Full-scale experiment on kitchen function in Hanoi

Tran Hoai Anh, ARK 3
School of Architecture, University of Lund
Box 118
S-22100 Lund
Sweden

Editor's remark: This paper has been shortened under responsibility of the editor.
A copy of the entire version (33 pages) is available at the authors address or at
LEA-ÉPFL, Case postale 95, CH-1015 Lausanne, Switzerland.

Introduction
During the period 5th to 26th March 1992, Elisabeth H. Dalholm and me, Tran Hoai
Anh, have carried out a study on functions of the Vietnamese urban kitchen, with E. H.
D as both advisor and co-researcher and me as researcher learning to use full-scale
modelling method in my study of kitchen function.

This is my second attempt to study the Vietnamese kitchen using full-scale models.
The first attempt was made at the Full-scale lab in Lund in November 1991, as an
exercise to use full-scale modelling method in the kitchen study. The findings from this
exercise about the method as well as about the main functions of the kitchen has been
used for setting up the experimental framework of the later study. These attempts are
performed in a dual context of a thesis as well as of a research and development project.

The study is a part of a licentiate thesis on "Functional kitchen for the Vietnamese
cooking way" that I have been working on at the Department of Architecture and
Development studies, Lund University. The issues it is dealing with are:
- Inadequacy of kitchen design in the apartment buildings in Hanoi, where the
  kitchen is often designed as a mere cooking place - other parts of the food making
  process are not given any attention.
- Lack of standard dimensional and planning criteria for functional kitchen which can
  serve as bases for kitchen design.

The thesis aims at finding out indicators on functional spatial requirements for
kitchen, which can serve as guide-line for designing functional kitchen for Hanoi. One
of the main propositions in the thesis is that functional kitchens for Hanoi should be
organised to permit the culinary activities done according to the Vietnamese urban
culinary practice. This is based on the concept that the culinary activity is an expression
of culture, thus the practice of preparing meal in the present context of the urban
households in Hanoi has an established pattern, method which demand a suitable area
and arrangement in the kitchen. This pattern and cooking method should make up the
functional requirement for kitchen in Hanoi, and be taken in to account if functional
kitchen designing is to be achieved. In the context of the space-limited apartment
building of Hanoi, special focus is given to find out indicators on the minimum
functional spatial requirements of the kitchen works.

The study is also a part of a co-operation project on Kitchen, Stove and Household
energy between Lund Center for Habitat studies (LCHS) and the Hanoi Architectural
Institute (HAI) where I have been involved as a researcher since 1986. Within this
project an experimental apartment has been built at HAI, and experiments have been and are being carried out on different aspects such as indoor climate: temperature, ventilation, smoke evacuation, etc. The full-scale kitchen models for studying kitchen function have also been set up in this apartment building, and the experiments were done in close co-operation with the project staff at HAI, as well as with the responsible researcher of LCHS.

Survey on kitchen condition in Hanoi

16 families of 2 main house types in Hanoi (apartment buildings and traditional houses) were visited before starting the experiment. Although the number of households visited was limited, there was quite a few characteristics of the kitchens that we found common:

- The kitchens are often small, the average is 4.5 square meters. Of the 16 households visited there were 12 households with the kitchen areas below 5 m², and four households with kitchen areas from 5 to 10 m². The kitchens are also often dark since there is no day lighting in most kitchens.
- Meals are prepared at home 2 or 3 times a day. There are often 2 to 3 cooked dishes to be cooked, together with rice as a permanent staple.
- The use of electric cookers is common, often supplemented by kerosene stoves (or coal stoves in a few places) in cases of power cut. The common types of cookers are portable single or double burners (hot-plates).
- Most of the families (visited) have a built counter to put the cookers (or stoves) on and stand while cooking.
- Food preparation is often done on the floor, near the cooking place or, more often at the water tank, since everything need to be washed. The water tap is often placed very low near the ground due to different reasons: low water pressure, especially in apartment buildings, technically difficult (in the Vietnamese context) to fix water tank high up and have the water tab at the counter level (most of the tanks in the apartment buildings are built on the floor). The sinks are quite a new element, present in the more "modern" kitchens. In these households, part of the food preparation and washing is performed at the sinks (the cleaner part) but some washing is still done on the floor at the tap.
- Every household has one or more water tank as the reserve of water. The water tanks are seen invariably in the kitchen, in the shower place, at the yard or on top of the roof. It is reported that the water supply situation is getting much better so the families don't feel dependent on the water tank any longer (thanks to the Finnish supported water programme for Hanoi). But, within a context of a city in rapid transition, a common uncertainty on the future situation is also felt.
- All the visited households own a refrigerator. It is often in the living room, or sometimes bedroom, but not in the kitchen. The stated reason is that there is not enough space in the kitchen. People do not store lots of food either in the refrigerator or in the cupboards. Foods is often bought in small amount for immediate consumption.
- Many households keep all their stock of crockery at the metal stand instead of having them in the traditional wooden cupboard. For better or worse, this later one seems to be slowly replaced by both the "modern" wall cup-board and the crockery stand.
- The chimney hood is not often present and the chimney is often not used.
- Both the equipment in the households and at the market show the tendency to use more "modern" kitchen equipment (especially electric cookers and sinks). If the electricity supply and its afford ability will not go down, the use of these equipment can be expected to be dominant in many households in Hanoi in the near future.

Below is a few kitchens which we consider as representative of the different kitchen categories that we have visited.
The corridor kitchen: This is the most common kitchen type in many apartment buildings. There is a surface 120 x 80 cm at height 67 cm (from the floor) under a chimney hood, serves as the cooking place. One stands at the corridor while cooking. The corridor is the passage way leading to the shower and the toilet at the end. There is no water connection to this surface, the water tap is at the shower place. Between the shower place and the cooking place there is a kind of cupboard, made of a few concrete shelves, where the families often keep their crockery, dry foods (rice, beans, etc.). The water tank is often built at the shower place. The families often use the corridor passage for keeping the bicycles at night.

Fig. 1. The corridor kitchen, Scale 1:100

Kitchens in the traditional houses: The traditional houses in Hanoi is of a tub house-type: deep and narrow. The house is usually 3 - 6 m width and can be up to 30 - 40 m deep, having 1, 2 or 3 court yards at intervals along the length. Most of these houses are shop houses, with the front room as a shop, or a workroom for some small industry activities. The last court yard often separates the kitchen and the toilet (at the back) from the rest of the house. In the old days these were one-family houses but as the families have grown and extended, these houses were now often shared by 3-4 sometimes up to 8 families. Thus the original kitchens in these houses now have different uses: as a common kitchen place where many families put their stoves to cook there (more common to the houses where the smaller household units are relatives), transformed into another room, or used as the kitchen for one of those families (the owner of the house). Other “kitchens” were thus added, invariably in the court yard, under a staircase, or in some living rooms!
Fig. 2. Kitchen in the traditional house 1, Scale 1:100

Fig. 3. Kitchen in the traditional house 2, Scale 1:100
The "modern" kitchens: The 3 modern kitchens we have visited are all quite new (from 6 months to one year) belong to newer houses, either 2-storey row houses or detached houses. All these kitchens have sinks and wall cup-boards. The cupboards are all wood with mica surface, quite expensive in Vietnam. These kitchens trick us more like symbols of a modern life in eyes of the households, provide a sense of achievement rather than functional. The cupboards are all too high for the housewives' reach.

Fig. 4. A "modern" kitchen, Scale 1:100

The full-scale experiment

Aims of the experiments: The aims of the study is to find out the relation between the work flow according to the Vietnamese culinary practice and the spatial requirements for kitchen lay-outs.

The key questions are thus:
1. How the work is done?
2. The kind of spatial arrangement required according to the work flow? (How to connect the main kitchen equipment and furniture in order to facilitate the cooking process)
3. How much space required for work surfaces and cooking area?

Main points of experimentation:
- a. The relationships among the main equipment: work surface, stoves, sink, refrigerators and storage in connection with the work flow?
- b. Work surface which includes food preparation surface and cooking surface: where and how much space needed according to the actual practice?
- c. The work flow and different types of kitchen lay-outs (corridor or L shape).
- d. Users' preferences, habits and actual practices in using and arranging their kitchens.
- e. Storage requirement?

The plans: Our purpose was to observe the main kitchen functions (food preparing, cooking, washing, storage) with the arrangement of the main equipment (stoves, sink, work surface, cupboard) in two types of plans: the corridor plans and the L shape plans. Within this two types of arrangement, smaller test-situations were set up.
concerning the alternative locations of refrigerator, the water tank, or the crockery stand in connection with the other main kitchen elements: stoves, sink, work surface. In plans A1 & B1, the test situation was that the refrigerator was arranged close to sink and work surface. Initially, plan A2 & B2 included the water tank and had the refrigerator close to the stoves, but were both changed. After the first test series with A1 it has become obvious that the work flow is refrigerator - word surface - sink - work surface - stoves. A2 was arranged to test the location refrigerator at the opposite wall of the work surface. The situation with the water tank was kept in A2 but discarded in B2, since we have decided to study kitchen function where foods is also prepared in a standing position, the sink was considered as one of the main kitchen equipment, the water tank was not for daily use but only for emergency water. B2 was just the reserve of B1 concerning the main kitchen equipment, in which we have added a small test situation using the “dead corner” for keeping the daily crockery.

Plan C was included later in the experiment. It was an actual Vietnamese kitchen design for a five storey apartment building to be built in Hanoi, to have more materials for comparison and to involve the research staff from HAI more in the work with full-scale models. It turns out that with plan C, the test-situation with refrigerator close to stoves was eventually tested.

SA1 = 6,73 m²
SA2 = 7,25 m²

Fig. 5. The corridor plans A1, A2. Scale: 1:50

SB1 = 5,34 m²
SB2 = 6,62 m²

Fig. 6. The L shape plans B1, B2. Scale: 1:50
Experimental method: It was planned that every alternative plan will be tested with 6 cooking by six woman participants - subjects. The experiment thus comprises on the whole 24 tests, while the structure of the "standard" normal meal was kept for all the tests. This procedure was kept with the 3 first plans: A1, A2, and B1. Since the test-situation in B2 was changed and reduced, plan C was included, instead of having a normal series of 6 tests with B2, only 3 were made and the last 3 tests were with plan C.

- All subjects were asked to arrange the cooking utensils and shelves as they want. They were also reminded that there is possibility to shortening, having more, or taking away any shelf, as well as to rearrange them in different heights.

- The kitchen equipment and utensils used were the ones commonly found at the households in Hanoi (according to the visits and interviews). All subjects were encouraged to mention any equipment or utensils that they are used to work with or possess at home, so that it can be provided in the models.

- As can be noted in the section about the plans, changes were made even during the experimental period. Changes on the plans were made before a new test series (of 6 tests). The changes in the arrangement of cooking utensils and shelves were allowed to take place even after each individual test within a series.

- However, it was difficult to keep to the ideal "like-at-home" situation and experimental principle. The use of the metal stand for crockery was one example. Only 3 subjects have the metal stand for crockery at home, but the others were attracted by it thus wanted to use it too, eventually it was used in all the tests. It was a rather awkward thing as it was too tall (60 cm) to be on the work surface (resulted in difficulty in reaching for many women) and wide (30 cm at the widest) thus occupied lots of space.

- Two video cameras were used in all the tests for recording all the meal-preparing activities. The top camera which covers the view from above gives a full picture of the subject's movements in the lay-out, her use of space and equipment. The side camera registers the subject's working position at the different work surfaces (food preparing, cooking, sink) and shelves. The cooking process was recorded from the starting moment till the time when all the cooked foods are served on the serving tray. Filming was also made on some of the washing up after meal to analyse the use of work surface and sink for this task.
- Interviews were taken with each subject before starting the first test (cooking). The questions were directed to get information about the subject (profession, age and height) as well as the conditions of her house, kitchen and how she works in it. The questions were also directed to what the woman consider as disadvantage(s) in her present kitchen and/or how she would wish for improvement. The information from these interviews was noted.

- Interviews were also made with every subject after each single test. The interviews were directed to get feedback from the subjects about each kitchen lay-out, in comparison to the other alternative plans. Questions were also raised on the non-normative aspects such as feeling of space (spacious, narrow, oppressive?) preferences of kitchen types, preferred location of dining place (or room, if possible), door and windows. These interviews were tape-recorded for later analysis.

**Fig. 8. Example of under counter in a corridor plan**

**Fig. 9. Many sieves are used which occupied lots of space**

**Fig. 10. People always reserve a space of 15 - 18 cm in front of the stoves for temporary placement of foods before and after cooking.**
Fig. 11. The serving tray

Fig. 12. The crockery stand split the work surface

Fig. 13. The most used work surfaces
The findings

Concerning the connection among the main kitchen equipment, the following was preliminary concluded:

- Connection work surface - stoves - sink was most important. A work surface was certainly needed close to both the stoves and the sink. The most trips made in all the tests during the experiment was between work surface and stoves (the mean value of all the tests was 45 trips per cooking). Trips between work surface and sink ranged second in frequency. The number of trips between sink and stoves was also significant, most of them were return trips.

- Although in general, spicing was done both during food preparation and cooking, spice was needed more at the cooking surface than at work surface. The number of trips between spice shelf and cooking place (stoves) were significant in all tests (with the mean value of 24 trips per cooking), but varied with different subjects.

- Connection between the refrigerator and the work surface was important, trips were made more between the refrigerator and work surface than refrigerator to stoves or sink. There was also a need to have a surface close to the refrigerator for temporary placement of foods. Locating the refrigerator close to the stoves but further to the work surface and sink was the point of criticism of plan C by all the subjects.

- The location of crockery posed a few questions. Most of the subject preferred to put the crockery (on the stand) by the sink because of the need to leave the crockery there for drying after washing up. From all the cooking however, it was obvious that during the preparation of a meal the crockery was much needed close to the work surface and the stoves. Which function should be given priority? or search for a good middle location that can satisfy both?

- Connection between the sink and the storage of cooking utensils (placed at under counter shelves in these tests) was also found important as not only foods but all pots, pans and cutting board have had to be washed before using.
Concerning the dimensional requirement of work surface area and height, the following was indicated:

- Work surface between the cooking place and the sink should not be less than 80 cm in the corridor plans, and 100 cm in the L shaped plans. A surface of ca. 60 cm would be also needed on the other side of the sink for temporary placement of foods during and after washing. Cooking place (including space for the stoves) should not be less than 120 cm. Depth of work surface can be 55 or 50 cm.

- There were some problem with asserting comfortable height for cooking surface due to the alternative use of electric cooker and kerosene stoves, which were of different heights. Height of 75 cm for cooking surface was found OK when using the electric cooker but too high when cooking with kerosene stoves. Which stove should the surface be designed for? or both? All subjects thought that "it would not look nice" if the cooking place was to be made into two levels to accommodate these two types of stoves, and assured that they cook mainly with electricity. Counsel will probably needed from the energy board of Hanoi about the future stoves?

- Height of 82 - 83 was found good for cutting and washing at sink, but as a cutting board of 4 cm thick was used, the actual work surface counter has to be reduced to 78 cm! A thin cutting board should be promoted?

Within the context of urban family kitchen of Hanoi, the above findings from the present study should be considered only as indicators which need further testing before valid assessments can be made. However in the place of a too-early conclusion, what the researchers thought they really benefited from this study was a clearer defined research area, method and concrete points for immediate and future experiments.

References:
- Dang Thai Hoang, Hanoi - A thousand year of construction, Hanoi 1980
- Hoang Huy Pho and Yokio Nishimura, The historical Environment and Housing Conditions in the "36 old streets" quarter of Hanoi, Div. of Human Settlements Development, Asian Institute of Technology, Bangkok, 1990
- Tran Hoai Anh: Full-scale modelling as a tool to identify indicators concerning cooking practice and kitchen lay-outs, Report, ARK 3, LTH 1991
Appendix

Table of trips among the main kitchen functions, Scale 1:100