What really matters? Systemic design, motivations and values of the circular economy companies in Italy

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ABSTRACT

Since 2014, the Circular Economy (CE) concept is gaining an important role in the European context thanks to the specific direction given by the EU policy. This research wants to frame Italian companies who are working on CE context to understand mainly which is their approach and awareness to CE and if the design is playing a role in this transition. At the beginning of 2019, an online questionnaire was sent to the actors present in the app database 'Mercato Circolare' who, since March 2017, is mapping the Italian situation collecting the actors related to the CE selecting companies, events and experiences of circular citizenship. Despite the response rate was 14%, the results are interesting: 100% are SMEs; 21% are not aware to work on CE; >52% identified difficulties with value appreciation; design competencies are present in the 66% of realities and in 29% the designers by formation are founders.
Keywords: circular economy, Italian SMEs, design

1. CONTEXT

Since 2014, the Circular Economy (CE) concept is gaining an important role in the European context thanks to the push coming from the European Union with the document EU (2014a). Following the study conducted by Zamfir et al. (2017), the country is the most important factor which influences CE development. In this case, the country of reference where the research was conducted is limited to Italy due to the database chosen to investigate the topic. In the Italian context, the app 'Mercato Circolare[1]'(MC), of the homonym innovative start-up[2], since March 2017 is mapping the Italian context collecting more than 250 actors related to the CE selecting companies, products, events and experiences of circular citizenship.
This research wants to frame the role of these actors in CE, understanding mainly which is their approach and awareness to CE and if the design is playing a role in this transition.

2. DESIGN, CIRCULAR ECONOMY AND SMES.

The main motivation behind this research is to understand how the design can contribute to the transition to a CE and to define and push an alternative and sustainable model of production and consumption to the linear one within the regenerative model Blue Economy (BE) by Pauli (2015). As Ellen Macarthur Foundation remind, the CE is "*economy that is restorative and regenerative by design*"[3]. This means that the entire system should be redesigned or designed by intention, considering many different factors, the complex system. However, in the scientific literature (scopus database), many contributions are narrowing the role of designer to product design, dealing with re-manufacturing or eco-design. However, in the review on CE by Lieder and Rashid (2016), design is mentioned "*crucial to the development of the new economic model of CE*" and "*product design is identified as crucial in the design of sustainable circular systems, especially in connection with critical materials research*". Bocken et al (2016) remember "*integrating circular economy concerns at an early stage in the product design process is important"* and shift the attention to the design of resources loops. They suggested two main design strategies: for slowing resource loops and for closing resource loops. For Andrews (2015) "*Designers now have the opportunity to lead the paradigm shift and in addition to designing for the 'closed loop' they have the potential to influence business and consumer behaviour and consumption by extending actual product life and increasing perceived value of products.*" De los Rios and Charneley (2017) arguing on the skills and capabilities for a sustainable CE, they claim for a changing role of designers given that "*the standard approach for creation, fabrication, and commerce of products is challenged*". They reported the categorisation by Go et al. (2015) on the different design approaches for a sustainable industry: from the design for life cycle, to the design for environment (preventive) to the whole systems design. In fact, design in the lastly has seen an evolution: as stated by Ceschin and Gaziulusoy (2016) it has passed from product innovation to product-service system innovation to spatio-social innovation and to socio-technical system innovation.
About the designers skills, for Go et al. (2015) they pass from the understanding logistics, distribution processes and engineering functions, to services design and user experience, to perception of value. Andrews (2015) adds that to reach sustainability "some designers need to change their practice while others need to change their practice and thinking". As designer decisions can influence all the value chain (Braungart and McDonough, 2009), different training and skills for designers are required to meet the need of sustainability, especially in the manufacturing sectors which required it as stated by Garetti and Taisch (2012). Along Cradle 2 cradle design (C2C) (Braungart and McDonough, 2009) which now is also a product certification, Systemic Design (SD) (Bistagnino, 2011; Jones, 2018) and Design for product-system sustainability (Vezzoli, 2007) are recent approaches and education method for design for sustainability that are enlarging the focus from product to the system where it is embedded.
Previous studies have tried to frame the CE concept in European enterprises. Zamfir et al (2017) referring to Italian SMEs stated: "*SMEs from Italy display a very heterogeneous behavior in adopting circular economy practices….SMES that activate in the manufacturing sector are the most active in the field of circular economy…the openness of Italian SMEs from services and industry to circular economy is also influenced by their total turnover…*". The Flash Eurobarometer 441 (EU, 2016) in a questionnaire requested by the European Commission DG Environment on European SMEs and CE showed that almost three quarters of companies undertook some CE related activity (in Italy the 67%).

3. METHODOLOGY

After a literature review about the relationships between CE concept and the design role, we defined and sent, at the beginning of 2019, an online questionnaire to each entity in MC database (MCd) which are 276 in total. Specific and mainly closed questions were asked to raise the response rate. The open (OQ) and close (CQ) questions (listed in

[1] English translation: circular market.
[2] Othe author, Nadia Lambiase, is the founder
[3] https://www.ellenmacarthurfoundation.org/ . Last consultation 10/02/2019

tab. 1) first want to frame the identity of these actors, after focus on their awareness on working on CE concept and on the different scientific approaches related to CE, and at the end look for the presences of designers and their roles and main competencies.

[Table 1] *Questionnaire questions*

n°	Motivation: understanding ..	Typology of data	Collection method	References
ENTERPRISE IDENTITY CARD				
1	..the principal sectors in which the enterprises are working	Productive Sectors	OQ[4]	statistical classification of economic activities NACE[5]
2	..the principal area in Italy	location	MCd	
3	..the age of the phenomenon	Foundation year	OQ[6]	
4	..which are their clients	B2B or B2C	MCd	
5	.. the typology of enterprises working on CE	Enterprise size	CQ[7]	European statistics[8] - Pedone (2016)
		n° Innovative Enterprise and start-up	CQ[9]	Italian law on 'innovative enterprise and start-up'
		n° start-up		
APPROACH TO CE				
6	..which approaches are known	Awareness on scientif approaches related to ce	CQ[10]	Approaches defined by authors
7	..their awareness on being into the CE concept	Ce awareness	OQ[11]	
8	…the most common CE principles	Ce principles	CQ[12]	Principles are base on an elaboration of Ellen MacArthur foundation principles
9	...the level of education about CE	Investment in training on ce	CQ[13]	closed answers mainly based by authors experience and EU (2016)
10	…the solutions and strategies adopted	Solutions to transition to ce	CQ[14]	closed answers mainly based on EU (2016)

[4] Q: write your ATECO CODES
[5] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32006R1893. In Italian: ATECO code
[6] Q: In which year the company was founded?
[7] Q: Which dimension has the company? A: micro (< 10 workers); small (10-49); medium (50-249); large (>250); we are not a company; other
[8] https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Enterprise_size
[9] Q: Are you an innovative enterprise? A: yes; innovative start-up; no; other.
[10] Q: Which approaches do you know? (multiple answers enabled) A: Systemic Design (Politecnico di Torino); cradle 2 cradle; Blue Economy (Gunter Pauli); ecodesign; CE; other.
[11] Q: Have you ever been aware to work on CE?
[12] Q: In which CE principles do you recognise your company? (multiple answers enabled) A: Use of natural input or from second raw material; design for the long-lasting duration of the object; preferring use to property; create value from waste; other.
[13] Q: On which of the following aspects, relating to the CE, have you invested in the form of training? (multiple answers enabled). A: general definition of the concept and application field; different CE business models; eco-design; regulations; none, we have internal competencies; still no training; other.
[14] Q: Have you done any of the following actions in the last 3 years? (multiple answers enabled). A: make an analysis of flux of energy and matter used by the company (understanding origin, quantity, …); make a Life Cycle Assessment analysis; obtain an environmental cerfication (specify); make a request for an environmental cerfication but not obtained; re-plan the industrial plant to a more efficient use of energy or water; re-design the product to easy the end of life; others; no one; other.

11	..the most common problems faced to work on CE	2 main problems in ce implementation	CQ[15]	closed answers mainly based on EU (2016)
IDEA CREATION, COMPETENCIES AND ROLE OF DESIGN				
12	…how the idea behind the enterprise was born	Idea creation	CQ[16]	closed answers based by authors experience
13	..presence of Designers (by formation) in the company	Design presence in founders and company team	CQ[17]; CQ[18]	
14	…if designers (by formation) are entrepreneurs	Design presence in founders	CQ[19]	
15	understanding principal competencies involved in CE	Competencies by team and founders	CQ[20]CQ[21]	
		External consultants	CQ[22]	
16	..if they are cooperating with other realities and are they public or private?	Partnership	CQ[23]	

4. RESULTS AND DISCUSSION

The response rate to the questionnaire was of 14% (38 on 276) in 1 week of time availability. The data collected were processed and aggregate.

IDENTITY CARD: The answers came mainly by enterprises that are 87% (30 and 3 social cooperatives). The other 6% are represented by 3 sole practitioner designers or artisan, 2 association/non profit and 1 research centres. Between the enterprises, 19 are micro, 11 are small and 3 are medium. This means that 100% of the enterprises are SMEs which is perfect in line with the Italian average situation as demonstrated by Pedone (2016). This data confirm also as the micro and small enterprises are playing a role as the subject for the change (Barbero, 2016). Moreover, 21 entities state to be innovative (as the Italian law definition[24]) and precisely 8 are innovative start-ups and 13 are innovative enterprise (start-ups 5 years old). 55% works with clients (b2c), while 40% with other business (b2b) - no data about 5%.

The foundation year frames the phenomenon in time. 22 were founded from 2012 and 2018, 10 between 2000 and 2012, and 6 from 1960 to 2000. The increase from 2012, with a pick in 2015, reflects the period in which Europe Union starts to talk about the CE.

The ateco code provided in addition to the company description in MCd for the one who doesn't have a code, let define that the 42% are involved in manufacturing sectors. Precisely the main ones are: traditional manufacturing activities (8 cases); 'design and produce' (8 cases) - will be referred as manufacturing activities along the paper -; informatics (4 case) and energy (3 cases). 4/8 'design and produce' are sole practitioners.

[15] Q: Identify the 2 main problems encountered in working in the CE. A: lack of sufficient human resources; difficulties in finding adequate skills; complexity in administrative procedures; complexity in legal procedures; difficulties in accessing to funding; Regulatory impediments; high cost to meet specific regulations or standards; no clear idead about needed investments; no clear idea on production process improvements; no clear idead about the economic benefits; difficulty in making value appreciate from the market; I don't know; no one; other.

[16] Q: How was born the idea on which you founded the company /start-up? (multiple answers enabled). A: from a personal necessity; to solve a society problem; from a precedent working activity; between colleagues of another company; to to respond to a public call; from scientific research; university project; CE is my philosophy of life; family enterprise; other.

[17] Q: Is there a design (by formation) among the founders? A: yes (Specify the role); no; other.

[18] Q: Is there a design (by formation) among the collaborators? A: yes (Specify the role); no; other.

[19] See 17

[20] Q: Indicate the main competencies of the founders (multiple answers enabled). A: economic / financial; Business / Marketing; communication; legal; software development; design; engineering; social and human sciences; natural science; Other.

[21] Q: Which competencies have you add to your team? (multiple answers enabled). A: economic / financial; Business / Marketing; communication; legal; software development; design; engineering; social and human sciences; natural science; Other.

[22] Q: Do you have external consultants?. A: yes, no, other.

[23] Q: Do you have partnership? A: yes, no, other

[24] Legge 17 dicembre 2012, n. 221 (DL Crescita 2.0- artt. 25-32). Retrieved online from http://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:2012-10-18;179!vig=

55% of the total entities are located in the north of Italy (21 cases, especially in Piemont, Lombardy and Trentino); 32% in the centre (12 cases especially in Emilia-Romagna, Lazio and Toscana); 5% in the south (2 cases). This reflects the situation about the total entities present in MCd.

APPROACH TO CE: Surprisingly, 8/38 state that they have never always been aware to work in this context. Many of these answers provided came from companies born before 2001. Regarding the 8 entities that 'design and produce', 2 don't know CE approach but 7/8 know the eco-design approach and 2 the C2C. Among all the 16 manufacturing activities only 3 know the SD approach and they are located in Piedmont region: this reflects the low diffusion of the approach in the manufacturing sectors outside the territory where it is a master degree (Torino, IT). Considering all the cases, after CE approach, the most known are: eco-design (16), BE (8), c2c (6) and SD (3). Only one reality know all the 4 approaches proposed. Approaches as Design Thinking, Sustainability, Green Economy, LCA and sustainable development were proposed voluntarily by 8%.

In the questionnaire 45% declare to have internal competencies about CE, while 30% have not yet invested in a training course on CE.

To frame which aspects of the CE they are implementing, we decided four main principles, which come from our interpretation of the Ellen MacArthur principles: 'generate value from waste'; 'use natural input or from second raw material'; 'design for the long-lasting duration'; 'prefer use to property.' In this specific research, many answers included more than one principles. The most cited was the 'generate value from waste' (33/38) and in 18 cases it was mentioned with the 'use natural input or from second raw material' which was cited in total 23 times. 9 state to work on 'design for the long-lasting duration' and 3 on 'prefer use to property'. Only 3/8 of 'design and produce' category are working for long-lasting duration of objects and 8/8 are generating value from waste.

About the actions taken as solutions or strategies in the last three years, 50% have done anything (9 are 'manufacturing activities'). Among them, 11 are micro enterprises. While about the other 50%, 10 have done an analysis of their fluxes and 6 a LCA, 4 have obtained environmental certification, 3 have re-design the product and 3 have environmentally improved their plant.

To understand the difficulties that they encounter frequently to work on CE, we have asked the main 2 problems. More than 52% identified difficulties in making the value added appreciated by the market, and about the 40% difficulties in accessing fundings. However, as the Flash Eurobarometer 441 state, one of the problems can be that in Europe "*just over a third of companies are aware of government financial incentives for activities related to the circular economy*" (EU, 2016).

IDEA CREATION, COMPETENCIES AND ROLE OF DESIGN: One of the most interesting aspect emerged is that 11/38 (30%) answered that CE is their philosophy of life. This reflects that the CE is not only a business opportunities, but a high percentage of people consider it as a cultural paradigm.

About the creation of the idea, almost the 50% choose the reason 'to solve a society problem', 37% 'from a personal need', 30% 'from a previous working experience'. 7 were born between colleagues in another enterprise, 5 from scientific research, 2 to answer a call and 2 from a family enterprise. 11 of the total had an experience in Business Incubators. In 47% of cases they have external partnerships and in 47% of cases they haven't. 4 declare to have partnerships with research centres.

With the goal to investigate the role of design in the CE, was asked to define the competences of the founders and the employees. 21/38 has stated to have internal competences in design. To frame better this concept, it was asked if there are designers by formation in the team. In this case, only 1/3 of these 21 have answer positively. The reason behind this double question can be find in the lots of meanings of the term 'design'. Infact, lacking an official register, design is intended has a capacity possessed by many people and not a specific profession which correspondence to a particular bachelor degree. The designer by formation are working in 12 of the 38 identities analyzed and in 11 cases they are founders (in enterprise founded after 2001). This reflect the abilities of designer as entrepreneurs (Margolin, 2002). Designers are working in 7/8 in the 'design and produce' category which reflects the skills of 'designer as producer' as demonstrated by Margolin (2002).

Along the competencies in design (45% between founders and present in 25 entities), the main one are: business and marketing (33), communication(27), financial (19), social science (16), engineer (15), Ict and development (14), natural science (10) and legal (9). It's important to underline that communication and legal services are mainly also delegated to external consultants, in addition to management one..

5. CONCLUSION

The results better define the Italian context on the CE, previously framed by other studies. Despite the response rate was of 13%, the main results are interesting: 79% are micro and small enterprises; 21% are not aware to work on CE; more than 52% identified difficulties in making the value-added appreciated by the market; 21% are 'design and produce' realities; design competencies are present in 66% of realities and in 29% the designers by formation are

founders. Although, the results do not highlight the designer with a role in the design at the system level, as one of its emerging skills (see SD). This can let start a reflection on the need to spread this message out of the academia and research sectors, to change really the business practice over the sustainability aspect.

BIBLIOGRAPHY

Andrews, D. (2015). The circular economy, design thinking and education for sustainability. *Local Economy*, *30*(3), 305–315. https://doi.org/10.1177/0269094215578226

Barbero, S. (2016). Subjects of change: micro & small enterprises. In Bistagnino, L. (2016). *microMACRO*. Milano: ed. Ambiente.

Bistagnino, L. (2011). *Systemic Design, designing the productive and environmental sustainability*. Bra, Italy: Slow Food. 2° edition.

Bocken, N., de Pauw, I, Bakker, C. & van der Grinten , B. (2016) Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33:5, 308-320, DOI: 10.1080/21681015.2016.1172124

Braungart M., McDonough W. (2009). *Cradle to cradle. Re-making the way we make thigs*. London: Vintage books.

Ceschin, F., & Gaziulusoy, I. (2016). Evolution of design for sustainability: From product design to design for system innovations and transitions. *Design Studies*, 47, 118-163.

De los Rios, I. C., & Charnley, F. J. (2017). Skills and capabilities for a sustainable and circular economy: The changing role of design. *Journal of Cleaner Production*, *160*, 109-122.

Ellen MacArthur Foundation (2012). Towards the Circular Economy: Economic and business rationale for an accelerated transition. Retrieved online: https://www.ellenmacarthurfoundation.org

EU (2014a). Towards a circular economy: A zero waste programme for Europe. Retrieved online from: https://eur-lex.europa.eu/resource.html?uri=cellar:50edd1fd-01ec-11e4-831f-01aa75ed71a1.0001.01/DOC_1&format=PDF

EU (2014b). Turning waste into a resource Moving towards a 'circular economy'. Retrieved online from: http://www.europarl.europa.eu/RegData/etudes/BRIE/2014/545704/EPRS_BRI(2014)545704_REV1_EN.pdf

Eu (2016). - Flash eurobarometer 441 - European SMEs and the Circular Economy. Retrieved online http://ec.europa.eu/environment/green-growth/docs/fl_441_sum_en.pdf

Garetti, M., Taisch, M. (2012). Sustainable manufacturing: trends and research challenges. *Production Planning & Control*, 23:2-3, 83-104, doi:10.1080/09537287.2011.591619

Go, T.F., Wahab, D.A., & Hishamuddin, H. (2015). Multiple generation life-cycles for product sustainability: the way forward. Journal of cleaner production 95, 16e29.

Jones, P. H., Kijima, K. (2018). *Systemic Design. Theory, Methods, and Practice*. Spinger Japan.

Lieder, M., Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Journal of cleaner production,* 115, 36-51.

Margolin, V. (2002). The designer as producer. *ICSID* news, 1-3.

Pauli G. (2015). *Blue economy 2.0*. Milano: ed. Ambiente.

Pedone, G. (2016). The economy is generated by the network of different activities in the jurisdiction.In Bistagnino, L. (2016). *microMACRO*. Milano: ed. Ambiente.

Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Journal of cleaner production*, 115, 36-51.

Zamfir, A.M. , Mocanu, C. , Grigorescu, (2017). A Circular economy and decision models among European SMEs. *Sustainability (Switzerland),* 9 (9), art. no. 1507

Vezzoli, C., Kohtala, C., Srinivasan, A., Xin, L., Fusakul, M., Sateesh, D., & Diehl, J. C. (2014). *Product-service system design for sustainability*. Sheffield, UK: Greenleaf Publishing Limited. Retrieved online from http://www.lens-international.org/tools/view/14?server_id=6