

Chapter 10

Triz Model Approach for Conceptualizing Household Furniture With a Disassembling Design

Omar Eduardo Sánchez Estrada

Universidad Autónoma del Estado de México, Mexico

Josué Deniss Rojas Aragon

Universidad Autónoma del Estado de México, Mexico

Mario Gerson Urbina Pérez

Universidad Autónoma del Estado de México, Mexico

ABSTRACT

This chapter is intended to present the main criteria of the systematized method to solve TRIZ inventive problems, as a tool that can be used when conceptualizing furniture for environmentally low impact homes with a design that can be disassembled. Detailed study of the TRIZ principle applicability facilitates identifying knowledge organization to solve technical problems of great difficulty, as well as creative strategical processes to answer questioning about shape, materials, interfaces, technical viability, and understanding of furniture functions. In order to strengthen the design's creative process, application of the 4 properties to determine easiness of disassembling are considered, as proposed by Johansson and Björkman, which are 1. identification easiness; 2. accessibility; 3. separation easiness; and 4. handling easiness; likewise, contextual and conceptual analysis is considered for the beginning, development and conclusion of the project.

INTRODUCTION

Excessive material extraction is one of the main problems of climate change and biodiversity loss, since 1970 the use of non-metallic materials has quintuplicated. It is estimated that by 2060 global use of materials will duplicate to 190 billion tons. Therefore, a systemic reassessment of resource use is required (UN, 2019). Nowadays, developing alternatives that look for complex-problem solutions is a process that requires implementing assertive models in order to build ideas, mechanisms and procedures that promote fast answers and group participation from different specialists, general public and any other element that provides with the chosen final solution.

Between 80 and 90% of furniture costs are defined during the design, before being manufactured (Desai & Mital, 2003). This affectation also has an impact on its life cycle as each stage may determine controlled resource use, considering the application stages in order to close material cycles. Development of low environmental impact furniture is a historic and current need, designers must face challenges of concept, manufacture and useful life of their project, and in their professional life they conceptualize functional objects based on human needs. However, environmental affectation is not always given consideration as the current priority is to define requirements of design, which facilitates recovering the value of products and process planning that give place to an orderly, easy and efficient separation of multi-part systems and separated units so as to make them available for a long use in new products. Defined activities for the disassembling process before, during and after are determined by the design (Mok, Kim & Moon, 1997).

Nowadays, a Design teacher's perception on aspects of structure, use, function and morphological analysis applied to objects is an everyday action and when evaluating the object's requirements as quantitative and qualitative units, recycling, reusing or reutilization of designs are not planned. For its conceptualization, strategies have been defined in order to obtain better timing when disassembling, promoting tendencies toward reutilization and alignment with generic criteria of companies, as well as actions to facilitate the designer with the project's global analysis process, considering the design's multiple variables to be addressed. Results obtained strengthen a new cultural construction for consolidating a sustainable productive sector, the teaching-learning structure for industrial designers, mainstreaming of projects between universities and companies, decrease of excessive exploitation of natural resources and strengthening of criteria for developing a circular economy.

In order to conceptualize a design, specific strategies are presented in terms of type and space location of furniture, where application area, primary functions and priority interaction systems are defined. Building a user's profile is established by thinking about the design. Besides, a strategic model is determined for material selection, applied ergonomics, load analysis and biomechanics study, anthropometric study, indicative factors, culture, context, aesthetics and energy saving for production processes. Finally, development of interaction matrixes and selection of proposals that are connected to the TRIZ model. Results obtained strengthen a new cultural construction for consolidating a sustainable productive sector, the teaching-learning structure for industrial designers, mainstreaming of projects between universities and companies, decrease of excessive exploitation of natural resources and strengthening of criteria for developing a circular economy.

15 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/triz-model-approach-for-conceptualizing-household-furniture-with-a-disassembling-design/265769

Related Content

Industry Views on BIM for Site Safety in Hong Kong

Allen Chi Kong Wan, Sambo Lyson Zuluand Farzad Khosrow-Shahi (2021). *Handbook of Research on Driving Transformational Change in the Digital Built Environment* (pp. 120-140).

www.irma-international.org/chapter/industry-views-on-bim-for-site-safety-in-hong-kong/279406

Post-Normal Material Practice: "Building" as Inquiry

Jacob Wayne Mans (2020). *Examining the Environmental Impacts of Materials and Buildings* (pp. 282-312).

www.irma-international.org/chapter/post-normal-material-practice/250571

Construction Work Health and Safety Management Using Building Information Modelling

Kerry London, Gurvin Kaur, Yingbin Feng, Angelica Vårhammar, Gabrielle Wallace, Peng Zhang, Swapan Sahaand Payam Rahnamayiezekavat (2021). *Handbook of Research on Driving Transformational Change in the Digital Built Environment* (pp. 91-119).

www.irma-international.org/chapter/construction-work-health-and-safety-management-using-building-information-modelling/279405

Urban Vacant Land Uses and Its Implications With Declining Cities: Green Infrastructure in Their Impact on Climate Change Hazards

José G. Vargas-Hernandez, Francisco J. González-Àvila, Elizabeth García Domínguezand Omar C. Vargas-González (2024). *Design Strategies for Efficient and Sustainable Building Facilities* (pp. 53-74).

www.irma-international.org/chapter/urban-vacant-land-uses-and-its-implications-with-declining-cities/353131

Evolution of Construction Systems: Cultural Effects on Traditional Structures and Their Reflection on Modern Building Construction

Meltem Vatan (2019). *Architecture and Design: Breakthroughs in Research and Practice* (pp. 1233-1251).

www.irma-international.org/chapter/evolution-of-construction-systems/216020