

BBS

SUSTAINABILITY MEASUREMENT AND MANAGEMENT LABORATORY (SuMM LAB)

**BOLOGNA BUSINESS SCHOOL |
CENTRE FOR SUSTAINABILITY
AND CLIMATE CHANGE**

REPORT #7

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REPORT 7: STRATEGIC VALUE CHAINS FOR CIRCULAR ECONOMY - CERAMIC SECTOR

INTRODUCTION

The Circular Economy (CE) has gained attention and importance on the policymakers' agendas in the last decade, as one of the key elements to respond to the global challenge of Sustainability Transition. The most recognised definition of Circular Economy has been framed by the Ellen MacArthur Foundation, introducing it as “an industrial economy that is restorative or regenerative by intention and design”¹. CE is an economic model considering and managing from the resource extraction to the end-of-life of products, goods and service, including resourcing, procurement, production, and reprocessing². The ultimate aim is to minimise both materials extraction and waste production³.

CE requires a multilevel approach, in order to enhance the value extracted along the chain. Typically, three levels are identified: micro, meso and macro⁴. The micro-level is materialised by enterprises, products and consumers. The meso-level includes economic agents integrated in symbiosis, such as supply chains, interfirm clusters and industrial parks. The macro-level is represented by the broader geographical context, namely city, regions and governments. For this reason, industrial clusters and districts may represent a valuable resource to boost the CE potential of territories.

Considering the richness of industrial clusters available in Italy and the Value Chains identified as strategic for the EU Circular Economy Action Plan, the Building and Construction value chain in general and the ceramic sector in particular is worth to be investigated more carefully. The potential impact generated by the Sustainability Transition of such value chain is remarkable, as the built environment, on the one hand, it requires about 50% of all extracted materials as feedstock, and, on the other hand, it is responsible for about 37.5% of waste generated

¹ Ellen MacArthur Foundation, EMF (2013). *Toward the Circular Economy vol.1. Isle of Wright*.

² Murray, A., Skene, K. and Haynes, K. (2017), “The circular economy: an interdisciplinary exploration of the concept and application in a global context”, *Journal of Business Ethics*, Vol. 140 No. 3, pp. 369-380, doi: 10.1007/s10551-015-2693-2.

³ Haas, W., Krausmann, F., Wiedenhofer, D. and Heinz, M. (2015), “How circular is the global economy? An assessment of material flows, waste production, and recycling in the European union and the world in 2005”, *Journal of Industrial Ecology*, Vol. 19 No. 5, pp. 765-777.

⁴ Kirchherr, J., Reike, D. and Hekkert, M. (2017), “Conceptualizing the circular economy: an analysis of 114 definitions”, *Resources, Conservation and Recycling*, Vol. 127, pp. 221-232.

in the EU (Eurostat, 2020). Moreover, construction materials are associated to high embodied energy, thus supporting the significant contribution to climate crisis brought by the built environment . Despite the recycling target of 70% set for 2020 , only 39.2 % of waste were recycled and 32.2 % landfilled in the EU in 2020⁵, thus highlighting a significant gap in the accomplishment of the objectives defined.

At the European level, the main ceramic clusters are located in Spain and Italy, respectively in the Castellón (Valencia) and Sassuolo (Modena) districts. The Sassuolo district develops across Modena and Reggio-Emilia provinces and supplies over 80% of the whole Italian ceramic tiles production . The economic impact on the national balance has been estimated in about 5 billion euro in 2018 , posing Italy as the sixth ceramic manufacturer worldwide.

⁵ Eurostat, (2020). “Waste statistics”. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics#Total_waste_generation (accessed on 20 September 2023)

⁶ Masson-Delmotte, V., Zhai, P., Pörtner, H. O., Roberts, D., Skea, J., & Shukla, P. R., (2022), “Global Warming of 1.5° C: IPCC Special Report on Impacts of Global Warming of 1.5° C above Pre-industrial Levels in Context of Strengthening Response to Climate Change, Sustainable Development, and Efforts to Eradicate Poverty”. Cambridge University Press.

⁷ European Parliament, EU (2008), “Directive 2008/98/EC on waste (Waste Framework Directive)”. <http://ec.europa.eu/environment/waste/framework/>

⁸ Boschi, G.; Masi, G.; Bonvicini, G.; Bignozzi, M.C. Sustainability in Italian Ceramic Tile Production: Evaluation of the Environmental Impact. *Appl. Sci.* 2020, 10, 9063. <https://doi.org/10.3390/app10249063>

⁹ Indagini Statistiche Sull’industria Italiana; Confindustria Ceramica: Sassuolo, Italy, 2019

KEY FINDINGS

The commitment of the sector towards sustainability is testified by the multiple initiatives put into place, both at the European, e.g. the “Ceramic Roadmap to 2050”, by the European Ceramic Industry Association, and national level, e.g. Ceramics of Italy for Sustainability. This project was launched in October 2020, born from the collaboration among Edi.Cer., Confindustria Ceramica, Focus Lab (a research agency for sustainable innovation solutions, social responsibility and the green economy) and with the support of MAECI (Ministry of Foreign Affairs and International Cooperation) and ITA (Italian Trade Agency). This effort is supported by a network of partnership developed both with institution, such as school, universities, communities and research centres, and business organisations. The main sustainability-oriented actions promoted by firms in the ceramic sector are developed both on the environmental dimension, such as decarbonisation, CE and mobility (e.g. the use of rail as an alternative to road transportation), and social dimension, in terms of corporate welfare and well-being, development of human capital and customer experience.

Among the sample of companies included into the observatory, we selected the 50 firms, representative of the ceramic sector in the Italian industrial context. Considering the stratified sampling method applied for the data collection (see Report 1 “Framework development and dataset construction”), the companies considered are located between Emilia-Romagna and Umbria regions. The distribution in the different provinces is reported in the following Fig. 1.

CERAMIC MANUFACTURES

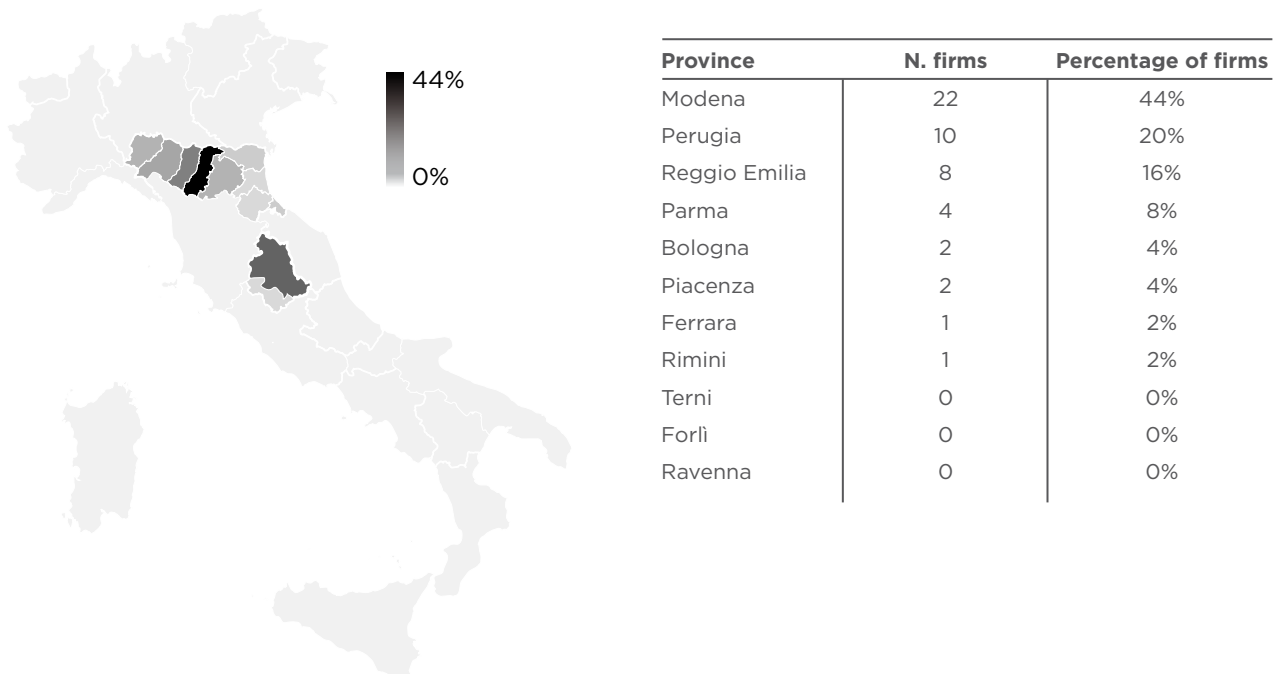


Figure 1. Geographical distribution of ceramic manufacturing firms in the two target regions (Emilia-Romagna and Umbria)

Among the sample of ceramic manufacturing companies, the 54% of firms is a Large Enterprise, while the 46% is represented by Small and Medium Enterprises, involved in the value chain.

Only the 12% of the companies in the sample do not implement any of the actions proposed, while 56% implement more than 10 sustainability-oriented practices.

Considering the companies covered by the observatory, this represents a remarkable result, as 27% of the overall population of companies do not implement any practice and only the 21% exceed the 10 practices threshold.

Processes:

1. **Environmental Impact Assessment:** this process include practice related to the monitoring of impacts developed across the different environmental matrices (e.g. air, water etc.), as well as setting target for impact decrease and communication and reporting of dedicated initiatives. Considering that ceramic manufacturing companies typically operates in big industrial plants, subjects to stringent regulation in terms of emission authorisation and verification by the Environmental Authority (Agenzia Regionale per l'Ambiente - ARPA) and they are included within the Emission Trading System (EU-ETS) for registration and limitation of Green House Gases Emission, it appears evident how the sector developed practices able to anticipate evolution in the regulations.
2. **Supply chain:** practices oriented at limiting the impact along the supply chain and the control over it, in terms of selection of suppliers also based on environmental and social criteria are key elements to support the diffusion of this process and it will become a strategic asset in the near future, considering the upcoming supply chain due diligence, as envisaged by the European Commission.
3. **Consumption:** this process depicts the ability of the firm to valorise the sustainability strategies toward the final consumer, in terms of policies to support the circular economy, but also the description of origin of the product and raw materials, promoting the "Made in Italy", one of the key assets of the Italian ceramic sector on the global market, which allowed to recover from the financial and economic crisis of 2008-2012.

PROCESSES DIFFUSION

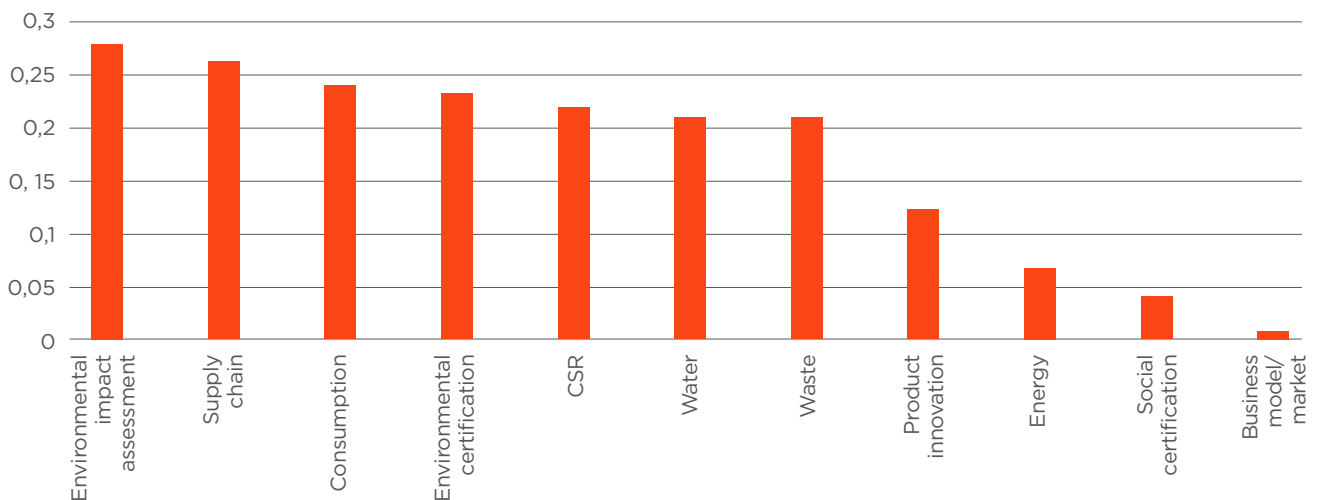


Figure 2. Processes diffusion among the companies of the subsample

Surprisingly, the most diffused practices are quite different from the ones developed by the overall sample of the observatory (see Fig. 3), namely:

1. **Wastewater treatment and purification, Waste recycling exceeding what required by regulation, air emission monitoring:** 50% of the companies of the subsample implement these practices, focused on the environmental dimension of sustainability, but developed over different matrix (waste, air and water), therefore requiring a broad and structured approach toward environmental sustainability.
2. **Risk analysis policy**, exceeding the regulatory requirement. This practice is often included into the Environment, Health and Safety Practices, and work at the crossroad of environmental and social dimension of sustainability. It resulted among the most diffused practice also in the overall sample of companies.
3. **ISO 14001** certification of the environmental management system. It resulted the most diffused practice in the overall sample of the observatory, with almost 30% of the firms implementing it (see Report 1 “Framework development and dataset construction”), while in the present subsample, even though exceeding the percentage of diffusion, ranked only fifth among the most diffused practices.

PRACTICES DIFFUSION

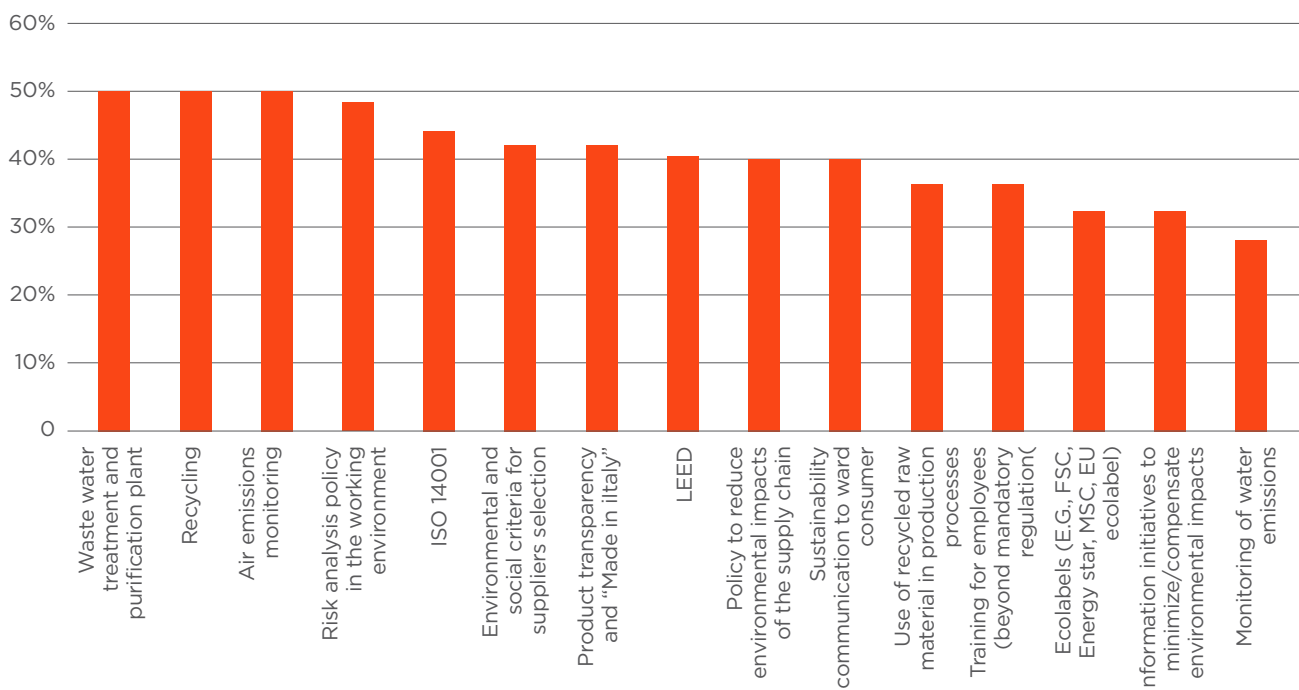


Figure 3. Practices diffusion among the companies of the subsample - the most diffused fifteen practices.

WHAT TO DO NEXT?

Considering that overall results provided by SuMM Lab, sustainability-related practices implemented by Italian companies are still a few, as less than 15% of companies mapped appears to develop sustainability processes at all¹⁰, but the ceramic sector results a vanguard in the field, with 88% of firms implementing at least one practice and 56% more than 10 at a time.

Nevertheless, this industry sector is carrier of several elements of concern in terms of sustainability and impacts, therefore, we report some suggestions to boost the sustainability performance:

At company level:

- **Developing competences** among personnel in order to identify the next market opportunities to valorise the sustainability-oriented efforts.
- **Work on Waste related and Product Innovation practices** to boost the CE potential of the company. Due to the involvement of ceramic manufacturing companies into the Building and Construction supply chain, the level of awareness towards this issue has been raised by regulations in the last decades. It is, therefore, reasonable, that companies strategically invest into practices which travel into the same direction as international targets, doomed to become more and more stringent, in terms of use of secondary raw materials, advanced recycling techniques and packaging. Moreover, practices such as Eco-design and Life Cycle Assessment may promote a sustainability-oriented decision-making process.

At industrial ecosystem level:

- **Develop strong partnership and symbiosis networks**, to enhance the CE potential which cannot be fully exploited at smaller scale, both in terms of material and energy recovery opportunity.
- **Sharing success stories**, to support the spreading of sustainability-related practices.

¹⁰ Mura, M., Longo, M., Domingues, A. R., Zanni, S. (2019). "An exploration of content and drivers of online sustainability disclosure: A study of Italian organisations", Sustainability, Vol. 11, No.12.

At policy level:

- Reward companies which implement sustainability-related practices at a systemic level, both internally and at industrial ecosystem scale. This should be accomplished not only through rewarding schemes in public tenders, but also through adequate tax relief systems.
- Supporting a prioritization of practices to target the efforts of companies, enhancing the more strategic ones.



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