CHAPTER 3

IDENTIFICATION OF THERAPEUTIC DESIGN ASPECTS

3.1 INTRODUCTION

The primary and preliminary enquiry into the population is conducted to disclose the regional exclusivity in social reality in users’ needs and perception in the area of the research, i.e., Chennai. The objective of this investigation is to identify and reveal the relevant socio-physical needs, cultural values and perception qualities of the primary user (patient and relatives) and secondary user (treating staff) in Chennai.

This section identifies and classifies the therapeutic design aspects required in cancer care facilities at Chennai, through discussions and interviews with novices and experts and by deliberation from a workshop. Using triangulation methodology, the feedback opinion obtained from the novice, experts and workshop are corroborated and correlated with the literature review to arrive at a concise list of therapeutic design aspects (AS1-AS8) of architectural design attributes.

3.2 PRELIMINARY RESEARCH SURVEY

3.2.1 The Investigation Process

Workshop deliberation: The workshop group deliberated on the topic “need for therapeutic built environment in the cancer cares facilities” by means of group discussion among the participants. In the workshop
“Architecture for Health\textsuperscript{1},” a group of twenty professionals, namely, engineers, architects, artists and others, who with basic understanding on hospital planning, deliberated on the issue related to the cancer care built environment with social, cultural values and sensory perception of the user, and the related architectural features required for therapeutic care.

**Novice Attitude:** Novices are defined as persons who have no direct professional contact with the cancer care hospital or department. Such persons are citizens, who may or may not have been a patient in a hospital or may have visited a family member, friend or colleague but who do not work in or have direct links with the functioning and planning of the hospital. They were selected based on the criteria of having no special knowledge of the design of a hospital or their external spaces. Thirty novices were selected at random with their consent to participate from eight cancer care departments and hospitals in Chennai. The novices were questioned to provide their views and were asked to nominate the initial elemental attributes that were considered necessary for a therapeutic character for cancer care built environment.

Each individual of the novice was approached separately and asked to reply to a maximum of five physical and psychological impacts the built form could create on them when they frequent the cancer care facilities and also to provide a list of therapeutic aspects and issues influencing the physical design of the cancer care facilities. Using a qualitative triangulation methodology, the wide range of aspects generated from their responses was

\textsuperscript{1} An two week Quality Improvement Programme on ‘Architecture for Health’ was conducted in School of Architecture and Planning, Anna University, Chennai, India during 14\textsuperscript{th} -26\textsuperscript{th} June 2004 and focused on multi view perspective in Indian healthcare architecture with participants being multi professional namely engineers, architects, artist and others who with basic understanding on the hospital planning were present. Experts were professionals as architects, engineers working in the hospital, hospital administrator etc. with work experience and knowledge on the hospital architecture.
categorized, initially into 14 areas namely: entrance and reception areas, security, signage, privacy, lighting, access and space issues, views and outlooks, nurses’ station / staff contact, temperature control, accommodation for relatives, toilet and hygiene facilities, leisure and catering facilities. The inference drawn from the novice group was gathered to classify the architectural design aspects of the therapeutic environment that wholly signify the healing of the patient.

**Experts’ opinion:** The experts represented the mixed group who were directly and indirectly involved with the cancer care hospital or department and were professionals like architects and engineers involved in the hospital design. Also, hospital administrators, doctors, paramedics, nurses working and operating in the built environment, owners and government authorities who administer and manage the cancer care facilities were inquired for their experience and exposure in the built cancer care environment and identify the significance of the design aspects with therapeutic value.

### 3.2.2 Inferences

Both the enquiry methods proved certain commonalities as per the following. Patients are sensitive to and are capable to articulate their architectural environment in hospital. They are able to discriminate between poor and good environments and can tell clearly what they like and dislike about them.

### 3.2.1.1 Response and suggestion deliberated from workshop

Workshop conclusion based on social cultural values and sensory perception of the user is listed in Appendix 1. The group, after the debate
produced a list containing recommendations or suggestions under the subcategory as follows:

- Quality and control of the environment
- Sensitivity and consideration to the physical impairment
- Care for the family
- Design that promotes social support experience

3.2.2.2 Responses and Suggestions given by the Expert-Novice

This stage of the research involved the experts’ study of the list of therapeutic aspects generated by the novices, which was developed based on the users’ needs. With the expert’s background knowledge of the cancer care built environment, the list of therapeutic aspects were categorized and ranked within an architectural functional classification:

- Outpatient area
- Diagnostic area
- Inpatient area.

The basic physical and physiological impact identified by the expert and novice and the responses / suggestions given by the novice and experts for the three areas in the healthcare builds are given in Appendix (Tables A1.1 and A1.2).

3.3 Classification of Therapeutic Design Aspects

In this succeeding research stage, the proposed attributes/issues given by the workshop participants, novice group and experts are considered as input for identification and categorization of nine therapeutic design aspects (AS1-AS9) for cancer care facilities in Chennai. With reference to the
literature review, the nine therapeutic design aspects identified were formatted into a questionnaire and used in two levels of enquiry; first enquiry to the users (patient, relatives and treating staff) on the significance of the therapeutic design aspects and second, to evaluate the selected case studies for the impact of the building design on the user’s therapeutic needs. Following are the nine therapeutic design aspects AS1-AS9².

**AS1 Image and scale:** The aspect deals with the appearance, form and spaces of the building, which give an insight into the building ambience and ease the anxiety and stress of the patient and staff approaching and using the building.

**AS2 Privacy and dignity:** Deals with the way people in a healthcare building are able to control their privacy and their interaction with others. It focuses on the way people can best maintain their dignity while under conditions that necessarily may not be found in ordinary life. Privacy also means that activities can continue uninterrupted.

**AS3 Lighting and views:** The aspect deals with the extent to which both staff and patients can see outside and around the building. It asks what they can view and the impact of natural light on their current activity and condition.

**AS4 Nature and outdoors:** Deals with the extent to which the patients have contact with the natural world. It asks whether they can see and access nature both around and inside the building.

² The abbreviation AS represents Therapeutic design Aspect with the numericals representing the nine therapeutic attributes.
AS5 **Physical comfort and control:** Concerns the comfort levels of the staff and patients in healthcare buildings and the extent to which they can control those levels. In this context, comfort refers to the biological comfort in terms of physical (indoor microclimate, temperature, noise etc.) and psychological (stress, anxiety, trauma etc). Allowing patients control over their environment is thus important and may also reduce their demands on the staff- particularly nurses.

AS6 **Legibility of the place:** Deals with how understandable and reciprocative the healthcare buildings are to the staff, patients and visitors who use them. Generally, layouts should be clear and understandable so that way finding is easy and people have to depend only minimally on signage or maps.

AS7 **Interior appearance and finishes:** Deals specifically with the interior of healthcare buildings and in particular what they look like. It also deals with the user perception and sensitivity to the indoors.

AS8 **Therapeutic Design Amenities - Indoor:** deals with a number of facilities that have been found to be important for the users of healthcare buildings, particularly patients. Eg. Safety and security, personalized care. It deals with architectural spaces and functional activities, which improve social bonding between the users and breach the institutional appearance of the place.

AS9 **Therapeutic Design Amenities – Outdoor:** Deals with architectural spaces outdoors that are exclusively created to improve the healing quality to the users and elevate a stress-free environment.
3.4 MEASURING TOOLS FOR THERAPEUTIC DESIGN ASPECT

The main content of the thesis is to study the user’s needs for a healing physical environment in cancer care facilities (serving as a hospital, institute, and centre or as a department) for providing the user a physical setting for cure and comfort. The preference and attitude of the user with reference to the built environment is enquired, using two survey tools – the structured self-completed questionnaire and Syntax software. These tools are used on the selected case studies for the following purpose:

- Inquiry to identify the therapeutic design aspects required for the user’s biological needs, namely, the physical and psychological needs. The method of inquiry is by means of structured self-completion questionnaire – preference questionnaire.
- Evaluate the case studies for the presence of therapeutic aspects by means of structured self-completion questionnaire and use of Depth map software.

3.4.1 Tool 1: Questionnaire Format

To answer and investigate the needs of the cancer patients, their relatives and staff, the research is done by directly approaching the primary source – the patient, his/her relatives and the medical staff attending to the patient, to enquire their needs and perception of the cancer care environment.
3.4.1.1 Questionnaire Structure

A quantitative inquiry system by means of structured self-completion questionnaire is created to question the user, first, for the therapeutic needs in the built environment and second, to evaluate the building design of the case studies for the therapeutic values. Both the questionnaires comprise of the therapeutic aspects as identified in the research and are the outcomes from the sources of corroboration, namely: a review of relevant literature, Novice-expert responses, Site visits and researcher’s observation in eight cancer department and hospitals in Chennai, consultations and interviews with key informants-hospital administrators, architects, engineers etc.

In the following data as in table 3.1, amongst the identified therapeutic design aspects, the first six aspects deal with the design aspects addressing the basic biological needs essential for the user, with the consequential architectural physical prerequisites, while the other three topics deal with the architectural and artistic design aspects that can solely enhance the therapeutic quality within the built environment by means of additional facilities or those having special therapeutic spaces. Hence, in the analysis of the user’s preference and needs, Preference-value questionnaire containing nine therapeutic design aspects (AS1 to AS9) are utilized while, in the user’s evaluation of case studies for therapeutic aspects, the Evaluation-value questionnaire deals with the first six therapeutic design aspect (A1 to A6). The formats of the two questionnaires are given in Appendix 1.
Table 3.1 Classification of Therapeutic Design Aspects

<table>
<thead>
<tr>
<th>Therapeutic design aspects as per the user’s biological needs</th>
<th>Therapeutic design aspects as per the user’s perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS1: Image and Scale</td>
<td>AS7: Interior appearance and finishes</td>
</tr>
<tr>
<td>AS2: Privacy and Dignity</td>
<td>AS8: Therapeutic design elements - indoor</td>
</tr>
<tr>
<td>AS3: View to the outdoor</td>
<td>AS9: Therapeutic design elements- outdoor</td>
</tr>
<tr>
<td>AS4: Integration of Nature</td>
<td></td>
</tr>
<tr>
<td>AS5: Physical comfort and Control</td>
<td></td>
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<tr>
<td>AS6: Legibility of place</td>
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</tbody>
</table>

The questionnaires were statistically validated to test the stability and strength of the selected design aspects by the reliability analysis -Alpha scale using SPSS software by sampling the questionnaire to 30 respondents (Table 3.2) and the questionnaire content was proved consistent and accurate with alpha value is more than 0.75. Hence, it was proved statistically and validated that the following measures or the design aspects in the questionnaire were suitable and dependable for the succeeding research process.

Table 3.2 Therapeutic Design Aspect – Reliability analysis using Alpha scale value

<table>
<thead>
<tr>
<th>Therapeutic design aspects</th>
<th>Alpha</th>
<th>Therapeutic design aspects</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS1: Image and Scale</td>
<td>0.75</td>
<td>AS7: Interior appearance/ finishes</td>
<td>0.88</td>
</tr>
<tr>
<td>AS2: Privacy and Dignity</td>
<td>0.81</td>
<td>AS8: Therapeutic design elements- indoor</td>
<td>0.93</td>
</tr>
<tr>
<td>AS3: View to the outdoor</td>
<td>0.96</td>
<td>AS9: Therapeutic design elements- outdoor</td>
<td>0.97</td>
</tr>
<tr>
<td>AS4: Presence of Nature</td>
<td>0.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS5: Physical comfort / Control</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AS6: Legibility of place</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.4.1.2 Empirical measures utilized

The preference–value questionnaire utilized the 3 point Likert scale evaluation technique with 0 for low significance, 1 for average significance and 2 for high significance level on the respondents’ need. These values given by the respondents are averaged and subsequently analyzed case studies wise.

The evaluation –value questionnaire utilized the 5 point Likert scale evaluation technique where 1 signifies low value with virtually no agreement; 2 for hardly any agreement; 3 as fair agreement; 4 for strong agreement and 5 for virtually complete agreement.

Enquires into the respondent’s characteristics in terms of sex, age and disability of the respondents and frequency of visits were conducted to identify the respective respondent’s feedback. The test of significance based on “t” distribution was tested on the respondent’s age, sex and disability characteristic and one- way ANOVA method were conducted for patients characteristics ‘frequent of visit’ to the out-patient area and the diagnostic area and on respondents characteristic ‘length of stay’ in the in-patient area. The final results of the preference–value and evaluation-value of the three zones were represented in terms of statistical ‘Mean’ so in order to establish a common measure, comparison and analysis of the results amongst the subjects of study.

3.4.2 Tool 2: Space Syntax-Depth Map

The Space syntax method utilizes the shape recognition concept to generate a topological or theoretic formal model of spatial configuration to understand the social, spatial behavior and perception of the user in the built environment. In this method, supposition is based on the behavior and
evaluations of the user in a built environment, not on the physical massing of the building, but on spaces where the user could see, access and stay. These three levels of activities by the user generate and formulate human interaction with and within the built environment and is distinguished by space syntax in three main ways namely, in closed groups, in open encounters, and in more remote communication. These three activities are measured by the syntax attributes of visibility, accessibility and enclosure.

The Space Syntax-Depth map software measures built form, based on a computer generated spatial analysis, used on the floor plan layout of the building in each of the case studies, using syntax attributes. The results thus obtained from the attributes are represented in a rainbow spectrum of colour ranging from red to blue color, with red denoting most segregated and blue denoting most integrated. Colors represents a purely mathematical, spatial measure of the relative accessibility, visibility and enclosure of the different parts of space in the floor plan layout.

3.4.2.1 Syntax variables and attributes structure

In the research context, the floor plan of the three zones (in-patient area, diagnostic area and out-patient area) in the cancer care case studies is tested using Depth map software to study social and behavioral logic of the respondents. The space syntax attributes are used to measure the users’ therapeutic needs in terms of user behavioral response and perception cue within the given cancer care built environment. These attributes are based on the space syntax concept of perception of space in terms of accessibility, visibility and enclosure of space used on the characteristics of therapeutic design aspects variables and the measures are, namely, Step metric shortest path length, Connectivity, Visual step depth, and Angular step depth.
The six therapeutic design aspects (AS1 to AS6) are considered in this stage of evaluation due to their disposition in addressing the socio-physical phenomena between the user and the built environment and the feasibility to measure and correlate the basic biological needs of the user and the physical configuration of architectural attributes. The socio physical phenomenon deals with biological needs of the user in terms of the physical and psychological needs and subsequent the manifestation and personification over the physical form, space order and function of the building structure. So, the Space Syntax is capable to appraise and assess the biological needs with socio physical implication like, privacy, dignity, outdoor and indoor compatibility, control and way finding in built environment. Hence, the therapeutic aspects, AS1 Image and scale, AS2 Privacy and dignity AS3 view to the outdoor, AS4 Presence of Nature AS5 Physical comfort and control and AS6 Legibility of place are considered in the evaluation.

3.4.2.2 Syntax measures and tools utilized

The concept of empirical measure using syntax attributes stem from the theory of cognition mooted by Hooper’s (1978) and the “model of behavior” by Moleski (1978) with the primary understanding of the association between cognition, perception and spatial behavior towards the decisive for the therapeutic needs. The space syntax attributes are utilized to evaluate the therapeutic aspects as follows and the resultant spatial analyses obtained are represented by the rainbow of colors ranging from blue to red.

Step metric shortest path length used to decipher AS1: Image and scale in an indoor plan layout. The aspect deals with the appearance, form and spatial quality of the building that would ease the anxiety and stress of the user approaching the building. This is an aspect, which could be measured in space syntax by means of visibility and connectivity to the place from the
entrance. The measure deals with the shortest distance or least number of nodes required from the entrance to other parts of the zone. The high % level of blue color indicates good visibility of the building.

**Connectivity** used to decipher AS2: Privacy and dignity, in an indoor plan layout. Deals with the way people in a healthcare building are able to identify and endure their privacy or their interaction with others. In syntax terms, privacy, which, among other things, refers to the degree to which an individual’s visibility is accessible—both physically and visually—in a spatial setting, may diminish with an increase in the degree of access and with a decrease in the degree of control primarily at the local level. The high % level of deep blue colour indicates a high level of privacy.

**Visual step depth** used to decipher AS3: Lighting and view to the outdoor using the indoor and outdoor integrated plan layout. The aspect deals with the extent to which both staff and patients can see outside and within the building with exposure to the natural setting. The measure inquires the level of visibility perceived from the user’s space to the outside to ease and divert the individual’s mind from pain and also, its impact on the visibility of the users can sight from their current activity and medical condition. The step depth itself may be viewed as the number of turns (plus one) that it takes to get from the current location to any other location within the plan. In Visual step depth, 0 meaning nil turn, 1 means one direction turn and so on. The color representations are deep blue for node value 0, blue for 1, green for 2, yellow for 3 and red represents node value 4.

**Connectivity** used to decipher AS4: Presence of nature using the indoor and outdoor integrated planning layout. The topography of nature or outdoor setting in association with indoor are essential for the respondents to solace in the existence of nature while waiting or being treated or cured.
within the hospital environment; hence, connectivity shows the direct link between the number of nodes in the indoor and the number of nodes in the outdoor system that are directly linked to it (seen or accessed with no change of direction). The ratio between the value of open outdoor space against internal indoor space is calculated (i.e. total node of green, yellow and red against the deep blue, pale blue).

**Visual step depth** used to decipher AS5: Comfort and control using indoor plan layout, the aspect refers to the amount of authority given to the user to control the environment and his behavior, and it may decrease with an increase in the degree of accessibility in a spatial setting. The visual step depth measures the control level by considering the number of turns (plus one) taken from the selected location to the next location within the plan. In Visual step depth, 0 meaning nil turn, 1 means one direction turn and so on. More nodes with value-0, 1, 2, show a high level of controllability. The color representations are deep blue for node value 0, blue for 1, green for 2, yellow for 3 and red represents node value 4.

**Angular step depth** used to decipher AS6: Legibility of the place using indoor plan layout. In Angular Step Depth, the step depth follows the shortest angular path from the selected segment to all other segments within the system, and the angular path length is recorded on the line (if there are two unconnected systems within the segment map, this does not matter; the unconnected system will simply not be shown) and are denoted by `1 step' for 90 degrees and so on. Nodes with value-0, 1, 2, shows high level of legibility while more than 2 node counts would mean complex way finding. The color representation are deep blue for node value 0, blue for 1, green for 2, yellow for 3 and red represents node value of 4.
3.5 SUMMARY

The chapter provides the primary and preliminary enquiry into the population by novice and expert method and the outcome of the workshop. The result concludes that the user group in the Chennai context needs social cultural values and sensory perception of the users to be integrated in the cancer care built environment. Representing the basic physical and psychological needs of the users, nine therapeutic design aspects necessary within the built environment were identified and classified. The measuring variable and tools to get empirical result data were also identified and discussed. The respondents’ reply from questionnaires and the evaluation of building design through response experience and syntax evaluation are the methods identified and utilized in the study.