Application of Full-scale Modelling in Vietnam: An outline for discussion

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This paper will attempt to discuss this issue. The discussion is formulated according to the following three points. First, it will discuss whether the principle of literature evaluation is reflected at the Western context. Second, it will see the possibilities of improving and enhancing the evaluation procedure. Third, it will attempt to highlight multi-dimensional aspects of the evaluation and the other dilemmas that may arise in the framework of the Western context from the European experts in this full-scale modelling approach.

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Abstract

This paper discusses the possibility of applying full-scale modelling in Vietnam, a non-western so-called developing country. It deals with two main questions:

1. Is the application of full-scale modelling to be restricted to the West only?
2. What are the possibilities, constraints and fields of application — with attention to the methodological validity and technical solution for full-scale modelling in Vietnam?

It is argued that since full-scale modelling is based on people-environment interaction, it should, in principle, apply to studies about people-environment relation anywhere on earth. On the methodological validity, it is discussed that application of full-scale modelling in Vietnam faces similar methodological problems as encountered in European applications (such as people’s behaviour in experiment, ability to understand the abstraction of models, etc.) although at another level as this paper will make clear.

However, it would be needed to design a modelling kit that is of low costs and adapted to the availability of local materials and suitable for the climatic condition of Vietnam.

Two fields of application are projected as most applicable in Vietnam: modelling in architectural education and research investigation. Application for user’s participation in the design process will depend on the development of building policy in the country.

Introduction

I was introduced to full-scale modelling at the School of Architecture in Lund, and wanted to apply this method in my study on functional requirements of the Vietnamese kitchen. Within this study, full-scale modelling was conducted for the first time in Vietnam (Tran, 1994). It was met with enthusiasm by Vietnamese researchers and architects at the Hanoi Architectural Institute. However, the study since met some criticism on the validity of applying full-scale modelling, a method developed in the West, in a study concerning a non-western, developing country as Vietnam.

This paper will attempt to discuss this issue. The discussion is formulated according to the following sequence: first, it is discussed whether the principle of full-scale simulation is restricted to the Western context. Second, what are the possibilities and, also, constraints in applying this method in Vietnam?

I will examine the theoretical foundation of full-scale simulation in the literature in tackling the first question. I then proceed to discuss some important methodological and technical questions about the application of the full-scale modelling method in Vietnam. This discussion is based on literature about the use of full-scale modelling in Europe as well as on my own limited experience in working with full-scale modelling in Sweden and Vietnam.

The discussion in this paper has no intention to end up with an answer to the methodological question about applying full-scale modelling in Vietnam. It is rather an attempt to highlight multi-dimensional aspects of the discussion and to explore different viewpoints on this issue. It also wishes to benefit from valuable comments from the European experts in this 5th full-scale modelling conference.
People-environment interaction as the basis of full-scale simulation

Full-scale modelling means the use of three dimensional mock-ups in real scale to simulate real-life situations. It belongs to the field of environmental simulation, which concerns the level of 'fit' between the people and the structure and quality of the environment (Stokols, 1993).

‘Fit’ is an important design criterion, which is also termed ‘acceptability’. According to Alexander (quoted in Zeisel, 1981) acceptable designs refer to those that achieve a degree of 'fit' between a 'form in question and its context'. The task of designers is to search for one acceptable response within a range of possible solutions (Zeisel, 1981).

Within the design profession, certain efforts have been made to define elements of acceptability in design projects (products). However, this is often done in the form of post-evaluation, when the project has been built, and used as ready-made recipe, in form of 'requirements' (or the likes) for future design. Simulation, on the other hand, is based on the direct interaction between people and (simulated) environment to discuss design ideas about the future 'real' environment.

According to Stokols (1993) attempts to simulate environment these are based on an ecological perspective, in which the relationship between human being and environment is perceived as reciprocal and dynamic. People have a tendency to optimise their environment to better suit their goals, plans and requirements.

People-environment transactions are viewed as dynamic and reciprocal, involving sometimes active adjustments to existing conditions but sometimes active and goal-directed efforts to modify the environment in accord with specified reference and plans (Stokols, 1993: 7). The aim of simulation is to stimulate this goal-directed and reciprocal nature of the relationship people-environment in designing a living environment, in order to optimise or improve the acceptability or the level of fit between the future environment and the needs of the people who will occupy it.

The processes by which individuals and groups rationally guide their transactions with the environment so as to achieve successively higher levels of 'fit' between their present or anticipated needs and environmental conditions are referred to as human-environment optimisation. (Stokols, 1993: 7)

This concept of human-environment optimisation, as its term indicates, applies to all humans and environments. Environmental simulation thus, in principle, can be applied in any corner of the earth, where there are concerns with the level of 'fit' between people and environment, and where there is the wish to stimulate people's interaction and their efforts to improve their environment.

Full-scale modelling as simulation of experience

What are the special methodological requirements of full-scale modelling? Will it cause complications in applying the method in Vietnam?

Many different techniques have been used in environmental simulation studies: drawing, photos, models, computer simulation, etc. Simulation by models is not new in the design profession and in scientific experiment whether in Europe or Asia. According to Lawrence (1987), the trend to use three dimensional models to eliciting public participation in the architectural design process has increasingly occurred in both industrialised and 'third world' countries. Small-scale three dimensional models have been used since long in Vietnam as representations of design proposals. Making models is an obligatory step in presenting design projects for students of architecture, especially in town planning projects. It is often considered by architects and planners as most effective in communication with the public and authorities about a proposed design.

However, the traditional use of small-scale models in the design profession is limited to
the representation of the design proposal, intended to 'sell the project'. On the contrary, simulation with models is used in the design or investigation process "to communicate possibilities, to give people something to think with and about" (Kaplan, 1977).

Full-scale modelling is discussed as most advantageous in the role of stimulating interaction between people and environment, since it provides people with the opportunity to experience the physical environment in real-life scale (Lawrence, 1987). The capacity to stimulate spatial experience is thus an important characteristic of full-scale modelling. This implies that application of full-scale modelling depends on whether the simulated setting (built models) is adequate to stimulate people's experience and communicate design messages. It also depends on how people react toward the simulated setting.

This is also the source of doubt and criticism on my early attempt with full-scale modelling in Vietnam. Is full-scale modelling, as a Western method based on built models (predetermined, probably Western influenced), viable for simulation and study of behaviour of people from a non-Western country and social context? How do the built models affect the behaviour of Vietnamese participants in the experiment? How do Vietnamese react to abstract models and the experimental setting? (Can they understand the models?)

I will try to discuss these questions below.

Methodological problems: Prejudice of the method?

The first question concerns the viability of applying a western method to Vietnam. Is the method valid or misleading? Does the method, developed in the West, bear some western, pre-conceptualised imprint that would be a bias in Vietnam? (The question put to me by some critics is whether I would end up as having Swedish kitchen in Vietnam because I use a Swedish research method?) Full-scale modelling, as discussed above, is a simulation process that is based on 1:1 models to communicate design possibilities by providing experience of the physical environment. However, there is no pre-prescribed process, but a range of procedures and modelling strategies that are formulated according to the purposes of the application. Full-scale modelling thus does not mean any one method but contains various methods of application. It is a versatile tool that can be used to serve different purposes.

Full-scale modelling is used in different ways in the various laboratories in Europe. The main fields of application are as a tool in the architectural design practice, for architectural education, for experimental and applied research, and for participation in design (Lawrence, 1992). Even within one field of application, different approaches to research also lead to different work (application) methods. In basic research, different views about participation (whether the participant is considered an experimental object or subject of participation) and investigation have resulted into different simulation procedures and experimental settings. In architectural education, different emphasis on form, function, and architectural themes influence the choice of simulation strategies, alternatives models, etc.

To me this means that the application of full-scale modelling in Vietnam is not hindered by a predetermined method built on western conditions and assumptions. Since specific methods of application must be developed for each study depending on the purpose of the application, this also means it is possible to set up methods that are not alien to the country's cultural and social context.

Another aspect of modelling is the construction of models to simulate a certain environment. Simulation literature has always shown great concern about the accuracy of the simulated setting, about whether the model is effective or misleading (Kaplan 1993). The simulated setting is often subject to criticism as misleading because it contains a set of pre-selected objects based on certain
use assumptions. For example, in my study the experimental setting can be criticised as leading since the presence of sink suggests that it be used for washing, and the use of counters in the kitchens assumes that people stand to cook, etc.

However according to Kaplan (1993) one should see the simulated setting in the light of its purpose, to provide imaginary, experience and communication. A simulated setting (model) presents one possibility in a series of possibilities, or one idea for communication in the modelling process. It is the participant who decides whether to modify, accept or reject a design idea presented by the model (the possibility to modify or reject an alternative should be made clear to the participants). To discuss and build the simulated setting together with the participants can be included in the modelling process. It is probably the most ‘objective’ and effective approach.

In the study of the Vietnamese kitchen, we have attempted both kinds of modelling processes: 1) building models together with the participants (the experiment in Lund) and 2) working out a set of alternative to be tested and appraised by the participants (experiment in Hanoi).

In the experiment in Lund, we started first with an existing kitchen (type corridor or L), have a participant cook a meal in it, then asked how she would like to modify it. She seemed to know exactly what were the inconveniences, what she wanted to change, and also a little of how it should be changed: A niche for preparing food is important, it should be close to the water source, the refrigerator is needed in the kitchen, etc.

Then she cooked another meal in the modified lay-out. This helped her to discover other dissatisfaction with the second arrangement: the refrigerator should be closer to the work surface (rather than to the stove), what would be better location for spicery, etc. This method was indeed effective as a learning process, for both the participant and the researchers: the participant learned to realise what she wants, and we learned about the priority given to various functions of a kitchen.

With the second participant we started to build together a “new” kitchen. This was more difficult: She seemed to have a clear image of what should be in the kitchen but not exactly how. It seems to be easier for the participants to learn what they want by experiencing and comparing alternatives, than to start from scratch.

The learning process by building together is thus certainly effective when the purpose is about learning the user’s values about qualities of a certain design. However when the researcher task is to identify some general indicators on kitchen functions requirements, another modelling process is required. In order to learn about common functional requirements and preferences, more alternative kitchens need to be tested and compared by a bigger number of participants.

This method was applied in our Hanoi experiment (although we would have to continue with a bigger number of participants and more alternatives).

It is thus the researchers (or designers) who decide simulation objectives, choose measuring (recording) instruments and elements of a simulated setting. Their capacity to identify relevant problems, conduct the experiment, and analyze the information obtained will decide whether the simulation process is effective or misleading. Their insight into the real-life situation, both the actual uses of an environment, as well as people’s opinions and wishes about how it should be used, also determine whether the simulated setting is close-to-real or misleading.

**Behaviour in an experimental setting**

Another question is how the models affect Vietnamese participants? Can we know if their behaviour in an experimental setting can be equivalent to their ‘normal’ behaviour in the real situation?

This issue is much discussed in the simulation literature (Kaplan, 1993; Lawrence, 1987; Hornyczky-Dalheim, 1993). However,
Kaplan (1993) comments that this caution can be exaggerated, that the practical world itself depends on simulations of many kinds, and the public has been widely exposed to models of differing degrees of equivalence to reality (models, photos, etc.) with our being consciously aware of how 'real' the model is. In the case of application in Vietnam, this question refers to another caution. It assumes a difference in the behaviour of Vietnamese (or Asians) and Westerners (or Europeans) in an experimental setting, and that this affects the validity of full-scale simulation.

It is possible that people who are used to less freedom of opinions and behaviour (as in many countries in Asia) react to research and authority in another way than people in the 'free West'.

However, when we consider that 'authority' in this case is represented by the professionals (experts), the situation may be different, even contrary. Respect and authority attached to professionals can be greater in the West, where society values the able, young and strong, than in many societies in the East, where authority is often granted to old people. When working with an older participant, the younger architect (expert) is in fact supposed to listen. When I work with older women on the issue of their houses and kitchens, I have no doubt that they would tell me what they think and would not hesitate to give comment and advice (they certainly know better!)

Whether the participants are rural or urban is yet another aspect which can lead to possible differences in their reaction to a full-scale experiment. How do these differences vary between country and country, and people and people? What characteristics of a person (or a person) influence their participation in an experimental setting? The issues of attitudes to research, authority and the resulting behaviour in an experimental setting deserve special attention in future studies and evaluations of full-scale simulation.

Of course one very important aspect of a participatory study anywhere is the creation of a mutual relationship and good communication between the investigators and the participants. This is of extra importance in a society where personal contact works better than official.

From our full-scale experiments in Hanoi, it was noted that most participants were quite self-conscious at the beginning because of being observed and filmed. However they became more relaxed after two or three tests, gave comments during the cooking, even made jokes. Some were very eager to discuss with us the problems in their kitchens and their wishes and dreams of a future kitchen.

Still the fact that their cooking is being watched seems to result in some extra work. For example, comparing to the tests in which I myself did the cooking, all other participants seemed to pay more attention to tidying up the work surface: spice was put away immediately after use, dirty dishes were brought immediately to the sink (or the water place), etc. This did not seem to disturb the work flow during the preparation of the meal (the participants seem to keep to their own working pattern of preparing meal through out the six tests) but resulted in somewhat longer preparation time for a meal.

Can this be explained by personalities? (I am not good in tidying up!) Or does it illustrate people's 'abnormal' behaviour in the laboratory? The number of our participants was too small to comment on this. This can be a point for observation in further modelling attempts. Also, knowledge about how the participants cook at home can be acquired by field surveys. It can be used to compare and cross-check the observations in the experiment.

Understanding of abstraction and representation

The question here concerns the capacity to understand the abstract presentation of the models of the participant. Will this be a serious problem for application of the method in Vietnam?

This is also an issue of much discussion in the full-scale simulation literature. How close is
the model to reality? Does the abstraction of the models affect lay-people's understanding of the design idea?

According to Stöckl (1992:282) problems arise when one uses models to approach reality.

One can try to achieve reality as closely as possible, still knowing that one will not succeed completely.

Still, he contends that in a full-scale model, one can walk around a space, which is not the case for most other architectural representations. He also discusses that the abstraction of the full-scale model can be turned into an advantage when it is considered as an instrument for better understanding of an architectural theme (Stöckl, 1992).

Other experiences from Europe found rather positive reactions to abstract models. According to the experience in Lund, some abstract models did seem strange to many participants at the beginning, although they quickly got familiarised.

At first the users often find it difficult to accept the abstraction of the mock-up. The employees from the theatre, for instance, were rather upset the first time they came to the laboratory and found tables made of cardboard and telephones made of frigoline. After a while, however, they got used to it.

(Hooriyanzsky-Dalholm, 1991:29)

Moreover, the degree of abstraction of models or its approximation to reality varies depending on the purpose of a simulation (Lawrence 1992).

Hardie (1988) found reactions to abstract small-scale models was positive in African people. According to him, although many people are illiterate they are used to practical matters, having often built or repaired their own houses, thus have acute awareness of shapes and sizes and a good capability to relate the models proportion to reality.

I think the ability and degree of perception in this regard among the Tswana is far greater than would be found among western participants (Hardie, 1988:58).

In our experiment in Haro, we did not use so many dummies. Most of the facilities were real and 'usable'. However, in order to allow more flexibility, we use shelves instead of cupboards.

Fig. 1. Open shelves as cupboard

In some of the tests we asked the participants to consider some shelves as two compartment wall-cupboard and asked them what would they like to put in each of the compartments. The results were that four participants used the compartment for different kinds of storage (i.e. one for crockery and the other for oil, sauce and the likes) while the other two participants preferred to use them as one big cupboard. They did not seem to have to
much problem to imagine the cupboard although what they had was only open shelves.

The fact that they work (experimentally) in a model kitchen, instead of the fixed kitchen of reality, seems to make the women to see the kitchen and kitchen work in a totally different light. One participant mentioned that while at home she works according to habit, hardly noticing how various functions link to the arrangement of kitchen facilities; during the experiment they were made to think of the work in connection to the physical organisation of the kitchen.

The 'flexibility' aspect of modelling is also an important element for active participation. The awareness that it is possible to move or change (It's so easy to change) any of the facility in the kitchen seems to make people feel free to mention their wishes to change. The alternative models help the participants to form judgement and realise what they want by comparing the different possibilities. Our participants did not have many comments after the first cooking. More and more comments came with later cooking as more possibilities were presented.

Also, the fact that several participants were asked to perform the same task also seems to encourage active participation since each tries to contribute her part to the experiment.

Full-scale modelling elements for Vietnam?
In this part I will discuss a technical aspect of full-scale application in Vietnam: the modelling kit.
What full-scale elements are suitable for application in Vietnam? Important criteria are probably low-cost, and appropriate to hot and humid climate.
In our experiment with full-scale model in Hanoi, we used simple elements, obtained and made locally. The structure of the modelling was based on the wall panel system of the lab at Lund. Simple panels were made of local wood (60x270x1 cm) with supporting legs. The fittings (counter units) were also built of wood, in units of widths from 1060 cm which can be combined into different counter lengths (Fig. 2). All elements were made manually by two local carpenters.

Fig. 2. Making wooden counters in Hanoi
(Phot: Hornsby-Dahlman)

We had some problem with distortion of the wooden elements. The 270 cm long and 1 cm thin wall panels were made of poor quality wet wood and warped after a few days. How to deal with this problem? One possibility is to avoid deformation by devising structures with smaller panel components. Alternatively is to find some low cost treatment for wood and to dry wood better before manufacturing.

Another problem in making the elements was the difficulty in getting the modelling elements to the exact dimensions required. This seems to relate to a rather loose attitude to experimentation and precision, (more from the researchers than the carpenters), which we think can be improved in the future.
Fields of application
The above discussion on methodological possibilities shows that there is no serious hindrance to application of full-scale modelling in Vietnam. There are many methodological questions to be answered, but several of these are still under discussion in Europe. To my thinking, the problems of application in Vietnam is rather of the same nature as the methodological problems in Europe, albeit of another level. In European experience, the choice of application field seems to depend on the interests of the different institutions under which the laboratory operates. Where the labs are connected to schools or universities as in Lausanne, Lund, Wageningen, full-scale modelling is more likely to be included in architectural education, although other kinds of applications such as participatory or basic research can be the major interest. Where the sim-lab is at the municipality (as in the case of Amsterdam and Bologna), it is used to serve municipal proposals such as supporting the decision making process for planning and design of new housing units or quality control (Lawrence 1993).

The elements and structure of the modelling kit are also an important aspect of full-scale application. Elements used in modelling can influence the kind and range of studies that a laboratory engages in. The small elements of Lausanne for example seem to provide a better possibility for creating and transforming facades, and other formal aspects (various form of window, doors). However it is rather difficult to build up and make changes thus not so effective if the aim of the study or investigation concerns the functional aspects of the interior. The wall panels system in Lund allows quick and rather easy setting up, effective for detailed study of interior space and functions, while its formal expression is limited. The kind of modelling elements to be developed in Vietnam will certainly influence the modes of modelling application that are to be taken. Moreover, there are two important pre-conditions for the application of full-scale modelling: the political environment of design (or design policy) and the financial capacity. Since user’s participation in design is discussed as an issue of policy, growing out of the concept of democratization of the designing process (Tweed and Woolley 1992), the promotion of full-scale simulation, as an effective media for communication with users is also very much a matter of policy. Whether the mode of full-scale modelling application depends purely on policy as such or also on cultural differences among the countries it is difficult to say. Since full-scale modelling is also considered useful for studying functions of the interior, it can be that the varying attitude to functions in different societies can lead to giving higher or lower priority to full-scale simulation. Emphasis on functions in the architectural profession and in other sectors of the Swedish society seems to have had a major role in the promotion and application of full-scale modelling in Sweden. It would be interesting to learn what other socio-cultural elements facilitate application of full-scale modelling. I can see that possibilities to apply full-scale modelling in Vietnam for two purposes as a tool for architectural education and as a tool in research investigation. The possibility of applying full-scale modelling for user’s participation in the design process is more difficult to project. This depends on whether the construction authority has the will or the means to promote user participation in housing projects or to involve users in the decision making concerning future buildings. The use of full-scale simulation in architectural education can be projected as least problematic. Architects and students in architecture are familiar with the concept of simulation by modelling and are with the representation and abstraction of models. From our discussion with the lecturers at the Hanoi Architectural Institute, the inclusion of modelling with full-scale models in the school’s curriculum is possible. It was expected that it can help students to learn more about the practical possibilities of various formal combinations (what is possible
and how) and avoid the creation of meaningless forms. This is also expected to
direct students to pay more attention to
functions of the interior. The architectural
school in Vietnam is somewhat "beaux-arts"
oriented, and the attention paid to elevation
and form study tends to outweigh the
attention paid to functions and plan
arrangement.
In the field of applied research, the most
immediate application of full-scale modelling
in Vietnam could be related to the projects
dedicated to determine norms and standards
(for housing and buildings) that are based on
people’s requirements. In Vietnam at present,
many such projects are under way since many
norms and standards need to be re-formulated
in all sectors. After our attempt in Hanoi, it
was discussed at the Hanoi Architectural
Institute and Ministry of Construction that the
method should be promoted for working out
standards for urban dwelling and kitchens.
There are also some emerging research
activities on the relationship between people
and the built environment that can be gain
from full-scale modelling.
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