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Exploring the knowledge of designers about the possibilities of Circular Economy

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Circular Economy is considered a sustainable alternative opposite to Linear Economy, which is based on the "take-make-use-dispose" cycle. However, its degree of implementation is still low. The designers are, among others, one of the most important agents to achieve a greater implementation of the Circular Economy. For this reason, it is necessary to find out to what extent they know its potential, if they apply it in the design process and in what way. In this work, an interview have been carried out to product designers and the degree of interest that they present about Circular Economy has been collected. The results, allow to identify the main designers' knowledge needs on this subject and to establish strategies to embed Circular Economy in the design process.

Keywords: Circular economy; designer's needs; design for x

Explorando el conocimiento de los diseñadores sobre las posibilidades de la economía circular

La Economía Circular está considerada como una alternativa sostenible frente a la Economía Lineal, basada en el ciclo de "extraer-fabricar-usar-desechar". Sin embargo, el grado de implantación de la misma aún es bajo. Los diseñadores son, entre otros, uno de los agentes cruciales para lograr una mayor puesta en práctica de la Economía Circular. Por ello, es necesario averiguar hasta qué punto conocen su potencial, si lo aplican en el proceso de diseño y de qué manera. En este trabajo se ha llevado a cabo una entrevista con diseñadores de producto en la que se recoge el grado de interés que presentan por la Economía Circular. Los resultados obtenidos permiten identificar las principales necesidades de conocimiento de los diseñadores sobre este tema y establecer estrategias para una mayor incorporación de la Economía Circular en el proceso de diseño.

Palabras clave: Economía Circular; necesidades del diseñador; design for x

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EXPLORING THE KNOWLEDGE OF DESIGNERS ABOUT THE POSSIBILITIES OF CIRCULAR ECONOMY

1. Introduction

The Circular Economy aims to ensure that resources maintain their usefulness and value during all the time. It optimizes the use of resources through renewable flows. Resources are regenerated or recovered and restored. The transition to the circular economy, where the value of material products and resources is maintained in the economy as much as possible and waste generation is minimized, is an essential contribution to the efforts made to achieve a sustainable and competitive economy (European Commission, 2015). Although the concepts proposed by circular economy are not totally new, it represents a fundamental alternative to the linear economic model that prevails today, in which raw materials are consumed to manufacture objects, to consume them and to destine them to their end of life. This linear model is based on the assumption that natural resources are available, abundant and readily available, but this is not sustainable. The Circular Economy (CE) is one that aims to maintain the usefulness of products, components and materials to preserve its value. Therefore, it minimizes the need for new inputs of materials and energy, while reducing the environmental wastage associated with the extraction of resources, emissions and waste. The Circular Economy offers opportunities to create well-being, growth, and employment while reducing environmental waste. The concept can be applied to all types of natural resources. Eco-design, repair, reuse, rebuilding, re-manufacturing, product exchange, waste minimization and waste recycling are all important aspects of a European Environment Agency (2016). Figure 1 shows a simplified model of Circular Economy.

Several studies show that the CE has a great potential to safeguard the environment and decouple economic development from the use of resources; it has also a high potential to make business sense and create jobs (Meyer, 2012; Ellen McArthur 2012). But there is still lack of knowledge about the implications of CE in engineering design (Widgren and Sakao, 2016).

There is a need to facilitate the transition From a take – make – use – dispose model that depletes natural resources and destroys ecosystems to a circular model where the value of products, materials and resources is maintained in the economy for as long as possible and the generation of waste is minimized.

Therefore, are designers and other professionals involved in product-service development (engineers, marketers, environmental experts, and business and innovation managers) competent to tackle the challenge of co-creating and producing “utility” in which the possible services and performance, safety, collection, recycling and end-of-life possibilities are taken into account, like cascading, refurbishing, reuse or biodegradation, and replacing products with services?

Figure 1: Simplified Circular Economy model. (EEA Report – No 2/2016)



There are several product design strategies and business model strategies to facilitate the move to a circular economy related to existing concepts and that are classified in Bocken et al. (2016) in:

- Slowing resource loops strategies: the design of long-life goods and product-life extension, i.e services to extend a product's life, for instance through repair, remanufacturing.
- Closing resource loops: recycling to close the loop between post-use and production is closed.
- Resource efficiency or narrowing resource flows, aimed at using fewer resources per product.

Designers and other professionals can find knowledge about approaches, tools and methods in design guides and online courses centered in the transition from linear to circular design. For instance, the IDEO Design Guide, in collaboration with Ellen MacArthur Foundation (<https://www.circulardesignguide.com/>) or the TU Delft University Course (<https://www.edx.org/course/circular-economy-introduction-delftx-circularx-2#>).

An analysis of new possibilities of design for a circular economy indicates that Universities and education organisations need to develop circular economy education programmes and curricula (RSA, 2016). Designers must now change their design thinking and practice and lead the development of the Circular Economy by creating products and services that match all inherent criteria of CE model. This knowledge should be embedded in design courses (Andrews, 2015).

Designers are, among other intermediaries, innovative actors in the transition to circular economy (Golinska et al., 2015; Küçüksayraç et al., 2015). There is also a need to research on motivation of consumer's purchases and replacement of still functioning products with new ones, which would help designers to better match consumers' choices and needs (Ramani et al., 2010).

KATCH_e is a knowledge alliance between Higher Education, companies and research centres to build competences in the field of product-service development for the circular economy (CE) and sustainability in the construction and furniture sectors. The present work is develop within the KATCH_e project, which is a 3-year EU funded project that consists of a well-balanced consortium of 11 institutions from 4 countries. One of its aims is to analyze training needs, state of the art, trends and policies on design for CE and sustainability. Among these, one objective is to gather information about the knowledge needs and actual interest that product designers have. This information should be collected from professors, researchers, business people, students, etc.

This work explores how far product designers are aware about the potential of circular economy, if they apply it in the design process and in what way. To carry on with this, two Spanish designers are considered as a preliminary study.

2. Research method

This section describes the method applied to gather knowledge about Spanish product designers about CE.

2.1. Design of interview for business

To reach the aim, interview method was applied to ask designers about circular economy. The interview was defined based on previous own experience and on similar studies, like the one from the university of Edinburgh (University of Edinburgh, 2015). The instructions to follow on during the interview are:

- Explain the purpose and motivation of the study and (IMPORTANT) explain the network we want to form and the advantages of being part of it.
- Do not accept short yes or no answers. Try to expand the answers.
- Ask questions based on respondents' answers
- Be impartial and objective.
- The order in which the questions are dealt may differ according to the pace and evolution of each interview.
- Interviews conducted in the second place may serve to refine responses already obtained.

Also, in some questions, it has been left the generic word TARGET TOPIC instead of specific target topics such as Symbiosis Industrial. It is pretended that each partner can adapt questions attending to the professional profile or expertise profile of the interviewee. We

leave questions with the Circular Economy term, others we have included Circular Economy and related topics. Apart from this, as Circular Economy is an umbrella term which includes the other subtopics, it has been grouped the different subtopics depending on the access points to achieve Circular Economy.

- The CE from the environmental/resource perspective:
 - Resource Efficiency
 - Resource Cascading
 - Reuse/Repair/Remanufacture/Recycle
- The CE from the Business Model/economic perspective:
 - Industrial Symbiosis
 - Product-Service Systems
 - Circular Business Models
 - Performance Economy
- The CE from the Designer perspective:
 - Design for Sustainability
 - Circular Design/Cradle2Cradle Design
 - Social Innovation
 - Design for Social Innovation

The list of questions for business people are depicted in section 3.

For an effective contact, the process was to first make a phone call to introduce the project and the purpose, followed by an e-mail in which a project brochure was delivered and finally arranging the date.

2.2. Selection of a design agency

In order to select a design studio to ask designers about circular economy, the following criteria are considered:

- The agency should be relevant. This can be proved by: prizes and recognitions, international clients and if they appear in specialized media.
- At least 5 years of experience
- Experience in furniture or construction
- Product design needs to be among its activities

In addition, it is important that the studio identity consider values like sustainability, user-centered and creativity and innovation. Taken into account these requirements, the design agency finally selected for this interview was Joan Rojas Studio (<http://www.joanrojeski.com/>) placed in Castellón, Spain.

Joan Rojas is a cooperative business made of four designers. They develop projects of product, graphic and web design. They also offer innovation and creativity consultancy services and teaching. They have appeared in specialized national and international media, such as: Experimenta magazine, Domus Design, Art4d, Decor, DesignBoom, Treehugger (<http://www.treehugger.com/>), etc. They have received several recognitions and they have

worked for clients from Europe and Latin America. They have designed pieces of furniture: table, sofa, chair; textures for tile and home devices for food and cooking among others.

Some of the researchers knew the designers, so the contact was easy to make in this case.

3. Results and discussion

This section presents the results of the interview to two of the four designers from Joan Rojas studio. The interview took about forty minutes. The answers to the questions are:

1. Tell me what "Circular Economy" means to you.

"Making the end of something the beginning of something else, not generating waste. Anyway, to be honest, we do not know what CE exactly is, we think in terms of cradle to cradle design and other related concepts".

2. What three words would you say best describes "Circular Economy"?

"1. Efficiency; 2. Coherence and 3. necessary"

What activities related to target topics does your company already perform?

"We try that our products promote that, we expect to communicate CE philosophy influencing the user in the use phase. For example, the silicone of our products for Lékué is difficult to recycle, but the type of products provide a sustainable philosophy: this is, practice home-made fresh cheese, which for instance leads to use less packaging". Or the design of a vase to revitalize the use of napkin instead of paper-made disposable ones.

3. Do your clients or providers express you a demand or an offer to change to a circular behaviour? If yes, specify what demand/offer

"In one case we received an order to think how to give a new life to wastes in a tile company. We finally recycled the used paper from the company in order to create new textures and apply them in the design of a new collection. This did not lead to substitute their usual manufacturing process, but it was a work in accordance of their corporate social responsibility.

In general, companies usually focus more on saving costs.

Another case was the one of the Citrus Spray, a sprayer that turns the fruit into a natural container. In this product it was initially thought to sell spare parts, but finally it was not implanted because the product itself is not very expensive".

4. What are the main drivers for establishing Circular Economy and related topics right now? What could be the drivers in the future?

"Institutions like universities and technological institutes. We think it is necessary to raise awareness to implement CE models. Laws would help".

5. Are there differences between national demands/offers and export demands/offers? Which type of differences?

"No, in our experience, each company has its own philosophy".

6. In which level is your company positioned in terms of design management? (according to Design Ladder Model by Swedish Industrial design Foundation), there are four levels: level 1: "no design", level 2: "design as styling", level 3: design as a process, level 4: design as innovation).

"4: design as innovation"

7. Who makes the product development decisions? Is there a design and product department or a committee within the company?

"This agency works as a cooperative. So, decisions are made by everyone, each project is managed by one person but decisions are made by everyone".

8. Is the consumer or other external stakeholders taken into account in the different stages of the design process (problem analysis, searching for solutions, decision-making,)?

"The user is taken into account all the time, especially in the creative and ergonomic aspects".

9. What barriers would your company probably face during the transition from linear to circular economy?

For us directly there would be not many difficulties. It would not be a problem.

Perhaps, it would be necessary to reformulate the way of working, in some cases the manufacturing companies are not fully adapted. They don't give value to some aspects what are necessary and don't want to implement them. It would need to be a whole system change.

10. Are the people involved in design and development in your company competent regarding the relevant TARGET TOPICS? What specific training skills in TARGET TOPIC/S will help in the transition process from linear to circular behaviour?

No, it should be necessary to go deeper into them. Mainly we would need knowledge about circular business models and industrial symbiosis, about the business and economic perspective.

11. Do you find initiatives such as KATCH_e project interesting? Would you like to receive more information about it or even to participate in testing didactic materials?

"Yes"

12. One of the outcomes from KATCH_e project is a MOOC on product-service development for Circular Economy and Sustainability. Are you, in principle, interested on this MOOC?

"Yes"

Which topics do you recommend for the MOOC? (Comment the topics from the list and others). "Those related to business. We work less on it"

13. In this sense, would you like to be part of the KATCH_e Network? "Yes"

14. Comments. (no comments)

The interview was easy to carry on and it confirmed the interest of designers in the CE. Although they do not know the CE definition, they are familiar with related concepts like cradle-to-cradle design. These designers are familiar to sustainability and promote designs that promote users sustainable behavior through the use phase. They are aware that more knowledge are needed about business and circular design. They are also aware that a company alone cannot make the change alone, but the whole system. When they mention "that economy is the main driver", it is evidenced that effort has to be done to communicate that Circular Economy is an economic opportunity.

4. Conclusions

This work reports results about the knowledge needs and the barriers that product designers from a Spanish design agency identify. The main conclusions are:

- The designers think that it is necessary to make the transition to circular economy.
- They do not think that they would have any problem in this transition. They feel that the main difficulties would be in the manufacturing process, since the changes are more expensive and time-cost.
- They are enough knowledgeable from the environmental and designer perspective. Their main needs for knowledge are industrial symbiosis and circular business models.

These findings stablish preliminary results about what business people think about the circular economy. More interviews are going to be collected in the framework of KATCH_e project in order to have a picture about the main interests for a formative offer about Circular Economy in higher education.

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