Urban Design Model For Dense, Laminar- Based New Quarters For Indonesian Cities

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Abstract: A new building-model has been developed out of extensive field-research within the context of Javanese cities. The consolidated findings show the potential of vernacular quarters for new urban planning and design strategies, which are based on more sustainable and contextual design paradigms as usually been used in practice within the Indonesian context.

A new building-model is presented, which can bee seen from two directions: top-down and bottom-up. The focus in this article is given at the bottom-up approach, which shows the utilisation for the actual settings of professionals, planers, investors, developers, habitants, etc, using a more intuitive and creative way of dealing with the design paradigms involved. This bottom-up approach is presented within the setting of 2 design tool-kits (physical and virtual context).

1. Introduction

There is marginal reference of Indonesian urban planning concepts in relation to the reality of city development in Indonesia. Town planning tools, which are used in Indonesia today, are mainly based on Western urban design principles and thoughts. Meanwhile in reality, the actual urban development in Indonesia happens according to Eastern operational systems under the influence of Asian principles. Therefore today's approaches applied for urban development are basically ineffective and inefficient. Additional to this discrepancy, the existing complexity and intransparency within the Indonesian city planning system and management produces further negative consequences for the actual development of these cities. Research done at dissertation level has given justification to this observations and assertions (Zahnd 2005).

The historical urban development in Indonesia is complex as it shows multi-layered and superposed development within its cities (Zahnd 2004). But recent urban development does not relate to this fact of its urban history and context. Therefore a widening gap exists between modernity and tradition within Indonesian cities.

Based on an extensive empirical search in two Indonesian cities in Central-Java (Yogyakarta as 'Inland-City' and Semarang as 'Coastal-City'), the consolidated findings show the potential of vernacular quarters for new urban planning and design strategies, which are based on more sustainable and contextual design paradigms as usually been used in practice. This extensive graphic and numeric data form a base for creating a new building-model for dense, laminar-based new urban quarters within a Southeast-Asian context (Zahnd 2005).

2. New Building-Model for Designing Urban Quarters

There has already been done major work related to this field. The model presented here takes the basic idea from the concepts of 3 approaches created within an Asian context (Fig. 1). It brings them together forming a synthesis for further development.

This new building-model can be seen from two directions: top-down and bottom-up. The top-down approach shows the model within an academic setting, where the paradigms are addressed mainly at an intellectual and theoretical level. This approach has been presented by a new theory (Zahnd 2005). But the focus of this article is given at the bottom-up approach, which shows how this academic model can be utilized within the actual settings of professionals, planers, investors,

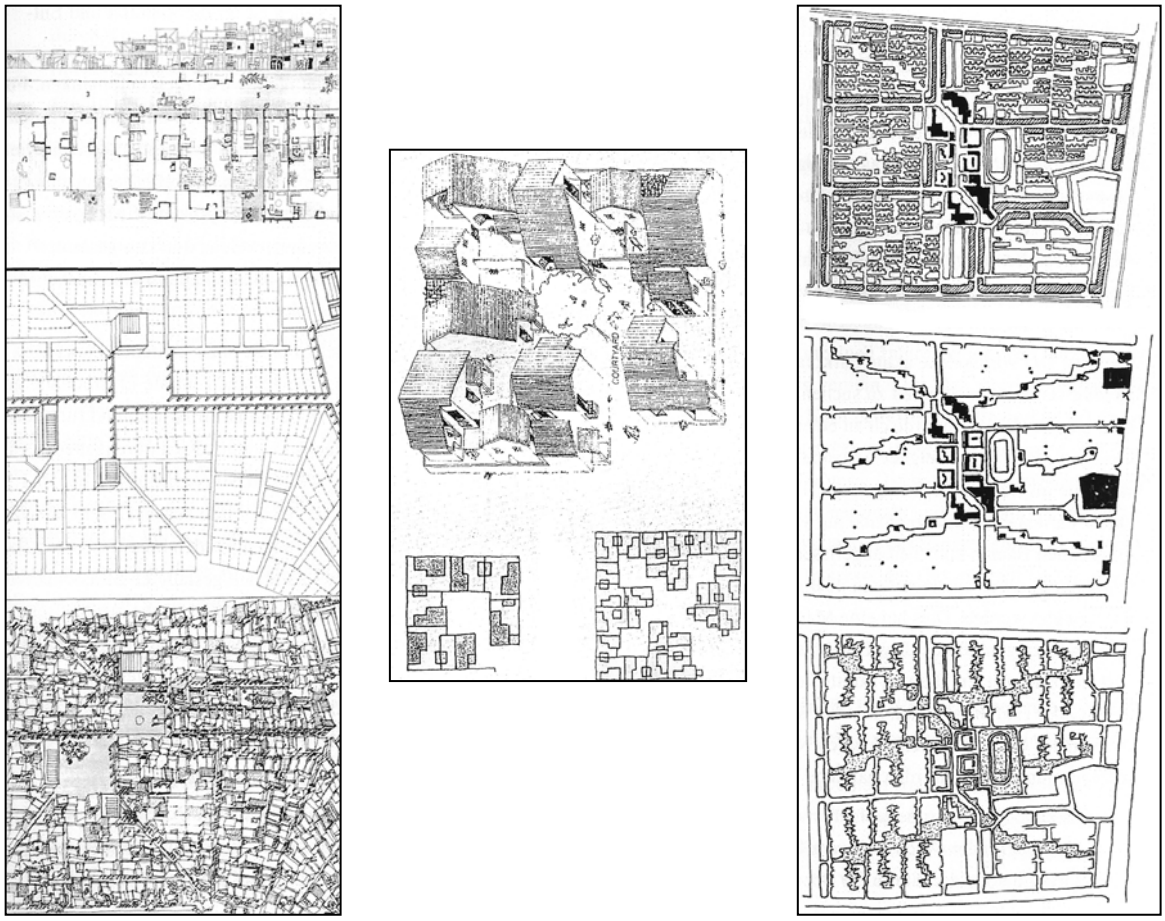

Figure 1

Three contextual approaches of within an Asian setting. Left: Kampung-project from Steven Holl for a new district in Manila. Middle: Cluster Courtyard concept from Charles Correa for settlements in India. Right: New town design patterns from Vastu-Shilpa Foundation for the satelit town 'Aranya' at Indore, India.

developers, habitants, etc, using a more intuitive and creative way of dealing with the design paradigms involved. This bottom-up approach happens within the setting of 2 design tool-kits (physical and virtual context).

2.1 Physical Approach

A building-set (Fig. 2) for urban design with 48 basic elements in 144 variations has been produced (at the scale 1:1'000 to reality), which derives out of findings from vernacular and formal settings. Within a set of 3 layers, 5'500 pieces of building- and space-elements including 12'500 trees (which are already part of the building and space elements) at various sizes are available. Special corner elements make it possible to form streets within flexible angles. Every piece is magnetized at its bottom, therefore they can be added easily and removed fast from and towards each other, leaving the whole model stable for many changes and further experiments. The model has already been tested (Fig. 3) within various settings of people and tasks, including a workshop at university level (University of Stuttgart, Germany), where the students could build quarters at the real size of 2 km^2 (2 m^2 in model). They achieved the task within a 2 hours time without given much explanation beforehand. The results showed much potential for constructive discussion and analysis afterwards. Further workshops are already planned with even more extended tasks to be given.

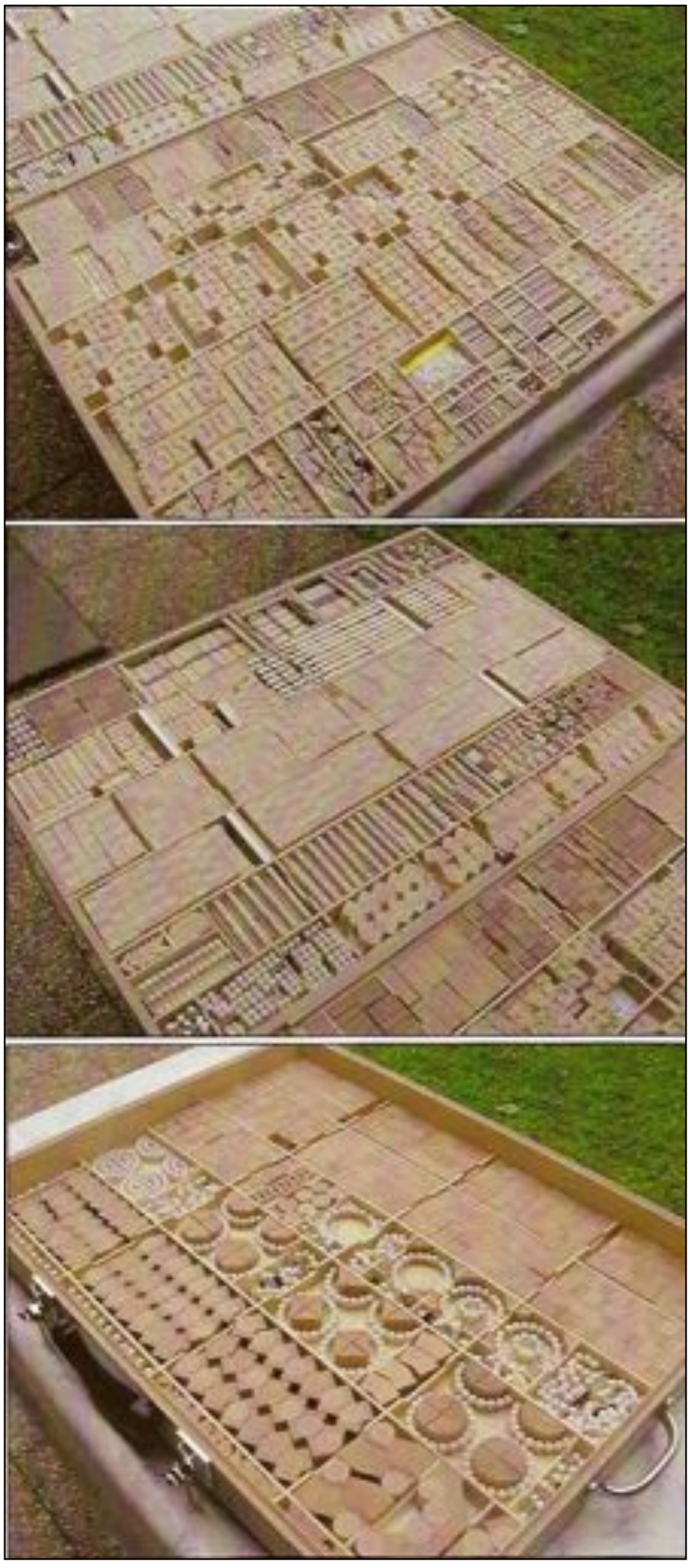

Figure 2

Building-set for urban design.

Top: Level 3 for elements for mainly private city areas

Middle: Level 2 with elements for mixed public/private city areas

Bottom: Level 1 with elements for major public city areas

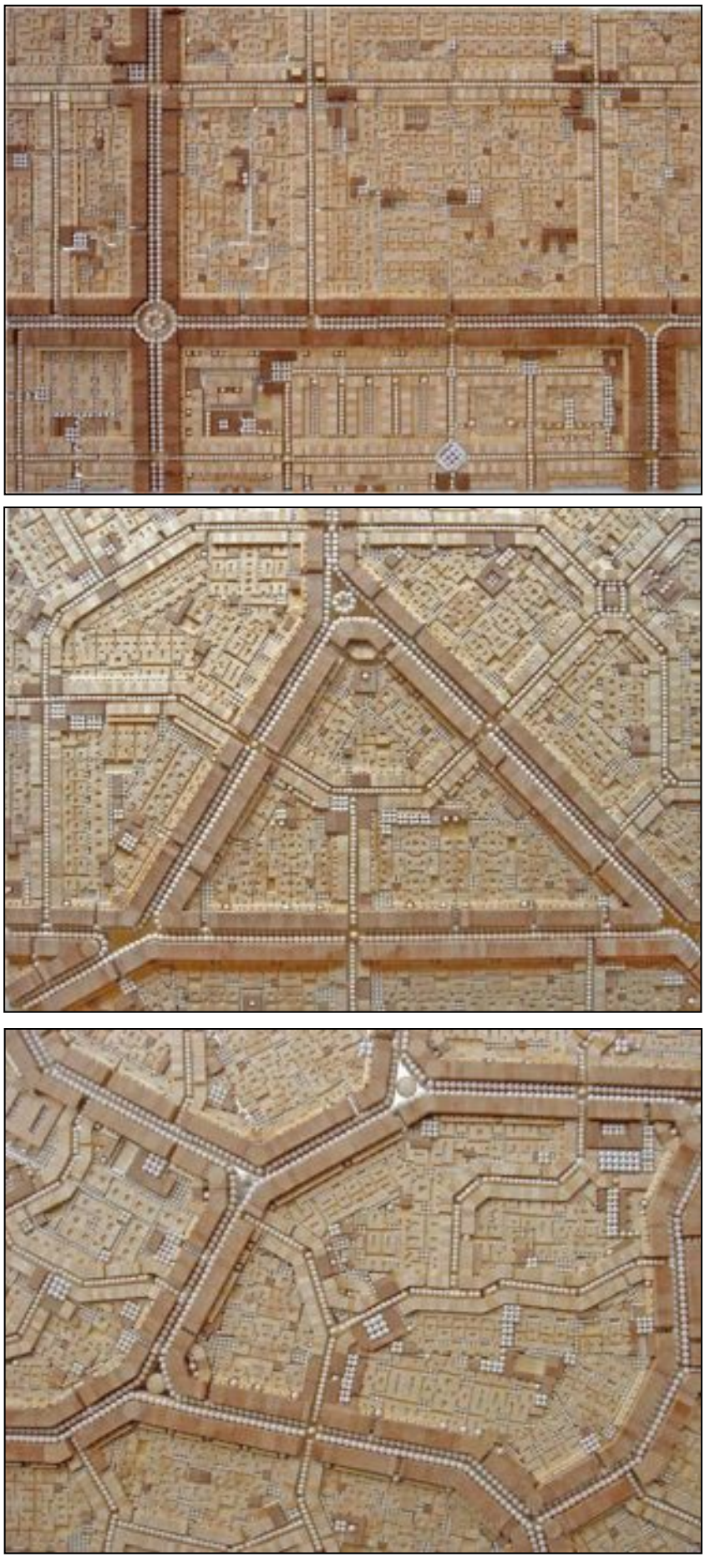

Figure 3

Built-models at the scale 1:1000

Top: orthogonal lay-out

Middle: 15/30/45/60/75 angle lay-out

Bottom: free layout

2.2 Virtual Approach

Despite the potential of this physical approach, there are also some limitations concerning the exact compilation of data and its related numeric analysis. Furthermore the production of the physical building-set it quite expensive and therefore not possible to be spread out easily within the wider region of Asia. Therefore focus is also already given to a virtual approach: creating new computer software for urban design, called 'Indosity' (Zahnd and Zwicker 2005), which is still in process of work. This is an application for creative exploration, evaluation and training in urban design and planning especially within a Southeast-Asian context. Trainees and users can build models of quarters or even parts of cities by arranging predefined building modules, which have their source in the actual setting of their contexts. The urban area created can then be discussed and checked for design flaws from its physical shape and relating urban figures and metrics.

'Indosity' builds up skills for:

- Reading and creating 2D plans for contextual urban quarters from a 3D point of view
- Understanding functions of building and space modules
- Understanding relations between building modules
- Understanding relations between form and function
- Tackling 'empty' spaces

The application is therefore a framework to visualize building and space modules. They can be grouped and be moved along the surface. It is a simulation model, overlaying area properties and visualization property (2D). The most important visualizations of a building module are the 2D and 3D drawings. Further functions like validation rules and simulations and further visualizations are added to display the calculated results based on the incorporating validation and simulation rules and properties defined for each building module. Part of this definitions and rules are already built in within the system, part can be defined manually. (Fig. 4)

'Indosity' makes different approaches possible:

- First of all it offers a certain set of contextual building and space modules, which can be put together freely and easily by drag and drop system. At this level there is no need to create and design new modules, as they are already available by different types and sizes within the application. This allows fast processes of designing new models.
- Second it offers automatically related statistical figures to all modules used in the actual model, without having to fill in manually all the coverage and ratio quantities. This gives an easy and quick access to evaluation of the whole area of the model design.
- Thirdly it offers various properties and layers of urban criteria for each object, which can be contextualized and adjusted individually within the model. As a result every property of all modules involved in the model can be visualized and summarized easily as total entities (indicators and figures expressed in exact numbers of quantities, different colour entities or localised exactly within the model as a whole in position and shape).
- Fourthly it offers the possibility to design new objects from of the given modules for experiments outside the given setting.

These explorations can be done at various administrative levels from neighbourhood units to city districts (Fig. 5). The model shows that using just a few types of modules and groups already allows great flexibility and variety even to the point, that the modules are almost not 'visible' anymore (Fig. 6).

Urban design has to focus on the products (the 'hardware' of the city) as well as the processes (the 'software' of the city). Therefore time factors are essential in thinking about the development of new quarters. Visualizing shapes at various times of development can be made (Fig. 7) by other interactive computer applications, which are already available at the market.

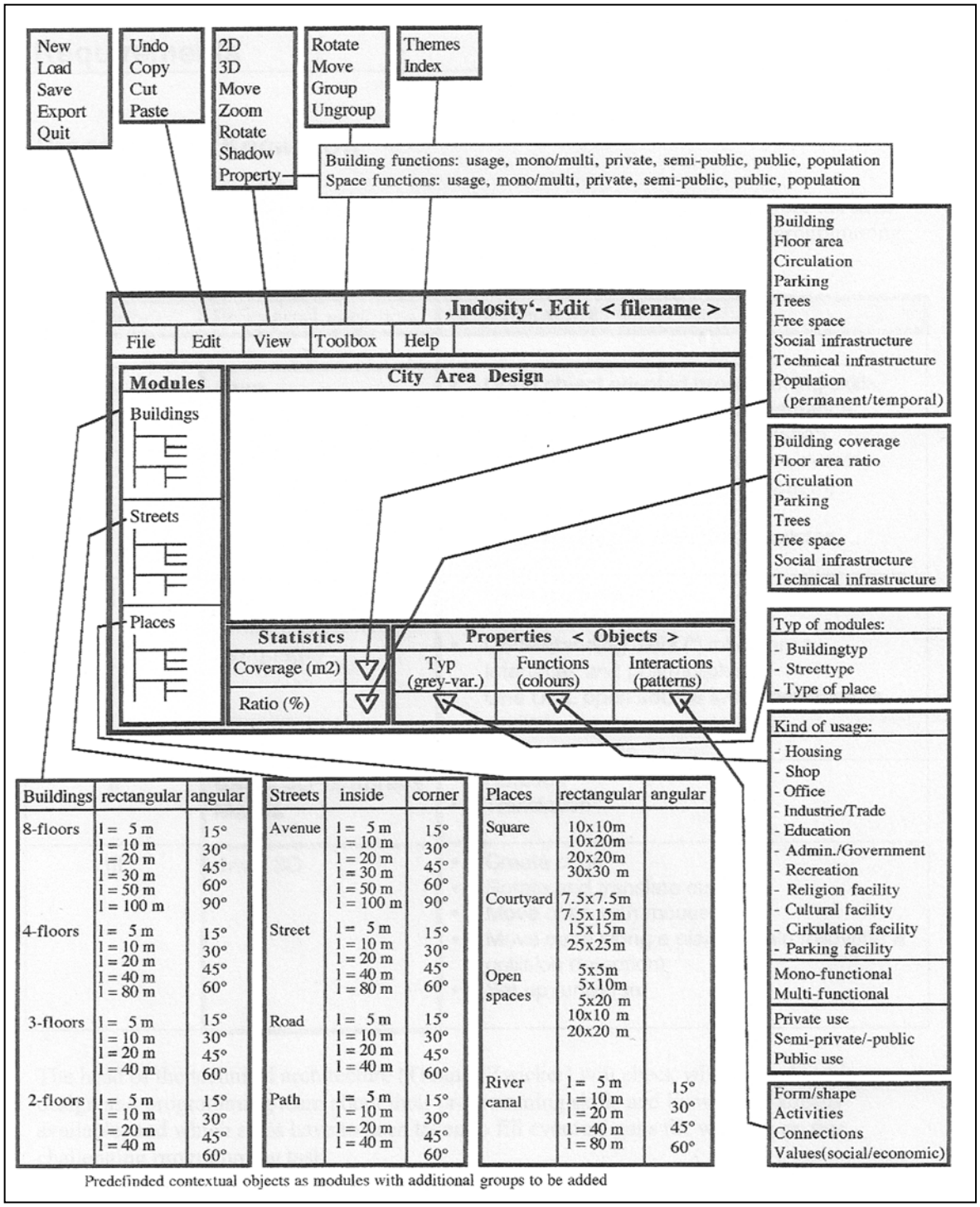

Figure 4

Functions and lay-out of the user-window

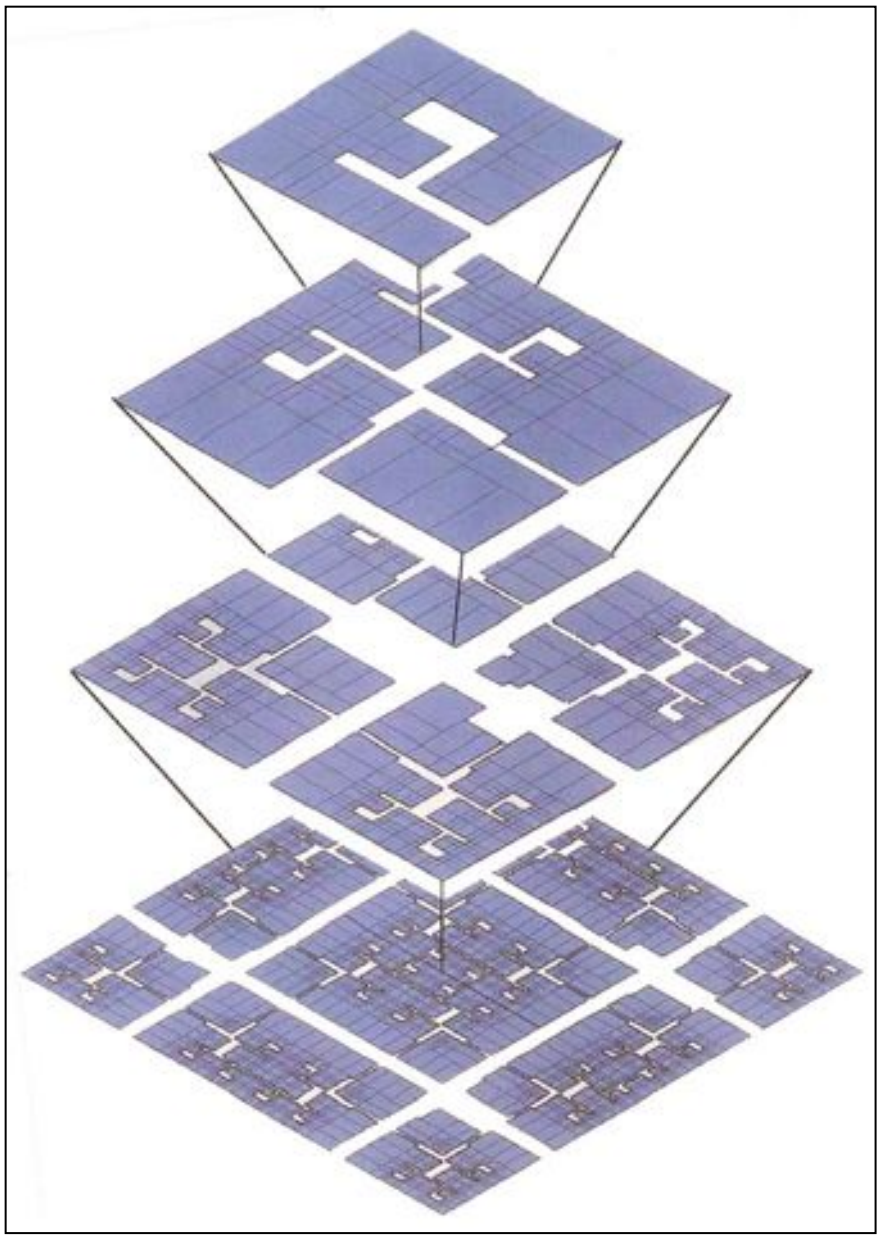

Figure 5

Design at various administrative levels within an Indonesian context: Example with **one** group-typ

1st level: unit
30-40 habitants
6-8 house units
whole plot-size:
min. 24x24 m^2
max. 36x36 m^2
Access: pedestrian

2nd level: RT
150-200 habitants
35-40 house units
whole plot-size:
min. 64x64 m^2
max. 96x96 m^2
Access: inside pedestrian
edges by car

3rd level: RW
600-750 habitants
140-150 house units
whole plot-size:
min. 140x140 m^2
max. 210x210 m^2
centre with social infrastructure and business

4th level: Lurah
2'400-3'000 habitants
550-600 house units
whole plot-size:
min. 280x280 m^2
max. 420x420 m^2
4 centres for various infrastructures and businesses

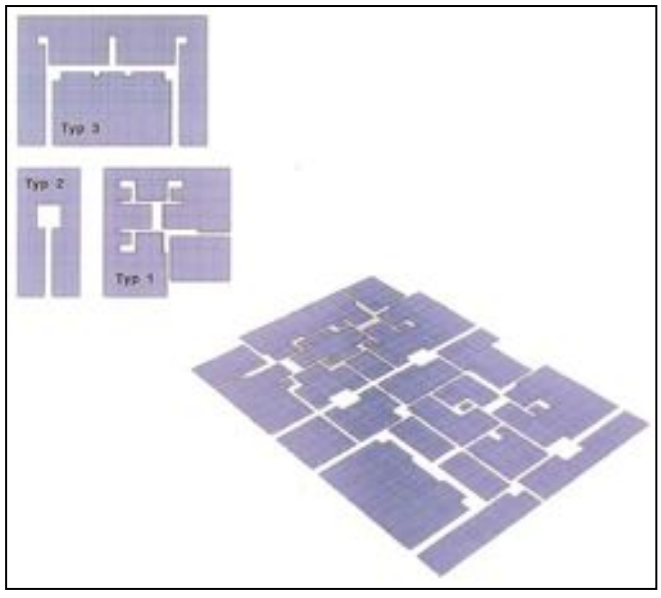

Figure 6

Various group-types (left) and a combination of them (right). There are many other types possible.

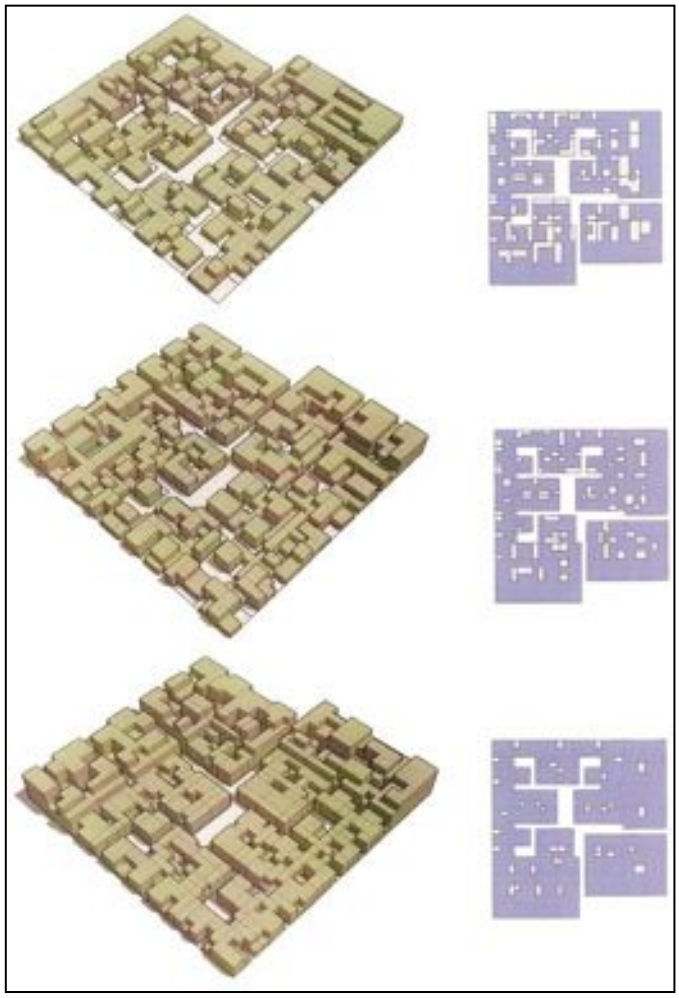

Figure 7

Example of development at RT-Level (neighbourhood level) using group-type 1

Top: Formation phase.
BC (building coverage): 0,65
FAR (floor area ration): 1,2

Middle: Development phase.
BC (building coverage): 0,75
FAR (floor area ration): 1,5

Bottom: Saturation phase.
BC (building coverage): 0,80
FAR (floor area ration): 1,8

(further density in this group-type will cause deterioration and therefore the social and economic values will start to drop. This fact will cause a natural and healthy saturation within the area or new types of elements and formations will be invented)

3. Conclusion

Designing new urban quarters within the context of Southeast-Asia is a challenging task, as geographical (tropics) and demographical (density) issues have to be addressed. The result of this research offers a bottom-up approach in presenting new application and tools for tackling contextual urban development issues in new ways. They are given into the hands of professionals, planners, investors and educators for dealing in innovative and creative new ways towards the ongoing challenge of building sustainable cities within the context of Southeast Asia.

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