Modular Ontology in Aging Rural Community

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Introduction

The term modular has been around in the construction business for decades and it has been proven that even vernacular traditional architecture relates to a certain degree of modularity in its designs. Modular architecture means to design with standardised units or dimensions for easy assembly or repair, and it is flexible in space arrangement as well as usage (Baldwin and Clark, 2002). Sattler (2012) describes modular architecture as something built or organised in self-contained units or sections that can be combined or interchanged with others to create different shapes or designs, in which she apply this in her traditional coastal construction project.

The Project

In the new exploration of our third year studio work for rural clinic in Malang, Indonesia, Jonathan Lee has successfully applied his design using this modular strategy combined with his distinct concept through the proliferating spaces using bamboo structures (Figure 1-2).

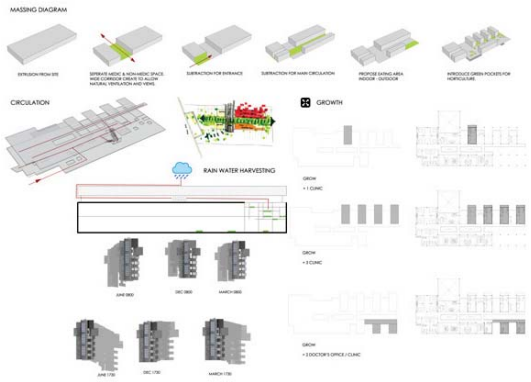

Figure 1: Conceptual diagram

Figure 2: Overall perspective of the rural clinic

The Concept

The concept of *growing clinic* is to propagate clinic functions and spaces consequently with the increasing needs of the local people. Malang is an agriculture land where farming becomes the widely held job. Owing to the low income of the farmers, even though it is important for the farmers to keep themselves healthy in order to continue growing crops, the option of health care is deemed to be unaffordable to them. Therefore, this project brief calls for a health care development on a farm land of 55 meters x 30 meters, with one access from the north side especially for the elderly citizens.

This clinic models an ecological place in conjunction with the concept of "grow a healthy lifestyle, grow a healthy community". This model redefines the perception of a conventional clinic. The notion focuses on barter trade system by growing crops and making public services in exchange of free health care becomes the fundamental idea of designing this clinic. Its essence revolves around providing green pocket allotments within the circulation for planting activities as well as for vertical farming (Figure 3).

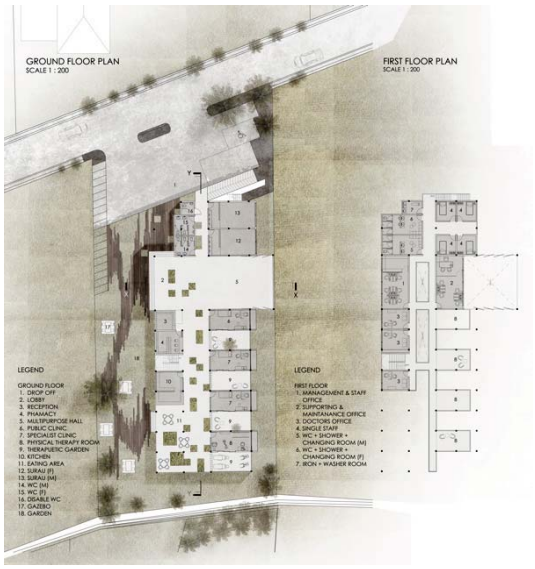

Figure 3: Modularity is well-defined even in the plans

The Program

Activities and zoning (permaculture, medical, food and beverages, private and multipurpose) are carefully planned without compromising each circulation path; circulation is designed in parallel to tie all zones together, which eases the elderly to walk around.

The aim of this development targets the elderly community by providing healthy activity spaces especially the introduction of green pockets between clinics, therapy rooms, lobby and circulation spaces. This planning promotes health care, exercise, social, being health-conscious and happy. The green pockets are placed along the main circulation to allow visibility to be enjoyed through the circulation route.

Figure 4: The double-bamboo structure used is to ease the future growth of clinic using modular dimensioning

The Spaces

The space planning and architecture naturally inspired citizens to cultivate plants such as: herbs, cucumber, tomatoes and etc. This is to encourage the community to work among one another by carrying out such simple tasks and be responsible for the clinic and its surrounding areas. Consequently, it gives opportunities to the younger generation to take responsibility in helping the elderlies. As years pass by, this clinic would grow into a green clinic with natural green walls as the barrier and green roofs to shade the sunlight. Figure 5-6).

Figure 5: Outside view of the surrounding landscape from the clinic

Figure 6: Encouraging green growth and daylighting to penetrate the long corridor

Each clinic is designed to face the eastern view of the cornfield and Semeru Mountain with private outdoor balcony covered with grass to allow physical therapy and stimulating natural ventilation across the internal space (Figure 7).

Figure 7: View from first floor to eating area below showing the hanging garden

The Structure and Construction

The construction of this project is tied with an interlocking series of grid system using bamboo construction. A standard grid dimension of 4m x 3m and 3m x 3m is used in relation to the sizes of the useable spaces. Its foundation, columns and beams are set up with traditional bamboo jointing techniques, which is adopted from the local experience. Central double rafter and lateral double rafter are used as the jointing method in the whole building system (Figure 8).

Figure 8: The raised floor and spaces between the double-bamboo structures allow natural ventilation and daylight to infiltrate across the whole scheme.

In conjunction to the *growing clinic* concept, the design also accommodates the clinic growth program by allowing future expansions. This is executed through different stages and at different levels without jeopardizing the operation of the clinic. Slabs and walls panels are inserted on the existing bamboo structural grid to create clinics and doctors' room without interfering with the setting of the scheme. In short, this clinic would propagate a healthy environment for the elderly and it also grows with the community.

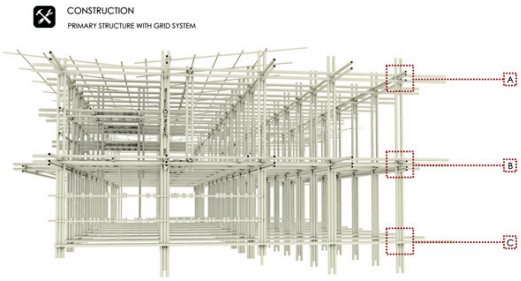

Figure 9: Double primary structure indicating the strength of its grid system

Conclusion

Such modular construction in this project has been applied in the local context with good understanding of regional dynamics and should be attained through further research and study. For example, material suitability and availability may differ from one country to another. Climatic requirement might also be an important parameter in the development of the system. The acceptance level of this method plays a vital part in the implementation among the local people (Wan Mohamed, 2009). One of the problems seen as a threat with tradition is that by its very nature it discourages innovation (Wan Mohamed, 2014). Midon et. al. (1996) has actually re-specified a timber traditional structure to suit a modularised dimensioning transforming it into a general guideline/ manual illustrating the installation of house components. Eventhough it mentioned that it could be mass-produced or individually acquired, unfortunately the dissemination of knowledge and information has not reached those in particular who are interested to build it themselves.

It is rather discouraging to be told that local resources such as timber, bamboo, thatch and etc are considered regressive. The concept of prefabricated system with low technology has been a widely known research in the third world countries. Stallen (1994), Ahmed (1998), Kumar (2002), Waleed (2004) have listed many of these local construction materials using prefabricated low technology in the rural area, such as concrete zip block and gypsum bricks (India), bamboo wall panels (Nicaragua, Colombia and Mexico), palm leaves round roofs (Mexico), small concrete prefab-components (China), interlocking load-bearing block (Malaysia) and many more.

It is possible to use modular architecture as a platform where the key concept in the development of prefabrication is no longer on technical issues but rather using technology to support social and in the case of this project, on health problems. Modular architecture can be redefined as strategies in which the fabricators supply a range of component variations with different capability levels, role and features that could extend diversity of selections to end-users.

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