4 The practitioners

The companies' participants have enjoyed their interactions with the students and valued most of their proposals. Many of them have been impressed by the quality of the final presentation, they have praised the work effectuated during such a short amount of time as well as the creativity of the solutions and have asked to receive the slides of the presentation. The Swedish FM also invited the students to share with them the software they used to support their speech. Whereas some of the practitioners had expressed a form of uneasiness in having to give a feedback to the students as they felt they did not have the competence to judge the students' contribution, they did comment on the feasibility of the solutions. Though being positive on the outcomes, some of their observations brought the students back to the concrete "real life" conditions of their project and highlighted the limitations of nudging the users.
All in all, the summer school was a successful event enjoyed by all the participants. However, the pedagogic contribution to the students' understanding of social challenges related to the development of sustainability is difficult to assess. From the event, we can transfer case descriptions and work setting, but a three days event is difficult to introduce in usual

professional or academic curricula. None of the participating educations could or would deliver credits for the summer school participation. The latter therefore can only appear as an "outside academic programme" activity on the students curriculum vitae.

5. DISCUSSION AND CONCLUSION

Whereas describing the context, process and goals of the spring school, has been a rather straightforward defining the outcomes and judging of their qualities appears to be more difficult! If all the participants agree that the summer school was a success, they may have different interpretations of the reasons behind this success. Another unknown feature is related to the quality and deepness of the learning judged on a longer term. Besides, it is difficult to assess what are the consequences on this event, whatever successful it is, in supporting and improving the teaching of sustainable FM in terms of existing education and curricula in the participating institutions. It seems challenging to recreate and share the tension and motivation built by the physical presence of the different actors Like other innovation process in large organization, the summer school creates a liminal space which needs to be shared and translated to more than the participants to realize its potential.

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