

Repurposing existent materials: a sustainable development strategy for design micro-companies — case studies.

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1. ABSTRACT

This paper is part of a PhD research concerning the application of neo-Dadaist philosophies to product development methodologies, featuring the repurposing of commercially available products and raw materials — pre-existences — as a strategy for sustainable development of design micro-companies. The aim is to encourage designers to act as producers, endorsing the creation and production of objects within non-industrial environments. In line with the DIY (Design it Yourself) movement, we analysed 93 case studies with representative use of pre-existences in the design process, regarding constructional, economical and functional procedures. The cases were ordered as *intentional* or *non-intentional design*, adapting the taxonomy presented by Brandes et al. in their 2008 *Design by Use* essay (Brandes, Stich, & Wender, 2008), further divided in five subcategories. The main features in order to evaluate the ability to profit from non *ad hoc* materials (not custom made parts) and its relevance regarding environmental and social sustainability were identified and are currently contributing to formulate product development methodologies, to be implemented and tested in corporate and educational environments.

2. INTRODUCTION

The current massification of design, generated by consumer society and translated by the myriad of unnatural objects that presently surrounds us, generally tends to reduce man to the role of consumer. The ability to create, to analyse and to build has been declining even in individuals whose activity develops in the area of creation/production. Experiments with students in disciplines related to design or artistic production show that there is a growing absence of analytical skills, of building processes knowledge, of technical and plastic exploration, noticeable by the frequent copies of existing objects or the use of conventional materials (Alesina & Lupton, 2010).

The resulting products — may be — potentially less interesting in form and in concept as well as expensive and far from a necessary pro-sustainability social awareness. As summarized by Sarkar and Chakrabarti

(Sarkar & Chakrabarti, 2011) creativity is a result of a process in which a person applies its capabilities in generating ideas, solutions or products in a valid and innovative way.

Apparently, the present-day trend is to battle the urge of spending and make the most of existing resources, retrieving practices that always characterized us, and that are needed today in face of economic and ecological changes — repurpose and reuse. These may surface as possible answers and paths increasingly attractive to designers, in which they keep finding more reasons for its implementation, highlighting the intersection between design and necessity (Thompson & Whittington, 2009). Giving shape to a necessity assumes in any context the function of making visible their particulars through a process of materialization of products, services and strategies (Maffei & Villari, 2006).

Several actions of creation, compilation and dissemination of self-produced articles have appeared since the mid-twentieth century trying to respond to needs such as mobility, space optimization, cost reduction, etc. Cases such as the German magazine *Guter Rat für Haus und Kleid*¹ or *Modellblau und Basteln*², born in the context of shortages resulting from World War II; the book *Nomadic Furniture* by Hennessey and Papanek (Hennessey & Papanek, 2008) which discloses solutions for nomadic lives; or the latest *Recession Design*³ project with two collections created by a collective of designers, tailoring everyday objects into new products, with free online distribution of the instructions.

Another example is the recovery of forgotten techniques and knowledge as exemplified by the initiative *Design With Conscience*, developed by the Artecnic⁴ company in 2002. This aims to promote self-sustaining communities of artisans in developing countries and fits into Manzini's *cosmopolitan localism* (Manzini, 2005). It intends to remove locations from isolation making them not only connection points for local networks, but also and above all to connect them to large global networks.

Artecnic's vision is to provide artisan communities around the world with two key figures: the designer and the project producer. The designer can adapt the resources and skills of artisans to the characteristics of international market. The project producer is in charge of logistics, marketing and artistic direction necessary to publicize the work of the designer and craftsmen to consumers. In this role Artecnic associates with non-profit organizations such as the "Aid to Artisans" or "British Crafts Council."

¹ transl. *Good Advice on Housing and Dressing*

² transl. *Model Building and Crafts*

³ the *Recession Design* project was presented in 2009 at the *Vienna Design Week* and in 2010 at *Fuori Salone*, Milan

⁴ *Artecnic* company was established in 1987 in Los Angeles and it's main designers are Tord Boontje, Hella Jongerius and the Campana brothers.

The ability to recognize potential resources, turning them into real resources and develop them with a view to sustainability is the challenge posed to these populations in order to create competitive products that promote the maintenance of indigenous knowledge. This project's success requires attentive designers, pragmatic and visionary producers and willing ambitious artisans. Designers should update their concept and meaning of being a designer today, accepting that local development is undoubtedly the result of a collective process in which they may take an active and proactive role (Manzini, 2005). It is also intended to avoid the mechanization of craftsmen, preventing low value of the production and undermining the project regarding the design or the economy. Pursuing these goals is to try to escape the industrial assembly lines, the exploitation of labour, work of the third world and the relocation of workers, which often occurs as a result of marketing strategies aimed at a global scale monopoly.

3. THE RESEARCH FRAMEWORK

As part of a PhD research synthesized by the question — *Can the repurpose of pre-existences in the design process establish a sustainable development strategy for micro-companies and stimulate creativity?* — this article focuses on two of its four goals:

- to verify if the readjustment of pre-existences as a raw material in product design can — in line with the DIY movement — become a sustainable productive practice, regarding economic, environmental and social concerns;
- to assess whether our assumption that the reuse/repurpose of objects and/or techniques — in the context of micro-companies — can reduce production costs; can allow the use of waste or surplus, decreasing the amount of waste on the environment and is able to support the establishment and maintenance of micro-organizations that create, produce and promote products and services;

In the quest for answers we are conducting a thorough review of the literature focusing on two key areas: repurposing and sustainability strategies, and creative process; but we also felt the need to gather and analyse examples from the state of art design production concerning reused or repurposed materials. This paper embodies that collection and evaluation — the case studies.

After the categorization and analysis of case studies we will formulate product development methodologies grounded on repurposing pre-existences with expected application in two distinct areas: micro-companies and education. The proposed methodologies will undergo testing in both areas and the collected data will contribute to the final evaluation of this research and its conclusions.

4. CASE STUDIES

We started with the categorization of examples — case studies — collected through bibliography, directories, websites and blogs, and also throughout ethnographic methodologies including interviews, observation and multimedia records, whose characteristics are representative of reuse or repurposing of pre-existences.

The term “pre-existences” refers to all non custom-made parts that incorporate an end product. The selected examples exhibit materials made and sold for different purposes or use in their construction post-production and post-use leftovers. With the term we are excluding *ad hoc* materials, pieces build specifically for an end product that require industrial facilities.

Intentional or Non-Intentional Design

The case studies were grouped into two sets according to their origins: *non-intentional design* and *intentional design*, adopting the terms from the *Design by Use* essay (Brandes, et al., 2008). In this book the authors categorized various examples according to their corresponding origins, classifying as *intentional design* the deliberate work made not only by design professionals but by individuals without specific training in the area that consciously idealize a product in response to a need adopting design methodologies; or as *non-intentional design* all situations of daily repurposing of objects to functions for which they had not been thought, these changes are made by the general population, often in an unconscious attitude towards design process.

In our research we adopted these categories but limited its application — we only gathered as examples of *intentional design* items developed by design professionals or trainees, excluding from the set authors without specific training. Considering that this research deals with design methodologies and practices it seemed important to confine the case studies to the profession scope. Regarding *non-intentional design* we added to the original category works produced by non-designers since there is no structured design thinking in its development; and removed from the group all the situations that didn't use an artefact, with examples such as sitting on a staircase or laying on the grass. Within the above-defined groups five subcategories were created: *material circumstances*; *production strategies*; *typologies*; *functions* and *processes*; further subdivided into increasing specifications.

Material Circumstances

We began by distinguish if the examples relied on *new materials* or on *old materials*. It was essential to separate the *repurpose* of pre-existences — our research focus — from the *reuse* of discarded goods. Within *reuse* are projects made of materials that after its initial purposes were fulfilled were incorporated into new

proposals rather than being rejected as waste. Inside *repurpose* we collected examples where the use of pre-existences, with or without previous functions, responds to certain needs throughout material, shape and aesthetic features. This seems a useful distinction since *repurposing* is closer to our goals than *reusing*.

Production Strategies

In another subcategory we considered important to separate *creation-production* and *creation-disclosure*. The first implies the development of products involving the creation, production and subsequent marketing of goods; and the latest the creation for further dissemination of constructive diagrams or instructions, usually associated with designers who pursue direct social interventions with cases like the above mentioned *Recession Design*, the *Pallet Design Project* by *Studiomama*⁵, or *Autoprogettazione* by Enzo Mari. Unlike the previous subcategory it didn't make sense to value one criterion over the other since it was the creation phenomenon — present in both cases — we wanted to study.

Typologies

The third subcategory relates to the types of products gathered: *furniture*, *utilities*, *lighting*, and *toys*. The reasons behind this choice are mainly concerned with the available subjects that will experiment the upcoming methodologies proposed by this research. We refer to students from Visual Arts and Art Technologies bachelor level course at Escola Superior de Educação do Instituto Politécnico do Porto (Faculty of Education from the Polytechnic Institute of Oporto). This course presents among other subjects Product Design; Paper, Textiles or Ceramics Workshops; Toys and The Construction of Play; and Visual Arts Workshops, providing students with creation skills and the ability to organize workshops whose target audience is characterized by huge age and cultural diversity. These subjects' assignments — often guided by material, technical and economic constraints — challenge students to develop products that can furnish workshops or establish it selves as content to teach at those workshops. The types of products also summarize the range of existing artefacts present in everyday domestic context thus enhancing the compilation of examples.

Functions

Within the referred types of products several functions coexist and it was necessary to resume those functions in another subcategory. Adapting the functions presented by Brandes et al. in their 2008 *Design by Use* essay (Brandes, et al., 2008) we defined 9 basic purposes for the products: *sitting*; *laying*; *playing*; *exhibiting*; *hanging*; *placing*; *illuminating*; *carrying* and *storing*.

⁵ London studio established by the danish designer Nina Tolstrup

Processes

We also needed to summarize the fabrication procedures used in the examples and thus synthesized 8 processes: *cutting*; *folding*; *assembling*; *bonding*; *soldering*; *sewing*; *moulding* and *printing*. We formed this list upon Kula & Ternaux's *Materiology, the creative's guide to materials and technologies* book (Kula & Ternaux, 2009) and based on the premises that micro-companies' budgets best comply with low-tech processes rather than expensive industrial techniques. All the listed processes may be carried out in workshops environments, another attractive feature for small entrepreneurs.

5. CASE STUDIES — ANALYSIS

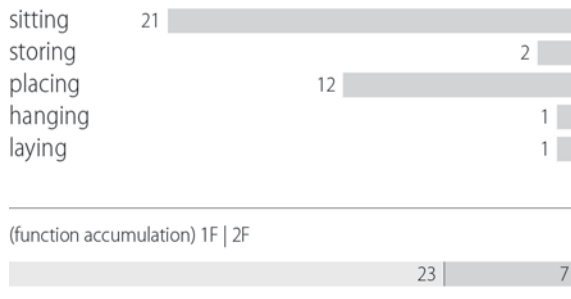
We gathered 93 representative cases of product design made in non-industrial environments, classified 80,6% of them as *intentional design* (ID) and 19,4% as *non-intentional design* (NID). Most of the ID products (86,7%) were produced and sold by their creators while only 5 companies simply offered instructions to build their artefacts (having anonymous origins, the NID instances were not accounted in this criterion). Repurposing of pre-existences appeared in 37,6% of cases against 50,5% of reusing situations, although 11,9% of the total shared both circumstances. Only in the lighting typology the numbers favoured repurposing, probably due the technical and safety requirements of electric appliances.

MATERIAL CIRCUMSTANCES (repurpose | both | reuse)

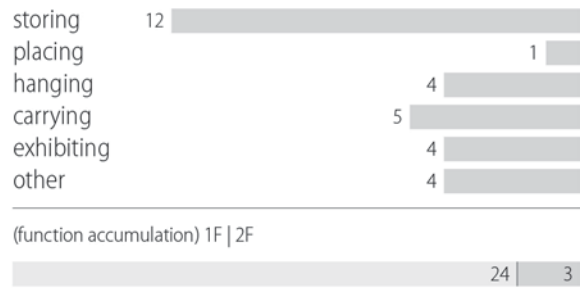
furniture	23,3%	26,7%	50%
utilities	29,6%		70,4%
lighting		66,6%	16,7%
toys	40%		60%
total	37,6%	11,9%	50,5%

The furniture typology gathered 30 examples short followed by utilities and lighting with 27 and 21 respectively; the smallest group belonged to toys with 15 items. Lighting and toys were also the groups with only one function: illuminating and playing, correspondingly; the remaining furniture and utilities groups featured the additional seven functions, some occasionally shared. Nonetheless, sitting and storing are the main purposes featured in these groups. In total, 83 of the examples had only one function and a mere 10 accumulated two.

FUNCTIONS | FURNITURE (30)



FUNCTIONS | UTILITIES (27)



FUNCTIONS | LIGHTING (21)

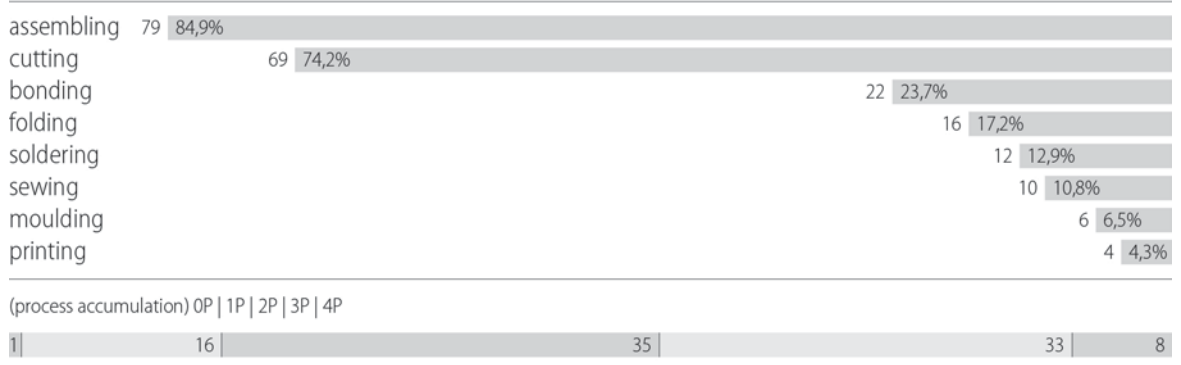


FUNCTIONS | TOYS (15)

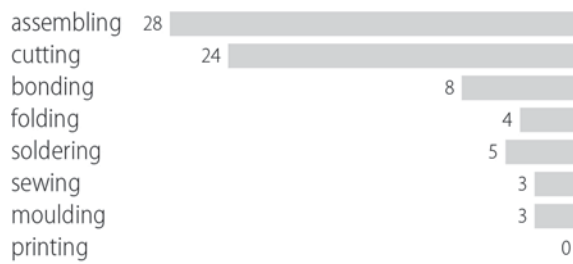


Concerning the fabrication processes clearly the ones that don't require expensive or complicated tools are preferred — assembling (84,9%) and cutting (74,2%). The instances for bonding, folding, soldering and sewing are between 23,7% and 10,8%, leaving moulding and printing with about 5 examples each. Most products (68) are made with 2 or 3 processes and only 16 artefacts were built with a single method. We found the use of 4 processes in just 8 cases, revealing a lack of interest for complex production.

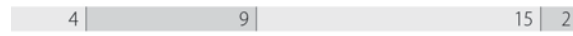
PROCESSES | CASE STUDIES (93)



PROCESSES | FURNITURE (30)



(process accumulation) 1P | 2P | 3P | 4P



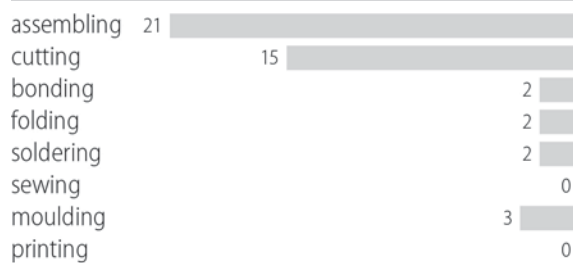
PROCESSES | UTILITIES (27)



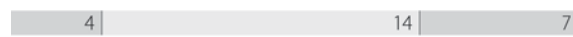
(process accumulation) 0P | 1P | 2P | 3P | 4P



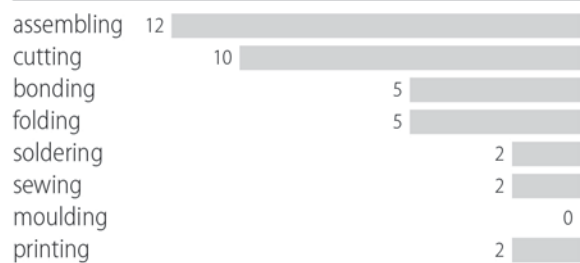
PROCESSES | LIGHTING (21)



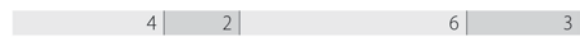
(process accumulation) 1P | 2P | 3P



PROCESSES | TOYS (15)



(process accumulation) 1P | 2P | 3P | 4P



6. CONCLUSIONS

This study still isn't enough to verify the sustainable productive practice of repurposing since no economical, environmental and social data was collected. A selection from the 93 cases must be carried out and creators should be interviewed in order to obtain the needed information. Anyway, the numbers suggest that it may be possible to reduce production costs — given small production runs — as illustrated by the simple and inexpensive processes preferred by the creators and self-evident in the use of fast-access materials, whether repurposed or reused. Micro-organizations can be settled and maintained without unnecessary pricy equipment to support the creation and making of products and services since its methods are based on low-tech procedures, in workshop-kind facilities.

The outnumbering of creation-production over creation-disclosure is also relevant for profit sake — in an Internet immersed world instruction files can easily be copied and distributed. All of the disclosure cases analysed involved designers that had other income sources; creation-disclosure actions seem to belong to another field than that of entrepreneurship. But the same wide network frame that poses a problem with instruction files can become an effective mass advertiser that quickly and inexpensively promotes designers and their work (all the collected ID items have related websites, many with online stores).

The gathered data also expresses the trend to create objects for specific purposes as 89,2% of the cases had a single function. This may imply that in small production contexts, giving answers to necessities, can become a creative exercise — as an example, for the simple purpose of sitting, 21 different projects were accounted. Freed from mass-production constraints creators can focus in shaping objects for particular functions, experiment and evolve. The analysed examples appear to have an emphasis on shape and material characteristics and how they relate to a particular function. If in its effectiveness a lamp needs something to hold a bulb, a structure compliant with electric safety issues and a piece that filters or directs the light, the applied materials present in the case studies already follow those conditions even if they're not intentionally made to become lamps. For instance, the bucket used on Cristiano Mino's *Secchio di Luce* lamp seems no different from an industrial made lampshade but it is certainly easier to find, acquire and transform by low-scale entrepreneurs. The case studies show a myriad of pre-existent materials that comply with the needs of defined purposes and all can be combined regardless complex-manufacturing processes. As we said before, important data is still missing (financial, environmental and social) nonetheless the knowledge on repurposing/reusing and on small production brought by this study will have a significant contribute in the development methodologies we're to formulate.

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