DEMONSTRATION PROJECTS: AN EFFECTIVE STRATEGY FOR SUSTAINABLE BUILDING?

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The paper is not proof read for English

1. INTRODUCTION

Demonstration projects and ‘good examples’ are increasingly common features in the contemporary work being carried out aimed towards sustainable development. In Sweden and in the Netherlands, as well as in other European countries and the rest of the world, during the past decade numerous demonstration projects for sustainable building have transformed the abstract notion of sustainable building to both a tangible and a visible concept. However, successful demonstration projects have so far made little influence on mainstream building [1]. This can be illustrated by a recent study by Nässén and Holmberg [2] which shows that contemporary demonstration projects for energy efficient housing have proved to result in reduced energy utilisation. Nevertheless does mainstream building not approach these lower levels of energy utilisation. Evidently there is a gap between good results from demonstration projects and what is diffused into mainstream building. Furthermore, the study of Nässén and Holmberg shows that the energy utilisation in new multi-residential housing in Sweden in later years even tends to exceed that of the housing stock in general. Accordingly, this also indicates a gap between contemporary ambitions for energy efficient and sustainable building and what has been built to date.

This paper discusses demonstration projects for sustainable building as a potential strategy for supporting processes towards sustainable development in the building sector. The perspective is that of Europe and the industrialised world based on experience in Sweden and the Netherlands. The paper addresses actors in the building sector, mainly key actors the architects and the clients, as well as researchers and authorities in position of initiating and supporting demonstration projects. The aim is to contribute to the enhanced understanding and use of demonstrations projects, both from a theoretical and a practical angle. The paper discusses the issues of production and the dissemination of reliable and useful information from demonstration projects as well as factors that will affect the influence of demonstration projects on mainstream building.

1.2 Methodology and approach

The paper is based on findings from four empirical studies carried out in Sweden and the Netherlands, exploring demonstration projects for sustainable housing from different angels [3], [4], [5], and [6]. These are: 1) case studies of demonstration projects, 2) qualitative interviews with key actors in the Swedish and the Dutch building sectors, 3) a study of the image of demonstration projects conveyed by the Swedish trade press, and 4) a study of the image of demonstration projects conveyed by The Swedish Architectural Review.

Sustainable building as a research field within the architectural domain is still relatively new. There are no clearly defined frames of reference or theories to relate to. The theoretical basis for the study presented in this paper has been chosen in order to provide useful frameworks for the analysis and discussion of the findings from the empirical material. On a broad level,
the demonstration project is discussed in relationship to the concepts sustainable development and sustainable building. Furthermore, theory has been selected from among other sources design theory, organisational theory, and innovation theory. Together with a description of the routines and the organisation of work in the building sector, this theory also provides a basis for discussing the conditions for the diffusion of experience and findings from demonstration projects to mainstream building practices. Moreover, the research has been inspired by discourse analysis for discussing the construction of meaning and the interpretation of the main concepts of demonstration projects and sustainable building, both among actors in the building sector and in the Swedish trade press.

2. AN INSTRUMENT IN A STRATEGY FOR SUSTAINABLE BUILDING

The contemporary discourse regarding sustainable development is dominated by ideas of mainstream sustainable development and ecological modernisation [6] [7]. The mainstream sustainable development developed through several United Nations publications on development over the last decades, as well as the Rio conference, is based on a free market, the continuation of growth and on the application of technology. Mainstream sustainable development shares the dominant ideas of modernisation and economic growth in the modern world, and does not suggest any fundamental or radical changes. The fact that mainstream sustainable development has been within reach of conventional tools and environmental and market regulation has contributed to the persuasion of governments all over the world [6]. Moreover, mainstream sustainable development offers good opportunities for the market of clean technologies.

During the last decade, both in Sweden and the Netherlands national investments have been made for sustainable development and sustainable building in line with the ideas of mainstream sustainable development and ecological modernisation, cf. [8],[9]. Investments for an agenda for sustainable building as well as measures to arrive at sustainable development have also been made on a building sector level. Among these investments the demonstration project has had a prominent role, especially in the Dutch approach. Initiated by national authorities in the Netherlands a demonstration project programme has resulted in 44 demonstration projects spread over the country. In Sweden, demonstration projects for sustainable building have been carried out within the frames for local investments for sustainable development supported by national authorities. Besides these national investments, European funding (Thermie, SHINE, Meduca, etc) has supported demonstration projects in both Sweden and the Netherlands.

As a strategy for authorities, the demonstration project is a positive instrument. The demonstration project will be appealing to an offensive strategy among actors in the building sector whereas a defensive strategy would need other kinds of instruments such as regulation. Accordingly, the demonstration project would mainly sustain the ‘front-runners’ while regulations are needed for the ‘laggards’.

3. THE DEMONSTRATIONS PROJECT AS PART OF A DEVELOPMENT CHAIN

Earlier research point out the necessity of building experiment and demonstration projects as part of innovation and development in the building sector [10], [11], [12], and [13]. The experiment and the demonstration project are seen as necessary parts of a chain from development of new technique and concepts to the diffusion of the same in the building sector (Figure 1). The experiment is followed by a demonstration project in the last stage before the diffusion. The demonstration should usually not be accomplished until the second or the third
full-scale trial plant in order to avoid negative demonstrations of untried technologies and concepts [10]. However, the research and development chain is seldom chronological in the building sector. Furthermore, the research and development chain can give the idea that research is a driving force for development, while instead development is usually triggered off through the search for problem solutions in practice [14].

There exists no clear definition of the term demonstration project. Instead the definition of the term can be understood through its application. The etymological derivation of the term ‘demonstration’ means to exhibit and show while the term experiment means to try a hypothesis. A study of literature in the field [5] shows that demonstration projects are seen as a way to show but also to try out new technology and concepts in full-scale projects under realistic conditions. The demonstration projects are distinguished to the experiment in involving less risk. However, in both kinds of projects focus should be on clear objectives, evaluation and dissemination of results. It can be noted that whereas the term demonstration project is increasingly used in the discourse of sustainable building the term experiment is seldom mentioned. ‘Demonstration’ is often seen as one characteristic in building experiments while the ‘experiment’ does not seem to be part of contemporary demonstration projects for sustainable building.

The dissemination of technologies and concepts to mainstream building practices is an important part of successful demonstration projects. However, earlier studies in the field show that the dissemination from demonstration projects often have deficiencies. Many authors bear witness to failure in systematic documentation and evaluation. This also shows a problem with allocation of finances as documentation and evaluation often has a smaller budget than the actual investments for innovations. Furthermore, there are seldom long-term evaluations effected on demonstration projects. Several authors also point out the need for ‘change agencies’ [13], [15] with the task of communicating experiences from demonstration projects.

Concerning the influence of successful demonstration projects on mainstream building there are other factors than the organisation of the demonstration project, the information production and dissemination, which will venture the reproduction of successful results. These are for example: economical conditions, risk, governmental policies etc. cf. [13]. Furthermore, the introduction of new technologies is often delayed by time lags as new technologies imply changes in routines and systems and will demand education etc. cf. [15].

4. CONDITIONS FOR LEARNING, DEVELOPMENT AND INNOVATION IN THE BUILDING SECTOR

The building sector is a large societal sector within the European Union with considerable importance for the national economies of its member states. The building sector is largely national, diversified and fragmented. Knowledge in the building sector is mainly developed through the practice, through the construction of projects. This empirical-practical knowledge
Building process is not systematic or controlled by scientific methods. It is subjective and contextual. The knowledge build-up, as well as all changes, in the building sector is usually characterised as being slow and taking place in small incremental steps. Knowledge building is a long process of planning, construction, evaluation and feedback, which can take many years from start to results.

Several factors challenge the efficiency of the knowledge build-up within the building sector [16], [17], [18]. One factor is the temporary nature of the building project, which has no organisational memory. The building project is usually considered as a unique event, and there are seldom long-term relationships between actors. A second factor is the fragmentation of the building process involving actors from different professional cultures. The fragmented building process has several clearly defined phases and knowledge is lost as actors in the project team enter and exit the process during its course. A third factor is the decentralised decision-making process and the ad-hoc problem-solving on the spot, which does not encourage long-term thinking. A fourth factor concerns the individual actor’s interest and attitude to learning.

Theoretically, the building sector provides an optimal ground for technology diffusion through multiple connections and interfaces with different actors, technologies and practise. The building project can be seen as an ‘experimental workshop’ [16], [19]. However, in practice the development and innovation dynamics is influenced by a number of factors that will impede sustainable development [2], [19], [20]. The prevailing short-term thinking in the building sector, due partly to the highly cyclic demand, as well as the focus on the production has led to a concentration on small innovations with quick yield. Initiatives taken by a single actor will meet resistance as this may challenge the effectiveness of existing networks. Innovation is not economically defensible for first-movers and this could also lead others to bear the risk for implementing new innovations. Accordingly, potential adopters of new technology are risk averse and cautious concerning the cost and efficiency of changing established procedures. Moreover, the building sector is rather conservative, characterised by static competition, and does not change its procedures. A renewal of the company stock does not lead to the introduction of new techniques, products or organisational forms. Consequently, productivity will develop more slowly in the building sector than in other sectors where existing and new companies need to innovate in order to be able to compete. Moreover, in such a system investments in research and development strategies for the future are not interesting [21]. Nor is there any interest to employ highly educated personal. Consequently, the educational level among employees within the Swedish building sector is low in comparison with other sectors cf. [22]. This also affects the level of interest in research and development. In Sweden not more than 1% of the annual turnover in the building sector is invested in research and development projects [22]. Furthermore, there are other contextual factors that will have an influence on the development and innovation dynamic in the building sector. These are: fiscal systems, regulations and laws, energy prices, loaning institutions and the fact that the building sector is has an important role in the national economy.

5. THE RELEVANCE OF THE DEMONSTRATION PROJECT

The empirical studies show that demonstration projects for sustainable building have an important role in the process towards more sustainable building. The demonstration projects make the complex problem of sustainable building both a tangible and a visible concept, and as such the idea of sustainable building will be physically present and represented in everyday situations as well as in discourses at a building sector level, at a national programme level and the general public level.
For the building sector, the demonstration projects provide real-world data, and can be attributed the function of reference objects for sustainable building both concerning the product, that is to say what sustainable building is and the process, how this can be implemented. The demonstration projects provide arenas for developing learning through doing in which actors in the building sector can try out new or more established sustainability concepts, environmental technologies etc. in practice. The practical experience performed in the demonstration project arena can also be observed by actors in the rest of the building sector. The demonstration project is theoretically a potential strategy that provides good possibilities for supporting learning and development processes towards sustainable development in the building sector as well as a knowledge build-up relating to sustainable building. However, the empirical studies show that demonstration projects have deficiencies regarding a strategy for making mainstream building more sustainable and as a basis for a knowledge build-up. Such a strategy has to be improved in order to become effective and influential.

5.1 Deficiencies in contemporary demonstration projects

One of the main ideas with the demonstration project is to provide learning experience for the actors involved and to become educational cases for the rest of the building sector. Even so, the empirical studies show that the opportunities for learning offered by the demonstration projects are not made use of. There is often a lack of systematic evaluation, feedback and dissemination of results from demonstration projects venturing the internal as well as the external learning processes. This will also venture the learning process among the actors involved in the project as well as the reliability and usability of the experience from the demonstration projects outside the project organisation. Ultimately, this in some cases will also contribute to the creation of negative demonstrations as for example rumours about failures cannot be refuted. The demonstration project should be carried out in an open manner so that observing parties can recognize the demonstration project as ‘a fair test’.

Accordingly, many contemporary demonstration projects reveal a waste of opportunities with regard to learning and knowledge build-up for the implementation of sustainable building. On the one hand, this can be explained by deficiencies in the organisation of these demonstration projects concerning evaluation, the production of reliable results and the internal as well as the external dissemination of experiences. On the other hand, this can also be explained by the general lack of interest and incentives for learning and generation of knowledge in the building sector.

5.2 The need for reliable and functioning ‘change agencies’

Another factor that impedes learning from demonstration projects is the lack of formal ways of communicating knowledge in the building sector. The empirical studies point out the lack of formal institutions and organisations for the dissemination of experience; both internally, from the temporary organisations involved in the demonstration projects to the home organisations, as well as externally, from the demonstration projects to the rest of the building sector.

The study indicates that neither research reports nor the trade press function satisfactorily as change agencies regarding the communication of experience and information from demonstration projects. Respondents in the interview study that has been carried out within this study, complain about the lack of reliable and also easily accessible information about sustainable building. The respondents seldom use research as source of information, which they find difficult to access, irrelevant for their practice or even non-existent. The fact that the actors do not use existing research is a general problem in the building sector see for
example [22]. The most commonly used sources are personal contacts and informal and formal networks.

The Swedish trade press has been studied as one easily accessible and often referred to source of information about demonstration projects and sustainable building in general. The study show that the trade press can function as an eye opener during the early stages of an adoption process for new concepts and technologies cf. [15]. However, the Swedish trade press fails to provide consistent information applicable in design or decision-making situations.

Furthermore, the information provided in the Swedish trade press about the demonstration project is scanty and lacks background information. Consequently, the trade press fails to create an understanding of the problem complex of sustainable building and the background to the decisions and measures taken in the demonstration projects presented. For example, the tangible aspects are often overemphasized leaving aside the important experience of the non-tangible dimension, the process of fruition. The lack of information about the background to decisions taken in the specific demonstration project implies a risk that already defined solutions and closed images or ideals of sustainable building can become normative. When these normative and closed solutions or ideals fail to address the interest of the building sector they may instead have a negative impact on the development of sustainable building cf. [24]. This applies for example if the demonstration projects are understood as not being able to be reproduced on a larger scale, or when the introduction of sustainable concepts or technologies are beyond the feasibility of present building practices or if the architectural design of the examples are not regarded as being aesthetically attractive. When ideals for sustainable building are beyond the reach of the individual actor or the organisation in everyday practice, sustainable building risks being set outside the main agenda of the building sector.

6. SUSTAINABLE BUILDING – A PLACE APART

So then what can explain the absence of influence from demonstration projects for sustainable building on mainstream building practice? As already discussed in this paper, this can be attributed the structure, organisation and the routines in the contemporary building sector that is not very favourable for development, learning and change. In this paper several specific reasons for the lack of influence for demonstration projects have been discussed. Firstly, it can be seen as being the lack of incentive and interest in the building sector to learn from experience. Secondly, that there is a lack of compilation and dissemination of reliable and useful findings from demonstration projects. Thirdly, many demonstration projects fail to appeal to actors in the building sector, as the ideals of the demonstration projects do not correspond with the ideals of the actors. A fourth reason is that demonstration projects are considered as being special projects and sidetracks from mainstream building. In the demonstration project, the actors involved make a commitment before the observing building sector and public to achieve a more sustainable building. The empirical studies show that when involved in such commitments, the building sector also approaches towards more sustainable building. However, successful demonstration projects often demand extra time in the process due to a more thorough planning: interdisciplinary tasks, the education of those involved, the involvement of expert knowledge etc. It can be seen as being a contradiction in that the ambition of many demonstration projects is to attain sustainable building under the rather ‘normal’ conditions of the building sector, which are characterised by short-term thinking and a focus on the quick yield from investments. After the completion of the demonstration project, the majority of the actors involved return to their normal procedures and projects where there are fewer resources for continuing the development of sustainable building. The demonstration project then becomes a sidetack or a one-off monument over
initiatives taken at a certain moment. Consequently, demonstration projects fail to become part of a continuous development process towards more sustainable building. The special project or the ‘research event’ has little chance of surviving in the real world where extra resources concerning time and money for fulfilling explicit objectives are missing or less present cf. [19].

6.1 The contradiction of distinction or acceptability
This study indicates that there is a contradiction between the acceptance of the necessary changes to accomplish sustainable building among actors in the building sector, and the idea that this should be within reach without greater changes in contemporary building practices. In order to become influential and to become normative on a broad level, sustainable building has to become the mainstream building practice. The empirical studies shows that many actors, both in Sweden and in the Netherlands is against the idea of distinguishing sustainable building as being a special kind of building project – sustainable building should be mainstream building. The empirical studies also show that actors within the building sector are opposed to the extraordinary or ideological experiment that fails to address the majority of the actors in the sector and that consequently falls outside the sector’s main agenda. Instead, the empirical studies point out the advantage of an incremental and successive development through realistic (and economically justified) projects using technology and methods applicable on a broad scale. In addition the study of The Swedish Architectural Review reveals a preference for a pragmatic and unobtrusive ‘ecological’ architecture. The study shows an aversion against the special and sometimes even symbolic examples of sustainable building. However, the study of The Swedish Architectural Review indicates that some architects idealise the merits of simply ‘good’ architecture and consider that good architecture in itself is sustainable. The same ideas are revealed among several respondents in the interview study, and are confirmed in an earlier study [25]. This view of sustainable building focuses on durability, and underestimates the importance of for example environmental issues.

The idea of mainstream sustainable building is in conflict with the fact that sustainable building has to point towards the future. The demonstration project has to be more sustainable than mainstream, and even much more sustainable considering the state of the world. Accordingly, this discussion indicates the problem of using a special label for the distinction of sustainable building. On the one hand, by addressing sustainable building as something special there is a risk it will be set outside the main agenda of the building sector. This is what characterises the development of sustainable building at the beginning of the 21\textsuperscript{st} Century in the Netherlands and also in Sweden. The building sector and also the public have lost interest in sustainable building. On the other hand, if sustainable building is not distinguished from mainstream building there is a risk that the concept will be watered down. There is a risk that the concept can mean anything, include anything, and in the most negative scenario even be ‘business-as-usual’.

7. DISCUSSION AND CONCLUDING REMARKS

This study indicates that the demonstration project for sustainable building has the potential for becoming a strategy for successive and incremental development in order to achieve the long-term objectives for sustainable development through realistic advancements. Demonstration projects for sustainable building tend to become quickly dated, as research and technology advances, and as cultural, societal and sector systems and values develop. Accordingly, the one-off demonstration projects should be seen as part of a development process; as concrete and tangible steps on the path of the long-term process towards the abstract objectives of sustainable building. Furthermore, the successive development adapts to
conditions for learning and development in the building sector and could encourage its actors to initiate and carry out demonstration projects as part of a learning process.

In order to make the strategy more explicit a stepwise model is proposed in which the demonstration project represents one level of innovation (Figure 2). The model distinguishes four levels of practice cf. [26]: 1) ‘basic’ practice, which means ‘business as usual’, 2) ‘best practice’, which is the best that can be achieved with present technology and methods, 3) demonstration projects that are more innovative than best practice, but nevertheless less innovative and risky than the experiment, and 4) the experiment or front-line project that uses the technology and methods of tomorrow. Accordingly, the model acknowledges the need for, on the one hand, ‘best’ practice examples and demonstration projects showing the way on a broad level, and on the other hand, building experiments or ‘front-line’ projects that have a much higher innovation level than the former. The model proposes that tomorrow’s ‘best’ practice and demonstration practice will become mainstream, while new higher levels of innovation towards sustainable development will be sought for in new demonstration projects and building experiments.

![Figure 2. The successive development of demonstration projects based on [x].](image)

The idea of the demonstration project as part of a successive development could be helpful in encouraging actors in the building sector to initiate and commit themselves to such projects. Through the empirical studies it has been revealed that some of the hindrances for the implementation of sustainable building are the lack of consistent images of the problem and the lack of reliable information. This can also be a question of the actors in the building sector having difficulties in transforming existing information into useful and living knowledge able to be used in practice. Sustainable building when addressed in its total complexity can be paralysing. Several respondents in the interview study have difficulties in describing the characteristics of sustainable building and some even find it impossible to imagine the ideal sustainable building in practice. Confronted with this huge and abstract task, and without any clear recipes on how to act, some actors will react by avoiding the task and persist with old routines. The ideal situation would be if demonstration projects could be seen and used as a strategy for incremental learning and development without the fear of making mistakes. All experience, good as bad, should be encouraged. The ideal would also be if the demonstration
projects could function as arenas for mutual exchange between research and the world of practice in order to build up knowledge, based on real world data, able to be scientifically tested and spread outside the project team.

The findings show similar experience from demonstrations projects for sustainable building in Sweden and the Netherlands. Supported by the governmental authorities, the Netherlands made larger investments in demonstration projects in the late 1990s. However, both countries at the moment experience a backlash in interest for sustainable building as well as what concerns the development of demonstration projects. The demonstration project as a strategy for supporting the process towards sustainable development in the building sector should be seen as one important part of a larger investment. Investments for sustainable building have to be made at a national and political level, at a building sector level and at the level of the organisations and individuals in the building sector, not least that which concerns education. Changes are needed in technological systems as well as in non-technical systems, such as the values and frames of reference among the actors and professional groups, and possibly also in systems outside the reach of the actors in the building sector, such as in economic systems, legislation etc. The paper presents the building sector as a large and complex system and supports the idea that changes towards sustainable development in this sector are processes that will need time.

The contributions from all the individual actors in the building sector involved in this process are indispensable. There is a need for a better understanding of issues regarding sustainable development among the actors within the building sector. In order to support such development, there is also a need for a better understanding of the factors impeding the actors from becoming involved in this development. These factors can be the problem with lack of information or lack of good examples, or the fact that the building sector is stuck in old structures and routines that impede development and change. The empirical studies indicate that the actors in the building sector are willing to accept the challenge of sustainable building, but there is some kind of paralysis to overcome in order to advance. An interview study, that was carried out within this study, shows that the actors often think that there are other actors in the building sector that should take the first step for development, or that the responsibility is on the politicians, or the trade press. However, it could be argued that all individual actors in the building sector should take a larger responsibility for sustainable development. In order to attain a higher level of individual as well as organisational learning and development this will also demand a critical view of the governing ideas and procedures in the daily practice of the building sector, both those of tacit and explicit character within organisations and professions.

The demonstration project as presented in this paper is built up on the idea of a more mainstream sustainable building with broad applicability in line with the ecological modernization of society in Sweden and the Netherlands. The paper has also shown that actors in the building sector more easily accept the challenge of mainstream sustainable building, as well as the idea of the successive development of the demonstration project, compared to more radical changes in contemporary building practices. However, it can be argued that there is a need for complementary demonstration projects or experiments that reach a higher level of innovation and that would demand more radical changes in building practices. The concept of sustainable building is still vague for many actors in the building sector, and accordingly open for personal interpretations. There is a risk that the concept will be watered down and become mainstream in order to be in compliance with other interests in
the building sector. This study indicates that there is still a need for further developed analysis of what sustainable building is, as well as how this can be accomplished.

8. ACKNOWLEDGEMENTS

This research has been supported by the MISTRA Sustainable Building Programme 1997 – 2000. In addition, the Adlerbertska Research Foundation and Helgo Zetterwall’s Foundation have contributed with financial support in connection with the empirical studies.

9. REFERENCES


