

A decision support system for architects based on participatory tools for community design⁽¹⁾

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Summary: *Many participatory tools and methods have focused on rural development but few have considered aspects of settlement in rural areas. This paper explores a number of such tools designed for Indian professionals working in the field of housing. The author first discusses a number of elements related to the effective participation of local residents and then describes the tools themselves.*

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I. INTRODUCTION

EVEN A CONSERVATIVE estimate puts the rural housing shortfall in India at 20.6 million, thus indicating a need for external intervention. However, interventions by government agencies or charity organizations have often failed to achieve a variable sustainable habitat, primarily because of a misplaced assessment of need.

This paper introduces a decision support system to aid architects and planners in information gathering and needs assessment for input into design and decision-making processes in the area of Indian rural housing. The method is based on participatory information collection games and includes three stages. The first stage involves interactive user documentation of baseline data; the second involves participatory group analysis and evaluation of issues coupled with rapid interactive verification of information collected in terms of spatial organizations and production mechanisms; and the third is a tool for rapid systematized retrieval of information for the preparation of a "user needs statement".

This paper explains the contextual background in which the decision support system was developed. It then discusses the basic elements of its methodology and its development and describes some of the participatory tools involved. Finally, it discusses field applications. It is hoped that with certain modifications the tools described in this paper may be adapted for use in different situations.

1. An earlier version of this paper *A Decision Support System for an architect working in a rural housing situation in India* was presented at the Second International Conference on Design and Decision Support Systems in Architecture and Urban Planning, Vaals 1994.

II. CONTEXTUAL BACKGROUND

a. Housing India's Rural Millions

HOUSING MILLIONS OF poor and homeless people in rural India is a challenging problem. According to the National Buildings Organization, the total backlog in housing was estimated at 30.8 million in 1991, of which 21.2 million was in rural areas.

In rural areas, there is constant pressure on existing land and building materials to meet the needs of the increasing population. The demand from neighbouring towns and cities for the natural resources necessary for building materials is also increasing. Consequently, the rural poor are increasingly denied access to resources that, in earlier times, were plentiful and often free. This process also ensures that in rural areas, where many services attached to housing had not been a great problem in the past, there will be increasingly less provision for the rural poor and, in many circumstances, housing standards could deteriorate further. For example, sanitation and water may become inaccessible to the poor due to the actions of individual land owners.

b. Misplaced Perceptions

Every housing programme needs to be integrated with the livelihood and lifestyle of its inhabitants so that it can be sustainable even after external support is withdrawn. This not only means that the houses built should be functional but also that the villagers should not be trapped into dependency, being unable later to upgrade their houses without external assistance. Planners, biased by the need to evenly spread limited resources, often do not manage to satisfy particular needs of people in specific communities. The lack of regular information to planners on the housing requirements of the community is critical. Evaluations of government housing programmes often indicate that misplaced perceptions are the main cause of project failure. Furthermore, it has often been noted that massive housing programmes have only accentuated inequalities when the building designs and processes are not appropriately developed because the users are not adequately consulted.

c. Statement of the Problem

It is now accepted that house and neighbourhood designs should be sensitive to the needs of the users. This paper is based on the premise that the architect has to understand the client in order to design an appropriate house.

The problem of rural housing in India has received some attention from the government since the very first five-year plan. Several donor organizations have also invested money to provide houses for the rural poor. However, these investments have often resulted in inappropriate or unsuitable solutions mainly due to misplaced perceptions of the nature of the housing prob-

lem. Very few architects have been involved in the rural housing situation. Thus, rural housing intervention has been left to engineers and administrators who have approached the problem only in terms of the physical supply of houses (often using a predetermined quality of materials) rather than in terms of the translation of a client's needs into a built form.

d. Study Objective

Sensing a strong need for the involvement of an architect/designer planner in the design process, the methodology developed here aims to provide a bridge of understanding between the architect and the dweller. The objective is to systematize and enhance communication and interaction between the user and the designer through developing a system for identifying and categorizing user needs so that the architect/planner will be able to modify the external housing programme to improve the quality of housing provided by external agencies.

III. FORMULATING THE METHODOLOGY FOR GRASSROOTS NEEDS APPRAISAL IN THE RURAL HOUSING SITUATION.

a. Basic Structure and Logic

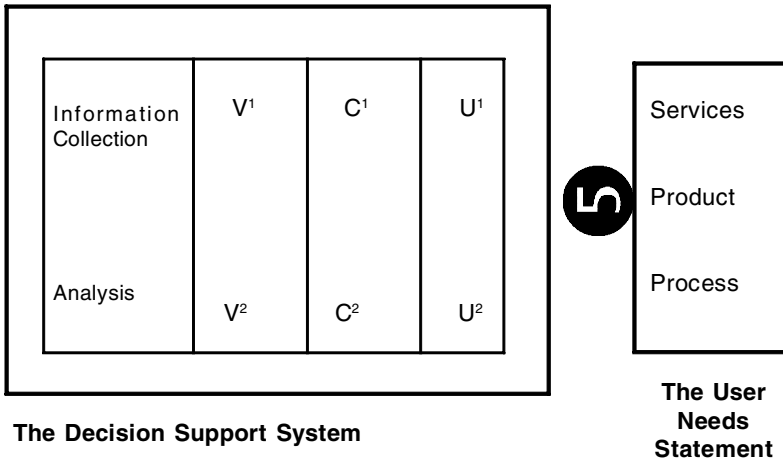
THE BASIC STRUCTURE of the decision support system was evolved to adequately document the needs of the user in user identifiable rural housing situations and to allow the local needs and priorities of the users to play an important role in the formulation and implementation of the housing programmes. The decision support system has two broad parts which are organically related and which need to be considered together. This structure is shown in Figure 1.

The first part is an ideological perspective which outlines key principles to which the architect, utilizing the decision support system for designing rural housing, has to be sympathetic and sensitive. In general, these are outside routine architecture studies. The other part is based on rapid participatory information gathering and analysis tools. These have been designed to allow for the collection and analysis of data at the village, cluster and unit levels. They enable both group and individual data collection and analysis.

b. Information Collection Methods

The information collection methods are based on observation, interview and participatory interactive games. Some of the tools are designed for simultaneous information collection and group or individual analysis. Each tool has a specific purpose and gathers information on either the priorities in housing infrastructure and services requirements, on issues of primary concern in house design or on the processes of construction and management of the habitat.

Figure 1: The structure of the Decision Support System



V1

- | | | |
|---------------------------------|------------------------|-----------------------|
| a. Village name | b. Village maps | c. Population |
| d. Primary household occupation | e. Cultivable land use | f. Infrastructure |
| g. Documentation of House Type | h. Water sources | i. Public health care |
| | | j. Soil type |

V2

- | | |
|-----------------------|-----------------|
| i. Village case study | ii. Village map |
|-----------------------|-----------------|

C1

- | | |
|--------------------------------------------|-----------------------------------------------|
| a. Documentation of community institutions | b. Observaiton checklist of cluster layout |
| c. Comparative list of house types | d. Ground plan game and community open spaces |
| e. Services selection game | f. S.W.O.L. game |

C2

- | | | |
|----------------------|-------------------------------------|---------------------------|
| a. The cluster study | b. Services selection game analysis | c. S.W.O.L. game analysis |
|----------------------|-------------------------------------|---------------------------|

U1

- | | | | |
|--------------------|-------------------------------|------------------------------------|------------------|
| a. Family Details | b. Family Income | c. Physical Documentation | d. Usage Pattern |
| e. Age of Dwelling | f. Socio-religious Indicators | g. Evaluation of Spatial Condition | |

U2

- a. The household studies

c. Systematization

The data and information need to be recorded in a descriptive case study format. This documentation will also be accessible to the designers when they require a deeper understanding of the situation.

d. The User Needs Statement

The method is designed to be applied in communities and physical contexts that are relatively stable. In such communities, people develop methods of satisfying many subsistence needs, sometimes very inadequately. It is from within this con-

text that the individual perceptions emerge and the architect has to respond. The presentation of the results is conceived as answers to three basic questions:

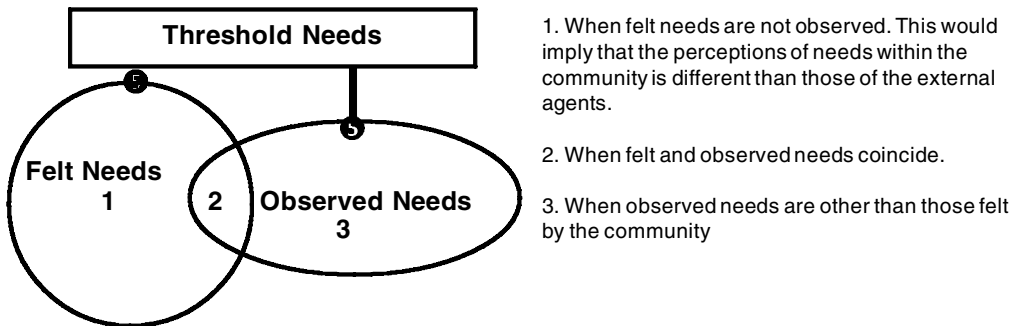
- What kinds of services are needed?
- What kinds of houses are desirable?
- What kind of delivery processes are desirable?

The three questions are to be answered considering three types of needs:

- threshold needs
- felt needs
- observed needs

Threshold needs are needs that are satisfied adequately in the present situation. These needs are sometimes difficult to articulate for the community as they are taken for granted. The observation based documentation of baseline data will help to address this question. Felt needs are those that the community identifies as priorities. They arise from a lack of adequate provision within the present situation. Observed needs are those that the external agent, usually the architect, identifies. The relationship between the three is shown in Figure 2.

Figure 2: The intra-needs relationship



IV. DESCRIPTION OF THE DECISION SUPPORT SYSTEM FOR RURAL HOUSING IN INDIA

a. Ideological Background

ISSUES RELATED BOTH to development and to participation arise from an emerging global consciousness and are essential conditions for the survival of humankind. Appreciating the value of these concerns will help the users of the tools to develop a sympathetic attitude during the synthesis of the information gathered and will set a reference point for future analysis, diagnosis and decision-making. It will act also as a statement of

values within which the results of the case studies will have to be interpreted. A good understanding of these principles may help the surveyors and the researchers as the consistency of the results may depend on an understanding of the concepts outlined below.

Sustainable human scale development has become a central concern of the international community. Although the ideas of sustainability have been gaining acknowledgement since the early 1970s, it has become the dominant concern in development since the Earth Summit in Rio. The concept of sustainable development does not assume a static state of harmony but rather is a process of change and growth which sustains, nourishes and continuously enriches society. The users of the tools should be introduced to these concepts and their local implications.

Participation as a necessary resource. The crucial importance of ensuring the participation of the beneficiaries has to be understood by the surveyors and researchers. Understanding the social and cultural structure of the community is an essential step for the design and introduction of new technology into the community. Thus, learning from the people is a precondition for designing development intervention in any society. It should be recognized that even an architect belonging to the same region may understand little about the living conditions or livelihood strategies of the poor.

b. User Need Assessment Tools

The tools presented here have been tested in the field and then further revised. They blend three academic traditions: architectural research, social research and participatory appraisal.

i. The Ground Plan Game

This is a simple and inexpensive tool used to obtain substantial quantities of information quickly. It is a group tool which allows for direct verification of the data by other members of the group.

Objective of the tool: the tool is used to obtain a realistic picture of the details of the growth of the settlement, to collect demographic data on the structure of the community and to record the level of services accessible to the target community.

Major benefits: the tool provides access to a large quantity of information very rapidly. It also helps create a favourable environment for subsequent group discussions. Data which may have been difficult to verify in individual household schedules can be checked by the group.

Using the tool: a clean place is identified in the village where 10-15 people can gather together. A plan is drawn on the ground with the houses and other community landmarks demarcated. The residents are introduced to this representation and each participant is asked to provide information on their own household by placing coloured cards on the floor in response to different questions. One has to be careful to explain that the pieces

should be placed separately, otherwise it might be difficult for the surveyor to read them. If a household that has been drawn on the plan is not represented at the meeting, a neighbour can be asked to provide information on the house. Once all the cards have been placed a photograph is taken to record the data.

Precautions when using the tool: the surveyor has to be careful to organize the game in a way which allows for the easy documentation of the results through photography. Cross-checking of the information given by individuals can be achieved by open discussion.

Field application experiences: this game was designed to act as a socio-economic baseline for the community and was well received by all. It was also the first opportunity for the researcher to meet with the community in a large group. Often, it was an important time for explaining to the whole community the purpose of the intervention and, simultaneously, to build up a rapport. Although it was not possible to have present a member from every family in the community, it was easy for neighbours to provide information on the missing families.

One conclusion to emerge from several trials was that attitudes relating to access to services was a community phenomenon and individual perceptions rarely varied within a community. Another conclusion was that, when dealing with questions about the growth pattern of the settlement, there was often a need to incorporate other questions on migration into the community as, often, the recent inhabitants were not the original occupants.

ii. Dwellers Evaluation Game

This tool is meant for collective information gathering and synthesis. It belongs to both U1 and U2 factors of the decision support system. It is a simple and inexpensive tool which can be used to obtain large quantities of qualitative processed information quickly. Coloured cards are put into shoe boxes with slits in the top for voting on different issues represented by the boxes. The game, being a group tool, allows for direct verification and validation of data by the other group members.

Objective: this tool has been designed to allow for participation by dwellers in the evaluation of their own dwellings. It helps to understand the felt needs among the community.

Major benefits: the tool provides access to a lot of information quickly. Being a group tool it allows direct verification of data by other group members. It allows deeper qualitative insight to the outsider. The game makes a lot of boring and tedious work interesting and enjoyable for both the researcher and the local residents participating in the project.

Method: First, an appropriate space has to be found where a group of six to eight people can gather. This game requires three boxes. One marked 'good' another marked 'adequate' and the third marked 'bad'. The participants are given the same number of cards each. There should be at least four colours of cards distributed to the participants. Each of the colours rep-

resent each of the broad criteria i.e. social, environmental, technological, and economic concerns.

The participants are asked to evaluate their dwellings with respect to each other. Each dwelling unit studied in detail with the household schedule i.e. the detailed questionnaire used for examining the houses, should be discussed. The issues of social, environmental, technological, and economic concern should first be discussed. Whenever needed the researcher should help in the discussion. A checklist of factors under each concern could be used to help the participants.

At the end of the discussion, the participants should be asked to place the cards in the boxes, reflecting their own personal evaluation of the housing condition of each unit in boxes marked: good, adequate and bad. The researcher should then count the cards. Individual choices should be noted as they may be useful in understanding the logic behind individual perspectives.

Precautions: this exercise can be conducted only after household schedules for all selected households are done. One must be careful that every participant expresses his or her opinion freely. This tool should be introduced carefully and one must begin the process only after the purpose and method of playing the game has been made thoroughly clear to all participants.

Field application experiences: this game was developed after a series of experiments with different formats in an effort to allow participation by users in the evaluation of their own dwellings. The earlier versions were conducted at a household level and separately for men and women, however it was felt that this was not a very successful way of identifying the perceptions of the users. Although the opinions of both men and women often varied, it was felt that the tool would be more effective at a community level. On experimenting with this tool, it was found to be more successful at a group level as the residents were able to discuss and compare different dwellings. As always, the discussions helped towards an understanding of the perceptions of users and the present version of the tool was effectively used to understand the perceptions of the men and women through separate discussions.

iii. The Services Selection Game

This is a simple and inexpensive tool belonging to C1 and C2 factors of the decision support system. It can be used to obtain information rapidly and to understand the immediacy of residents' needs. The game is played to select different service and infrastructure requirements and will help the architect to understand the community's needs and priorities as well as allowing for the expression of individual requirements.

Objective: to understand the level of services and facilities available to the members of the community and to understand the infrastructure and service priorities of the community and the individuals therein.

Major benefits: access to a lot of information quickly. The

game makes a lot of boring and tedious work interesting and helps create an environment conducive to group discussions on the subject among respondents. It also helps to generate a high level of quality information which would not have been possible with normal interview based methods.

Using the tool: a place is identified where 10-15 people can gather. The respondents are encouraged to sit to allow for easy discussion. The purpose of the game and how to play it is then explained. It is made clear that no individual wins the game but that the most immediate felt need of the largest number of respondents will be identified through the game. The different services shortlisted from previous group discussions and observations are described and the participants are encouraged to debate priorities before casting their votes. (The colour of card given to each participant may be different so that it is possible to document individual voting patterns. However, voting is confidential.) After the votes have been cast, each box is individually opened and votes counted. The total votes for each service are counted and the results shown to the respondents.

Precautions: the purpose and method of playing the game should be clear to all the participants. Everyone should have a clear view of the boxes and the services they represent when the rules of the game are introduced. During the group discussion, everyone should have the chance to express their opinion.

The field application experiences: application of the game was an interesting experience for both the surveyor and the beneficiaries. Different rounds were needed for men and women and, although the priorities within men's groups and within women's groups were often similar, most often the priorities between the men's and women's groups in a community differed. For example, in one village there was no source of drinking water close to the homes. The women thought that drinking water was a priority need. The men, however, were in the process of investing in an electricity connection.

Another important realization on the application of this tool was that, in many cases, it was not possible to take premarked boxes to a new site. The services available in each community differed and the boxes should be marked only after a preliminary appraisal of the site.

This game was very successful in most situations and two factors emerged as a result of its application. The first came from the issues raised during the discussions where it was possible to identify clear cultural patterns in attitudes to service provision. Needs also varied according to the socio-economic situation and physical characteristics associated with the site. It was very revealing to note that, in all cases, the groups came to a consensus relatively easily reflecting the fact that they shared common problems and perceptions.

The other result of this game was derived from the actual voting by participants which identified the need priority for certain services. One interesting outcome emerged after a discussion which was mainly centred around the immediacy of the need for electricity. However, participants voted for housing construction assistance as the top priority. On questioning this, it

was explained that, at that time, the monsoon was about to start and everyone was involved in repairing their houses. This would imply that the need for housing programmes runs at specific times of the year.

iv. The S.W.O.L. Game

The unserialized poster with “Strengths, Weaknesses, Opportunity and Limitation” analysis. The tool belongs to both C1 and C2 factors of the decision support system as it allows for both information collection as well as interactive group analysis.

Tool description: this tool consists of a set of pre-designed posters which depict local building possibilities. The posters cover construction methods prevalent in the region and are preferentially sequenced by the participants according to their requirements. The tool allows for a framework for group analysis and/or evaluation of issues. Four categories, ie. strengths, weaknesses, opportunities and limitations, are used in the fieldwork to examine, define, discuss and record the issues.

Objective: this game encourages discussion. It allows preferred construction processes and materials to be identified and provides a framework for the analysis of a given situation. It also encourages the participation of a large number of people and facilitates the discussion of potential solutions (opportunities) and constraints (threats).

Major benefits: the tool helps to gather information and to understand quickly the perspectives of respondents. The visual materials, ie. posters, are very useful for attracting attention and for reducing the need for description to the group. They also help the researcher to communicate in cases of linguistic nuances. This tool is used simultaneously for information gathering, analysis, assessment, monitoring and evaluation. It is also very effective in recognizing and exploring both sides of a situation and in encouraging a discussion based on trade-offs and negotiation. It encourages open, in-depth, focused and frank discussion among the participants and gives them a chance to discuss opportunities and strengths, weaknesses and limitations on a wide variety of issues surrounding housing.

Using the tool: first, the purpose of the tool is explained to the participants. All the pictures are displayed to the group and an open discussion on each picture is held. This discussion should explore the contextual relevance of each construction method and process. Temporary removal and reintroduction of a poster can sometimes stimulate greater discussion. For the SWOL analysis, the categories should be clearly explained.

Precautions: the pre-designed posters may not depict an important preferred construction method or combination of construction methods. Blank paper should be taken onsite to draw the missing possibilities. It should be made clear to the group at the beginning that the exercise does not take into consideration the house layout or plan but only the construction method and construction process and that when expressing their preferences the group is not talking about layout or form construction.

The process of application: the introduction of this game in-

variably took the most time as each poster and the structure of the analysis (in terms of strengths, weaknesses, opportunities and limitations) had to be explained to and understood by the participants. However, the visual material helped a great deal in keeping the participants interested in the game. They did not have much difficulty in understanding that choice had only positive or negative aspects and that each case had a combination of both.

It was evident from the exercise that the beneficiaries rarely saw the posters as illustrating the final form of the houses and that they found it easy to concentrate on the construction and managerial processes associated with the housing design. The outcome of this game was most often revealing as to the desired materials and processes. A great variety of factors such as the status value of particular materials, their cost, availability, maintenance costs and processes, the climate of the region and the availability of skilled craftsmen in the area were discussed prior to the selection of a particular set of materials. The selection of a particular combination of elements varied a lot between regions and the exercise was always crucial to understanding the particular requirements of a community. The architect/planner/surveyor was most often a learner in this discussion.

One very revealing example was when the inhabitants of a cluster preferred the use of bamboo as the understructure to the roof rather than second grade timber. They were very critical of a large project conducted a few villages away where architects had used second grade timber for the roof structure because they felt that bamboo disfigured easily under the weight of wet tiles. However, the inhabitants pointed out that, although bamboo was cheaper and disfigured easily leading to some leakages in the roof, second grade timber was more brittle and cracked, giving way after a few years. Indeed, the organization that had constructed the houses in the neighbouring village was under tremendous pressure by the villagers to replace the timber with bamboo. Although the project had been very successful in many other terms, this issue had created a great deal of resentment.

c. Application of the System

As the primary concern of the decision support system is to develop an interface between the architect/planners and the end users, any evaluation of the decision support system is best measured by the level of participation achieved through the various tools and methods applied. The level of participation affects both the quantity as well as the quality and validation of the data collected.

Rapport-building with the community is the single most important factor on which the success of the tools depends. In this context, it is important to locate the surveyor's camp close to and, if possible, within the cluster as this helps to gain the trust of the community. The language used in group discussions should be as close to the local dialect as possible and the surveyor should make the effort to learn local terms as soon as

possible. As every village and community has established power structures and vested interests, approaching the local leaders makes for an easier introduction into the community, however the leaders should not be allowed to dominate in the group discussions.

The decision support system is designed to reverse the hierarchy between the surveyor and the beneficiaries to enable the surveyor to learn from the context. This is also helped if the beneficiaries are not in awe of the external agent. The method of analysis is built into the survey through a series of observation, dialogue, assimilation and reflection exercises which are finally documented in the form of case studies.

Analysis of the method was based on criteria such as how much the researcher and participants learnt from the exercises and how much data was generated rapidly. Also important was how easy it was to find patterns and to relate various parameters to arrive at a broad picture of the local housing processes. Participation, once started, should not stop with an interactive process of design as further inputs from the community could greatly enrich the decision-making and implementation process. The success of the decision-making process should be judged by the extent to which it allows for the greater participation of the user community in all aspects of the improvement project.

V. POSTSCRIPT

THE DECISION SUPPORT system has been field tested not only in a study context but also in the earthquake affected regions of Maharashtra. Here, it was confirmed that the community cluster scale (i.e. an area smaller than the village and larger than the family dwelling linked by common space and/or common facilities) is the most effective level at which to work. It was also confirmed that fulfilling each of the various factors or variables identified in the study contributes towards the user's level of satisfaction in their habitat. The study did not focus on drawing up a general hierarchy of these factors and it was evident that every situation was different depending on the context.

The tools allowed for an in-depth understanding of the user's perception in each application. It allowed the users and intervening architect to make a structured identification and diagnosis of the needs and priorities in the habitat situation and had the potential to identify a variety of possible approaches to solutions. Though it allows for disaggregation and analysis, the synthesis and interpretation of the situation is the most vital part. The field applications reinforce the premise that the housing programmes of external agencies can be innovatively designed if the users' perceptions are kept in mind and, wherever possible, users are involved in the decision-making process.