Chapter 4
Genetic Algorithms:
Stages of the Study in the Expert System

ABSTRACT

This chapter includes the second phase of the Re-Coding Homes Project, which has been conducted as a TUBITAK (The Scientific and Technological Research Council of Turkey) research project with the title "A User-Centered Model Research Towards a Flexible Interior Spatial Design for Mass Housing Units: Urban Renewal Housing." In this phase, which will be presented in this chapter, the design model and an expert system have been developed with the aim of improving the interior spaces of mass housing projects in accordance with different user needs and providing solutions that will increase the flexibility of apartment interiors. The expert system that can operate the flexible modular system proposed in the housing units has made it possible to achieve a large number of spatial variations by means of "multi-parameter layout design." "Mass-customization" approach was used in order to generate satisfactory results for users' spatial needs and life styles.

INTRODUCTION

The previous chapter had focused on the first phase of the project, survey studies and findings gathered from the case study. Regarding the first phase, this chapter of the book concentrates on the second phase of the study which is characterized by the design model development process and which an expert system has been developed to find out the alternative layouts of the data obtained by the survey. The expert system that developed in relation to the flexible and modular design model, made it possible to achieve numerous spatial variations by means of "multi-parameter layout design".

TOKI (Housing Development Administration) Başıbüyük Housing Settlement in Istanbul was selected as the project site for case study due to the residents' varied profiles and cultural backgrounds. This variety of current users was regarded as an issue that could enrich the set of (design) alternatives and increase the widespread impact of the design model. The design model is characterized by a flexible expert system that leads to different spatial variations by multi parametric layout generation based on parameters determined by the user needs. The spatial variations embrace different interior modules answering to different activity sets concerning the basic activities that take place in living environments.

Parallel to the development of the expert system, design team worked on detailing the interior modules. All modular solutions and their possible relations were studied on the model. Workshop process aimed to enhance the various qualities of the modular furnishing solutions before prototyping. During prototyping, the final variations generated by the expert system began to be elaborated by the design team's interpretations and transformed into final products.

BACKGROUND

Interior modularity and modular systems have been studied for different typologies of spaces for many years. Ericsson and Erixon (1999) defines the modular design approach as creating a diversified set of products that is shaped by a strategic and flexible mentality, rather than looking for the optimal product that leads to the optimal solution. In this case, new products that respond to changing needs can be developed and these solutions can be integrated into the system without breakdown of the whole. In architecture or construction fields, a well-thought-out modular system will increase flexibility by reducing the negative impact of changing needs and facilitate the management of the system (Ericsson and Erixon, 1999).

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