THE ITERATION METHOD FOR DEVELOPING CREATIVITY IN ECODESIGN

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The methods of conceptualization, the theories behind the green-products are issues that this paper wants to address. Spiral Iteration is a method developing creativity in ecodesign for textile and leather industries. It will be demonstrated that exploratory and experimental research in textile design was able to validate the spiral iteration tools and the aesthetic tools allowing the creative to express, through specific visual language, a whole individual universe of Cultural Design, as green identity of cultural sustainable idea of the products.

Keywords: ecodesign, cultural design, spiral iteration, green products

INTRODUCTION

Sustainability as an applied science has two distinct directions: an analytical direction and an exploratory one, from the description and analysis of problems, to solving problems by finding solutions defined by evidence-based research (Douglas and Isherwood, 1996). This approach also requires transparency in the methodologies regarding the conceptualization of organic products and the development of new products. The ecodesign standard, ISO 14006/2020, imposes its restrictions to achieve the sustainability of green products. These constraints are in contradiction with the cultural design that facilitates maximum creativity, innovation and culture embedded in the product (Baumgarten and Rautner, 2016).

The typologies of clothing and footwear manufacturing, if we focus our methodological research on this field, refer to “fast fashion”, “slow fashion”, and arts and crafts or “handmade”. These technological systems have different rhythms of product development, determining the different structure of the fashion business. In any anthropized system, Design has the role of showing how objects and processes should be, unlike science, which shows us how phenomena, matter, processes and objects are, being an exploratory and prospective research. That is why design actions are organized in open, creative, consumer-oriented systems, as opposed to systems in scientific research, which are closed and oriented towards solving the technical problem. Research in design has the role of determining and defining through specific methods of scientific research those systems, methods, practical solutions of the design problem in different industrial ecosystems (Norman and Verganti, 2016). The type of research that is perfectly adaptable to the field of design is evidence-based research, in which scientific investigation is humanistic, technical-technological and socio-economic and certifies the evidence necessary for the development of design processes.

Research Methodology in Design

Ecodesign as a typology of conceptualization and design of the green product is still methodologically unstructured. The green product, both as a technological complexity and as a maker's approach, between slow fashion and fast fashion, there is an arrhythmic industry, neutral in terms of assortments and oriented towards ecodesign and sustainability only in a very small proportion. In this context, the eco-product development methodology, as an experimental methodology, can only be based on a model of discovery and problem

<https://doi.org/10.24264/icams-2020.VI.2>

solving, a model developed by Daniel Clark in 2012 called XProblem (Plano Clark and Ivankova, 2012). This method aims to define the problems and outline a design perspective as close as possible to the realities of the industrial ecosystem. After understanding the environmental issues, a design perspective is discovered or revealed, a design solution is attempted, a test is performed, up to simulation or prototyping, the stage is called Design Iteration. This process is repeated until reaching the optimal design solution that responds to the problem. The methodological steps are the following:

- Immersion in the environment of the problem – implies that design researchers integrate themselves into the environment of the problem to understand the ideas and possible solutions it offers (Desmet and Hekkert, 2016). Thus, in the issue of eco-friendly footwear, immersion in the environment means socio-psychological research in shops, where customer opinions can be taken directly by the designer, sellers' opinions on consumer buying behavior are valuable, the immersion of the designer in the environment of eco-friendly footwear to observe the entire LCA, what are the problems that affect the product design, if the carbon footprint is measured, if the product traceability is respected, the designer's immersion in the distribution process, but also in the product's operating environment, asking customers questions (Pardo and Schweitzer, 2018).
- Convergence – design meetings have the role of converging all issues: those related to product concept materials, technologies, packaging, accessories and advertising and software in a logical and proactive system in the development of the eco-product;
- Divergence – the use of disruptive advantages that lead to innovation. Thus, in iterations made to test the model or a new function of the product, a feature or a new aesthetic direction, reverse decisions are used to create the disruptive advantage. Iterations will lead to creative results, but also to solving the eco-product.

The iterative process in design consists in: identifying the design problem, first of all by defining the needs for that product, choosing those methods and cultural working tools corroborated with technical and economic analysis tools that optimize the specificity of the product range, generating ideas and development of an ideatic prototype (idea sketch, idea modeling, CAD model, sketch folder). Virtual simulation of the product is required to see if it meets all needs (Pop *et al.*, 2018). All mistakes, inadequacies, problems that do not meet the needs are corrected and applied in a new design, along with what was innovative in the previous iteration (Jin and Chusilp, 2006). The iteration process is a spiral process, in continuous development. Fig. 1 shows the CDIO model, a complex spiral of a design iteration.

Figure 1. Bermejo, S., 2016 CDIO-Design iteration spiral

To initiate his/her creative approaches, the designer specialized in ecodesign requires the upstream results, namely the data obtained through individual and company surveys, the limits of the environmental footprints of all partner organizations, carbon footprint measurement and the results of LCAs of all research teams within the project.

PROBLEM SOLVING / HYPOTHESES

Iteration in design is also called “rapid prototyping” or “spiral prototyping” and is done because simple prototyping is not enough in routine design. Ecodesign requires changing the design in any iteration, knowing from experience so far that ecodesign, due to its technical and economic constraints, is not a creative design.

We assume that the designer specialized in ecodesign needs as many creative iterations as possible to obtain a good design project because he/she goes deeper in the field through this creative tool that reveals the knowledge of the specific field, while a classic, routine design, or a redesign does not require many iterations. It is also assumed that in conceptual design the constraints imposed by the designer to achieve the goal of the final project, in turn, require many iterations. The laboratory experiments performed in the field of footwear fashion and textile design for fashion design aim at validating these hypotheses or not.

EXPERIMENTAL

Experiment in Footwear Fashion

The observance of the sustainability requirements disciplines the design of the products and processes, throughout the value chain of the product, which is why designers pay more attention both to the ideation processes and to specific information and research processes. Within the project, a design iteration was made regarding the use of recycled materials, product redesign and development of a design campaign regarding the recycling of materials. The designer Ivona Manea, collaborator of the Il Passo brand, set out to carry out a design campaign, to raise awareness of the need to recycle plastics and a demonstration of a creative design process, using plastic from beach bags. Through a simple iteration, the designer made three variants of a shoe line that will use recycled plastic. Through a simple, creative iteration of the first sketches of ideas, the designer showcased a visual, emotional demonstration of the need for ecological responsibility in moodboards. In images 1 and 2 one can evaluate its entire visual approach, using both the cultural technologies for the development of product concepts and the technical knowledge necessary for footwear design. Cultural technologies in fashion design use content tools as working tools: philosophical imaging, visual archetypes and visual cultural items and also use the cultural tools of expression that are defined by the artistic language, which has its own syntax and stylistics. The transformation of an idea thus obtained into a product concept implies transversal actions, of stylistic declination and commercial (assortment) declination. These are obtained through new creative iterations. Thus, through this process of design thinking, with the help of cultural tools, a greater diversity of cultural objects and creative products arises, transforming the recycled material into a new emotional, cultural and useful product for the informed consumer.

Image 1 and Image 2: Ivona Manea, “ASCII_Code” collection, 2019

Experiment in Textile Design

An experiment in the field of textile arts and textile design carried out together with students from the National University of Arts (UNA) Bucharest, coordinated by associate professor Dorina Horatau, PhD, aimed to develop the design iteration in three different typologies of textile design: classic design, creative design and conceptual design. The analytical emphasis of the project manager (design research project) was the comparative observation of the development of iteration as a working tool, but also the method of developing individual and group creativity (of the design team). For the student Anamaria Palosanu, the numerous iterations led to projects of high quality through physical prototyping. This experiment in screen printing technique was performed after the student experimented with a mixed technique whose routine iteration did not lead to a satisfactory result in terms of the textile design project for fashion (Image 3).

The routine constraints imposed by the screen-printing technique, through the repetition and inversion of the pattern/color, but also by the “Dropping rain” theme, line composition, forced the student's mind to find a long series of creative iterations.

Image 3: Classic iteration in textile design, using a mixed technique - Anamaria Palosanu, 2nd year student in Textile Arts, project coordinator: Assoc. Prof. Dorina Horatau, PhD

Not mastering the screen-printing technique and the search for a personal artistic expressiveness were two important impulses in experimenting with creative iterations (Images 4 and 5).

Images 4 and 5: Creative iterations in textile design, through screen printing technique - Anamaria Palosanu, “Dropping rain”, 2nd year student, project coordinator: Assoc. Prof. Dorina Horatau, PhD

It was found that the imposition of constraints in design leads to the development of a larger number of iterations. In conceptual design, when the objective of the design project is to convey the message of the design concept, the refinement of the final solutions can be achieved through creative iterations of the same basic idea, to which are added the stylistic declinations that will allow the development of the iteration spiral. In this student experiment, the concept of the “dropping rain” theme is supported by the graphics of the screen-printing field.

RESULTS AND DISCUSSIONS

The two types of experiments on the analysis of the practice of creative iterations in fashion design and textile design for eco-product development resulted in over 50 creative iterations expressed through idea sketches and prototypes and two collections of eco-products for footwear and textiles. Creative iterations proved to be useful tools in the development of designers' creativity, both through simple iterations and through iterations based on constraints of the eco-product or of the collection design author.

The basic constraints in ecodesign are, practically, a set of rules that will allow to achieve the objective, namely the green product.

These simple rules refer to:

- observance of innovative design solutions that take into account the entire life cycle of the product, from raw materials to post-consumption;
- observance of rapid prototyping, through successive iterations because only in this way can the optimal solution of designing a viable eco-product be reached,
- a holistic approach, from the first stage of the design process, emphasizing the multifactorial and interdisciplinary synergism, will allow to achieve the objectives, demonstrating that ecodesign is a defining field for green product,
- efficient use of material and energy resources and eliminating all pollutants, all types of destructive messages and symbols;

- personalized innovation of both the product and green technologies and services towards the responsible customers will change the producer-consumer relationship.

CONCLUSIONS

The need for creativity of eco-products is the one that imposes on designers several types of iterations, both creative and compelling, in order to obtain a good cultural design project.

The behavior of designers during the iterations is different depending on the type of iteration: if it is a creative, free iteration, the behavior is more relaxed and the iteration is intuitive, and if the iteration arises by constraining the design problem, the iteration sequence is from cognitive to creative.

The basic constraints in ecodesign are, practically, a set of rules that will allow to achieve the objective, namely, the design of the green product. These constraints also require greater attention to all design processes in the product value chain. Creative design needs several iterations to solve the complexity of the green product problem for the clothing and footwear industries.

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