

Special Issue Future of Smart Cities

# FUORI LUOGO

Rivista di Sociologia  
del Territorio, Turismo, Tecnologia



*Guest Editors*

**Monica Bernardi**

**Luca Bottini**



Direttore Fabio Corbisiero  
Caporedattore Carmine Urciuoli

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# The promotion of sustainability policy in the urban context: the role of industrial companies<sup>2</sup>

## 1. Sustainability, urban space and industrial areas

The effects of the connection between urbanisation and industrial development have been the subject of urban studies for more than a century. Today, against the urgency of the changes imposed by the climate crisis, it is necessary to carry out accurate analyses and define appropriate tools that support the necessary alliances that must develop between models of city governments and corporate actions, including their social roles. In addition, it has been widely recognized how civic space is a constitutive element of social, economic, political, cultural, and ecological relations and development processes. In particular, many contributions of geographic urban studies have underlined the significant role these factors take in shaping development itself (Harvey, 1982; Markusen, 1987).

In cities, economic activities are concentrated, innovation develops, transport, trade and information flows converge. Urban and environmental issues produced by rapid urbanisation have become highly problematic for local governments (Dizdaroglu *et al.*, 2012) and many cities in all parts of the world are today struggling with complex environmental or socio-economic problems such as natural disasters, climate change, loss of biodiversity, ecosystem destruction, internal disparities, socio-economic inequalities, and digital and knowledge gaps (UNDESA, 2019).

Historically, in many countries (mainly but not exclusively European), rapid urbanisation has been a direct consequence of the growth of industrial centres (Gollin *et al.*, 2016). More recently, urban areas have been characterised by moments of de-industrialisation (Tregenna, 2009) and re-industrialisation that have led to a series of widespread phenomena, with the emergence of virtuous micro-processes undertaken within the creative-cultural economy and participation in social innovation (Florida, 2005). Above all, however, a new focus has arisen on the promotion of sustainability in the urban environment (Finco & Nijkamp, 2001). Because they host most of the human population and are the places where the majority of the world's energy is consumed (60-80%) and where carbon emissions (75%) are produced, cities are now playing an ever more crucial role in combating the climate crisis and promoting sustainability (UN-Habitat, 2022). The situation fares no better when assessing the impact of industrial activities on world pollution, which is still responsible for a majority of the damage to human health, ecosystems and the climate (European Environment Agency, 2021) we are witnessing in this era.

Reducing negative impacts is therefore a priority that unites cities and industries (Fanfani *et al.*, 2021). This vicinity, both in terms of territory and of issues to be solved urgently, has led to the hypothesis that there is a need to promote 'circular' and 'metabolic' relationships and flows between urban and peri-urban spaces, whether industrial or agricultural (Bellamy Foster, 1999), to sustain settlement resilience (Newman *et al.*, 2009) as well as "non-expulsive" forms of development (Sassen, 2014). From this perspective, we can read about recent efforts to promote development scenarios that have been based on the protection/valorisation of the territory (Cerruti But *et al.*, 2017), through activities such as the reuse of former industrial spaces for socially useful activities or the sustainable and energy-efficient reconversion of production processes and industrial spaces.

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## 1.1 *The promotion of urban and industrial sustainability*

From a top-down perspective of the promotion of sustainability, the 2030 Agenda for Sustainable Development comprises the still unresolved benchmark that has been hotly debated in practice and in the literature. These contrasting views have been manifested in the promotion of conflicting policies and “stop-&-go” kinds of actions that different governments have put in place, as well as in the fact that only certain groups in civil society are, today, fully aware of and sensitized to the topic of sustainability. The 2030 Agenda expresses a clear judgement on how unsustainable the dominant development model is, and highlights the needs to integrate economic, social and environmental dimensions in all future actions. All the world’s countries are called upon and will have to play an active role in the struggle to contrast the climate crisis. Consequently, each country should actively engage in defining its own development strategy to achieve the Sustainable Development Goals (SDGs) included in the implementation of the 2030 Agenda, which envisages and requires a strong involvement of all components of society, from public sector enterprises to civil society, philanthropic institutions, universities and research centres, as well as information and cultural actors (Mura *et al.*, 2022).

As far as Europe is concerned, in December 2019 the European Commission approved the European Green Deal (COM/2019/640), Europe’s sustainable growth strategy, in which the environmental and climate protection goals and the 2050 net zero emission targets were set. Then, the European Parliament defined a series of wide-ranging strategies that aim to support the green transition. Among the points considered in the Green Deal are reducing emissions, supporting the recovery of biodiversity, promoting a more sustainable economic model of production and consumption (through circular economy, technological innovation in industry, recycling, changes in the food system, etc.) and providing economic support for those countries and population groups that are most affected by the changes taking place.

In July 2020, the European Council also endorsed the Next Generation EU (NGEU), providing for the allocation of substantial resources to help EU Member States overcome the Covid-19 pandemic crisis and revive their economies. In order to access the resources provided, Member States had to adopt a Plan for Recovery and Resilience (in Italy the NGEU), which required approval by the European Council upon proposal from the Commission. The NGEU’s objective is to stimulate investments that drive recovery and to implement reforms that increase the sustainability of national economies, making them more resilient for the future (Coppotelli, 2022). Unfortunately, recent events in international politics, such as the Russian aggression in Ukraine and the ensuing energy crisis that has mainly affected Europe, but with obvious consequences also worldwide, are rewriting the political agendas of all EU countries and many others also with respect to decarbonisation commitments (Butera, 2022) and sustainability in general.

## 1.2 *SDG for urban and industrial sustainability*

Promoting the sustainable development of industries is a key objective of two of the UN Sustainable Development Goals (SDGs): SDG 9 aims to promote inclusive and sustainable industrialisation and SDG 12 seeks to sustainably manage natural resources, chemicals and waste. Furthermore, SDG 11 strives to promote positive linkages between urban, peri-urban and rural areas as well as urban resilience. A recurring concept in these SDGs is resilience. Both the ability of cities to recover after traumatic events and to adapt to changes in the urban ecosystem is what is meant by urban resilience. According to Folke (2016), the most relevant traits of resilience now include the capacity for continued learning, self-organization and adaptation to dynamic environments. To understand the paths of resilience and sustainability in the urban environment we need to focus our attention on the combined impact of urban growth and global climate change, and how

cities can develop whilst, at the same time, the social, economic, environmental, and governance needs of current and future generations can be protected (Wendling *et al.*, 2018). To pursue this aim, clearly, collective efforts and the adoption of interdisciplinary approaches that can address the problem on different levels will be required.

One of the strategies promoted at a European level is the circular economy, that is to say, “a production and consumption model that involves sharing, lending, reusing, repairing, reconditioning and recycling existing materials and products for as long as possible” (European Parliament, 2022a), which is an economic model that pursues a radical innovation of production and consumption systems with the aim of separating resource consumption from value creation. This model adopts the principles of the “3 Rs”: Reduce, Reuse and Recycle (Ghisellini *et al.*, 2016):

- the principle of reduction pursues the minimisation of the use of energy, raw materials and waste generation through production efficiency (so-called eco-efficiency);
- the principle of reuse refers to any operation by which products or components that are not waste are reused for the same purpose for which they were conceived (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and on repealing certain directives, 2008);
- the principle of recycling refers to “any recovery operation by which waste materials are reprocessed into products, materials or substances to be used for their original purpose or for other purposes. Though this includes the reprocessing of organic material, neither energy recovery nor reprocessing to obtain materials to be used as fuels or in backfilling operations are involved” (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and on repealing certain directives, 2008).

Back in the early 2000s, the application of these principles to industrial development led to the idea of industrial symbiosis (IS), an approach developed primarily in engineering, which “engages traditionally separate entities in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and by-products” (Chertow, 2000, p. 314). More recently, studies focused on developing alternative forms of energy production and consumption have led to the extension of the concept of a mutually beneficial relationship between industry and the urban sphere, hypothesizing the possibility of an urban-industrial symbiosis. This model posits a positive relationship between the urban and industrial fabric. According, for example, to Butturi *et al.* (2019), “synergies among eco-industrial parks and the adjacent urban areas can lead to the development of optimized energy production plants, so that the excess energy is available to cover some of the energy demands of nearby towns”. Therefore, for the purposes of this discussion, we have borrowed this idea of positive interaction between the (rapidly evolving) urban space and industrial areas as an example of a very real strategy that can foster regional eco-development in industrialised urban and peri-urban areas.

## **2. The role of different stakeholders in promoting sustainable actions**

The relationship between the urban fabric and industrial systems has been represented using different models since the 1970s, whilst experiences in Italy have provided support to some particularly important contributions (Camagni, 1991; Trigilia 2001). Several models have approached the study of systems innovation from the standpoint of the analysis of the relationships among the different actors involved, such as private companies, public institutions and the research world, (Etzkowitz & Leydesdorff, 1998). More recently, these models (first of all, the triple helix model) has been revisited in order to incorporate the demands of sustainability, adding additional helices to represent relevant categories and advancing the proposal of quadruple helix models. The additional propellers took the form of civil society, the smart city, sustainable green resources or eco-innovation. In recent years, a quintuple helix theory has also included the environment (Galvao *et al.*, 2019, Carayannis & Campbell, 2010).

In contrast to this tendency of adding more helices to the models, Etzkowitz and Zhou (2006) proposed analysing the issue of sustainability through two “twin” triple helices. The traditional triple helix, which exemplifies the cooperative arrangements between university, industry, and government to induce innovation, would then be paired with a triple helix composed of university, government and civil society, which could accommodate the space dedicated to controversies over technological innovation. University, industry, and government relations, based on the principles of reciprocity, most often focus on the positive aspects of developments in science and technology. However, a critical conflict of interests is just as frequently juxtaposed with industry, which pursues maximum commercial performance, and the public actor, which should be committed to upholding high standards for quality of life. It cannot be denied that the university-industry-government triple helix does not necessarily lead to sustainable development (Zhou & Etzkowitz, 2021). When problems arise, public institutions begin to play a distinct role, aimed at remedying the negative consequences of development or technological innovation. This creates a university-civil society-government triple helix, which should pursue a balance between development and sustainability.

### *2.1 The role of public actors in the sustainability framework*

Public institutions can exercise their role of direction and correction of development through a range of complementary strategies, and actions on a level of culture, governance, and economics. The current debate surrounding this role, which is both academic and public, has focused on the different relationships that can exist among these aspects, as exemplified by the Green Deal. These associations can readily combine regulatory reform, recommendations and guidelines, the provision of public resources and services, financial instruments and certifications that are fully capable of attracting private investment in support of publicly allocated capital (Coppotelli, 2022).

If, by shifting our point of view, we focus on the objective of “zero emissions” for example, we can see that public actors have generally undertaken actions, which often complement each other, on all the levels mentioned. All these actions that aim to promote low-carbon behaviour at individual and collective levels represent a push for cultural change. Social advocacy, by public entities (city administrations, educational institutions...), of the concept of carbon neutrality in the population is among the main strategies available for this aim (Choi & Ritchie, 2014). On the governance side, there are actions that promote the reduction of carbon emissions through the formulation of specific policies and the use of economic instruments designed for this purpose. Policy instruments may include, for example, self-imposed limits on the carbon released by a given city or region or the promotion of low-carbon cities, which are particularly widespread in China (Lo, 2014). Economic instruments include both taxation and incentives. The carbon tax is the imposition of a tax on greenhouse gas emissions whilst the carbon credit system includes the allocation of emission allowances to groups of recipients in compliance with national programmes. According to a recent report by the Institute for the Climate Economy (I4CE), carbon revenues reached 49 billion euros in 2020, with 52% of the revenue coming from taxes and 48% from allowance markets. Most of the funds then went into projects related to ecological transitions or the general budget of the jurisdiction where they were collected (Postic & Fetet, 2021), thereby turning these projects into incentives.

### *2.2 The role of private companies*

Since the nineteen-sixties the Corporate Social Responsibility approach has become increasingly popular. CSR promotes the idea that a company should not only be concerned about its profitability and growth, but also about its social and environmental impact, including the needs

and opinions of all its stakeholders in its strategies (Mura *et al.*, 2022). Though Corporate Social Responsibility strategies are usually adopted by companies on a voluntary basis, recent European regulations have shown a trend towards pushing the transformation of what were once voluntary actions into legal obligations. For example, the new Corporate Sustainability Reporting Directive (CSRD), passed in 2022, introduced more detailed transparency obligations on companies' impact on the environment, human rights and social standards. The new obligations apply to all large companies, as well as to listed SMEs, which, however, have more time to adapt to the new rules (European Parliament, 2022b).

In a landscape of increasingly stringent regulations and heightened attention to sustainability issues, the need for companies to pursue at least some forms of sustainable innovation is becoming more and more pressing (Cillo *et al.*, 2019). At the same time, sustainable innovation can prove to be a strong advantage for SMEs because it can lead to their gaining a competitive advantage over competitors by increasing brand reputation, customer loyalty, access to sustainable markets and supply chains, and often to access to national and European funding initiatives (Mura *et al.*, 2022).

Whereas the application of sustainable innovation in business includes all aspects and areas, it is not simply limited to product innovation. The different points on which action can be taken include, for example, production systems, logistics, human resources management and infrastructure. However, production systems generally have slow processing times, which cause inefficiencies and waste that reduce system performance (Alves *et al.*, 2015). In terms of sustainability, the benefits of adopting Lean Production strategies such as creating safer workplaces and improving environmental efficiency by eliminating waste, reducing emissions and increasing energy efficiency are described in the literature (Belhadi *et al.*, 2018). In the field of logistics, the focus is usually on mitigating externalities and reducing space and time through the adoption of eco-efficient activities.

Although the application of green logistics encompasses the traditional objectives of coordination activities, it complements these with a broader, more systemic vision that involves all actors along the supply and distribution chains (Engelage *et al.*, 2016). In human resource management, Green HR, sometimes also referred to as Sustainable Human Resource Management (SHRM), has been discussed since the 1990s (Boudreau & Ramstad, 2005; Renwick *et al.*, 2008). SHRM can be defined as the adoption of human resources management strategies and practices that enable the achievement of financial, social and ecological objectives with an impact inside and outside the organisation and over a long-term time horizon (Ehnert *et al.*, 2016).

The basic idea is that to promote the organisational sustainability of a company (Benn *et al.*, 2014) there is a need for the fusion of innovative organisational theories and the development of appropriate synergistic frameworks to support the improvement of companies' environmental performance (Jabbour & de Sousa Jabbour, 2016). Finally, with regard to infrastructure, over the years, the design of sustainable buildings has become a broad and multidisciplinary research activity (Wang & Adeli, 2014) involving the participation of building owners, contractors, suppliers and users. Most of the research carried out on sustainable buildings has focused on energy saving (the creation of net zero energy or positive energy buildings), water saving and the possibility of making buildings greener by reducing carbon emissions, for example, by installing external insulating surfaces to reduce the energy needed to heat or cool the building (Magrini *et al.*, 2020).

### *2.3 The interaction between public and private actors*

At this specific moment in the history of sustainability, if we observe how private, public and civil society actors interact, when dealing with this issue, we are faced with a number of hybrid forms of sustainability governance (Lemos & Agrawal, 2006). Observing the quality of relationships

between public and private actors in the promotion of sustainability Cashore *et al.* (2021) identified a number of categories, ranging from collaboration to coordination, from isomorphism to competition and “chaotic” coexistence. Often, competitive relations occur when one of the actors, be it public or private, formulates regulations that replace, subvert or empty of meaning those formulated by the other actor. In other cases, the presence of an overly complex system of regulations leads to the coexistence of conflicting objectives whereby chaos ensues.

Then, the question arises: How can these forms of governance reach the ideal situation of complementary collaboration, in which the public supports the private to facilitate compliance and the private sector’s objectives so that they are aligned with the environmental policies defined at the public level? Initially, the hybridisation between different forms of governance tends to lead to a proliferation of parallel, and often uncoordinated or even mutually exclusive, standards. This first phase is usually followed by a moment of competition between the different standards, with some of them falling into disuse whilst others conquer their own application niche. After this first selection, coordination mechanisms usually intervene, leading to the integration of different standards, or to the definition of forms of meta-governance. Finally, there is frequently an attempt by public bodies to integrate and expand the implementation of particularly widespread or effective standards, even though they originated in the private sector (Lambin & Thorlakson, 2018). Currently, we are still in a situation that tends toward instability and proliferation, where the reference framework is neither perfectly clear nor particularly integrated. The case study developed here highlights a number of critical features and addresses the need to explore where companies stand in this debate.

### **3. Italian SMEs between urban development and sustainability**

The 2018-2020 ISTAT Report on Innovation in Enterprises notes that the objectives of undertaking actions with a low environmental impact and of reconciling innovation and environmental protection are being increasingly included within company strategies. In the 2018-2020 three-year period, 40.3% of the innovative companies surveyed declared that they had introduced one or more innovations that had positive effects on the environment. Generally speaking, large companies are more attentive to environmental sustainability (56.1% vs 39.1%) than small companies.

#### *3.1 Methodology*

In the context of studying sustainability assessments of several Italian companies, we had the opportunity to collect a set of qualitative and quantitative data that we discuss in relation to the theoretical background so far introduced, focusing on the territorial distribution of SMEs with respect to cities and on the degree of innovativeness and sustainable innovation of SMEs. The tools for data collection included:

- a sustainability assessment reporting tool based on the GRI Standard;
- a semi-structured survey directed at company leaders, organized around four main topics: innovation, growth, and change management in the company, assessment of the company’s vision, awareness and efforts made for sustainability, assessment of employees’ motivation and vision, relations with the territory and public actors;
- an ad hoc questionnaire investigating daily behaviours (with a specific focus on mobility to/from work) and attitude towards sustainability as well as motivation and attitude to change in relation to work. The questionnaire was submitted to all company staff. Data were collected on a voluntary basis using a pen and paper questionnaire, and the response rate was 52%.

### 3.2 Sample

Our analysis involved three private companies, which employed between 25 and 500 workers, with a total of 10 production plants (company 1: two plants, company 2: two plants, company 3: six plants), located in North and Central Italy, (Table 1).

Although a sample of convenience was adopted, these specific companies were selected based on their dimensions and locations in relation to urban and peri-urban environments, whilst the sample was not developed with the intention of providing any comparisons of the differences based on their geographical positions. All but one of the plants in the analysis were in the vicinity of urban centres, mostly small and medium cities, placed among industrial zones and agricultural land. Moreover, two of the plants were near natural parks, with high levels of biodiversity. Eight of the plants were near logistical infrastructure (motorways, naval ports, railway hubs), whilst two were relatively far from logistics hubs so the company's suppliers' trucks had to travel significant distances on secondary provincial roads.

Ten relevant actors were interviewed for this study, most of whom were over 70 years old. For the most part, they were CEOs, general managers, HR managers, operations and procurement managers, and members of the administrative and governance bodies. Only one of the interviewees was a woman. None of the facilities involved in the study had a sustainability delegate, and all sustainability decisions were somewhat centralized with the CEOs of each firm.

Whilst in companies 1 and 2, corporate policies were implemented equally in all plants, company 3 had a more variegated situation, where different strategies and management methods were applied by the different functional areas, including customer and supplier relations, use of raw materials and water resources, staff training and skill development, as well as some aspects of human resource management. A total of 656 questionnaires were distributed and collected, covering about half of the total employee population surveyed.

### 3.3 Results and discussion

The production activities at each of the plants observed caused a number of environmental impacts in the area around the plant, which also included, given their territorial proximity, adjacent cities. The impacts identified were direct emission of greenhouse gases and pollutants at two plants of company 3, intensive use of water with effects on the water basin in nine plants out of ten, production of contaminated water classified as waste in four plants, (one at company 1 and three at company 3), five plants had considerable impact on the road infrastructure, (one plant at company 1, one plant at company 2, and three plants at company 3). In seven of the ten plants, including the business with more than 500 workers, the employees travelled to work exclusively by car. Even though in the other three, located in the close proximity to urban areas, many of the workers used public transportation or cycled to work, they represented a minority of the employees compared to those who drove their cars.

Although the annual revenues of the three companies varied (being €90 M for company 1, €130 M for company 2 and €185 M for company 3 respectively) their behaviour regarding local monetary investments on the ground, was fundamentally the same: small donations to charities or sponsorships of local sports teams or, in most cases, none. In all three companies, total such investments did not exceed 0.05 percent of revenues. In contrast, more substantial investments were made to improve the energy performance of the plants, including the use of photovoltaic panels applied to the thermo-technical assessment of the building. On the other hand, whilst there were more than 1,000 direct suppliers that worked with the ten plants, only company 2 applied environmental and social sustainability criteria, in addition to economic criteria, in choosing a certain supplier over another.

Of the themes touched upon during the interview, five were the most relevant to our research.



The first topic investigated concerned each company's use of space, and its development needs and projects. The use of the local space was not problematic only for company 1. Whereas even though company 2 occupied a very large area, it was located far from logistical infrastructure with high volumes of goods entering and leaving the plant. This meant that the small provincial road that runs through the valley was saturated with trucks, effectively creating a not negligible "occupation" of collective space, which was an aspect that was noticeable to management, but for which there were no proposed solutions.

Company 3, on the other hand, had a need to increase the area allocated to its production facilities. Actually, a transaction to purchase adjoining land had just been completed, involving more than 40 owners of even tiny pieces of land adjacent to the plant. Therefore, what was once a green area, measuring more than 10 hectares, even though it was not maintained, was converted into a built-up area with no specific concerns expressed by management. Even if the company was already situated in a highly built-up area, the further cementing or taking away of green space, open land for agriculture was not perceived as problematic.

Secondly, managers were asked to assess how important and/or strategic for their companies it would be to achieve sustainable innovation and in what specific areas the innovation effort was being focused. According to the managers of company 1 and company 2, their organizations needed to invest in sustainable innovation because their customers were large multinational organisations that, over the past few years, have adopted increasingly stricter criteria regarding the environmental impacts of their suppliers' products and processes. Therefore, the pursuit of sustainable innovation was an instrumental interest, focused almost exclusively on the environmental and reporting aspects that are required by customers. In these cases, social sustainability was not addressed, even though management did recognize that being a sustainable company is an important and attractive factor for younger generations. Company 3, having no significant reporting obligations to date about sustainability, was instead very focused on the wellbeing of its workers and the local community. They had been working to activate processes to increase sustainability awareness and skills, whilst also trying to implement innovative paths, some that might even be considered radical.

Another element that was taken into consideration was the level of sustainability awareness, that is to say, the motivation and openness to change found among all employees, which should have had a cascade effect on the local community (social advocacy and cultural change). Management judged its employees to be, on average, moderately motivated in the workplace. This was a point we were able to confirm by comparing the interviews with the results of an anonymous survey administered to all workers. Moreover, the quantitative data collected showed a greater level of openness and motivation to change (in a sustainable direction) among white-collar workers than there was among the blue-collar workers. However, the active roles of the employees in the plants involved in the study was shown to be low or non-existent. Granted that most of the unsustainable behaviours adopted by employees (e.g., exclusive use of the car for workplace mobility) were perceived as problematic, these were not the subject of actions that were deemed to require a change.

There were some formalised processes used to collect ideas and proposals for change and innovation from employees, yet participation was low. Since company 3 was relatively young and had a recent history of takeovers, which created a rather diverse situation both territorially and in terms of organisational culture, the male presence was predominant, sensitivity to issues of diversity and inclusion was very low, and attention to environmental impacts was basically limited to legal compliance. This situation seemed to be only partially acknowledged by management, which, although aware of the problem, seemed to lack the appropriated knowledge to implement concrete solutions.

The next point of this investigation focused on the relationship between private and public, which brought up the questions: Who is responsible for promoting sustainability? What was their opinion on the tools the public provides to impel sustainability? The leadership figures interviewed were

quite critical of the public's role in supporting a sustainable transition. Company 1, which worked in the automotive sector, where there are many regulatory constraints, foresaw even stricter regulations for the future. Albeit, the other two companies have fewer constraints, in the future, they too will be affected by increasingly restrictive regulations on the environmental impact of their processes and products. Within this framework, the role of the public actor was perceived as purely regulatory, since it did not provide any material support for development and change.

Nevertheless, some specific issues did indeed emerge in this regard. For example, it was pointed out that, because there was no local public transportation, no car sharing services, and the location of the plants made it dangerous and objectively uncomfortable to use a bicycle, in most cases the only way to get to work was to use one's personal car. The companies have not proposed any solutions, nor have they encouraged carpooling, or done any mobility tracking of their employees. Management's view is that it is not up to the company to take action to improve public mobility infrastructure, but if there was a roundtable discussion promoted by a public actor to propose improvements, they would gladly participate.

Another example was related to the infrastructure to produce renewable energy. Companies 2 and 3 had just installed photovoltaic panels on the roofs of their plants, and company 1 was planning to do so soon. The reasons for this operation were purely economic, given the rising costs of energy. Indeed, producing clean energy is generally perceived as the task of the energy producers. It would be very positive if a public actor conveyed the production of energy from renewable sources within an area, thus including the roofs of houses and factories, without relying on citizen's sensibility and resources.

Finally, as concerns waste management, company 3 contracted the collection and treatment of its waste to several consortiums in the areas where the different plants were located. The waste produced was all properly classified according to national and European regulations. The regulations, however, stipulate that a company can deliver its waste by classifying it with a code that assigns to the collector the responsibility of sorting it and allocating it for reuse, recycling, composting, waste-to-energy, or landfill. The group, by custom, had always classified its waste for this latter method of disposal. Therefore, even though 98% of its waste was composed of recyclable materials, the company was unable to say with certainty where the waste it delivered would end up nor what the actual percentage of recycled waste was. Again, it appeared to be the public actor that was not capable of playing any role in waste treatment coordination or in ensuring better management of the process, including from a circular perspective.

In the experience of those interviewed, collaboration among actors to promote sustainable innovation were rare, since nearly all actions were implemented based on autonomous inputs. Apparently, the private sector (especially multinational clients) frequently set environmental standards to which the entire supply chain is expected to conform, under penalty of exclusion from doing business. Sometimes, these standards are drawn from supranational legislation, though more often, there are no defined rules and standards can vary from client to client.

Only company 2 had a very strong connection with the local community, and actively promoted economic, environmental and social sustainability. Recently, company 2 promoted projects in collaboration with a nearby women's penitentiary, and with some hospitals which were both local and in other parts of Italy, to further the understanding of and harness the positive social impact generated by its products. However, there were no formal discussion groups or committees in which private and public actors participated, nor were there any monitorable and verifiable processes to manage this system of territorial development. In the other two cases, although the path to include the promotion of sustainability in the local community had only just begun, so far the process was entirely internalized and was supported by private consultants whilst there was no relationship being developed with the public or even among the workers. In all cases, also due to the size of the companies (all of which were SME) their relationship with the territory was mainly the result of the specific representations and sets of values expressed and maintained by management.

## Conclusions

The general aim of this study has been to reflect upon the relationships between industrial and urban areas, and the critical role that both must play in the path to a sustainable future. Academic research is already debating the positive impact that a carefully planned interaction between companies and nearby urban areas could have in terms of sustainability. At the same time, the difficulties of promoting coordinated and mutually supportive actions between public and private actors have been highlighted, and we seem to still be in a phase of overlapping and conflicting regulations and attributions of responsibilities.

Since the nineteen seventies many models explaining the processes that interlink industry, innovation and growth of cities have been proposed (Ramella, 2013). More recently, thanks to the growing attention dedicated to the issues of sustainability, climate change and the general problems derived from human activities in the Anthropocene (Beall & Fox, 2009), and different aspects of this relationship have become the focus of attention. As clearly stated by the SDG 11.a, it has today become imperative to “support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning”, in order to achieve sustainable urban environments. The definition of policies and development plans that may ensure balanced territorial evolution is tightly intertwined with the promotion of sustainable industrialization (SDG 9).

Small and medium size companies represent a relevant proportion of Italian industries, and are usually situated in peri-urban areas, industrial zones or those regions previously dedicated to rural or agricultural activities. As a consequence of this proximity, the unsustainable impact of a company necessarily affects a city in several ways. A number of examples of these relationships are provided by our sample. For example, poor management of the waste generated by industry tends to clog up a city's waste disposal network. Disproportionate use of the road network compared to its structural capacity has often been found to be a detriment to the community (heavy traffic, roadway impairment, etc.). Unsustainable models of production, and management of corporate activity can and often does create an unsustainable organizational culture that affect all its employees.

However, companies can become promoters for the development of a wide range of sustainable practices. They can be involved in the planning and realization of infrastructure networks and home-work journeys, with positive spin-offs for the local community. They can also create the conditions for the emergence of energy communities, as proposed by the UIS models. By fostering staff training on sustainability, which is functional to the company's activities, yet which produces a change in people's mindset and thus in the urban community itself, these goals can be achieved to some extent.

What emerged clearly from our investigation, however, was a generalized lack of tools and knowledge among private actors. This seems to stem from the fact that companies lack standardized procedures and professional figures devoted to the management of sustainability, and, consequently, a number of significant issues arise. Starting from the overrepresentation of older males in decision-making positions, these issues often include the lack of the adoption of any sustainability criteria for the selection of suppliers, the problematic use of the territory, with negative impacts on green areas and infrastructure and, also, little or no reinvestment of corporate revenues to support local sustainability endeavours. For the most part, any actions implemented are not organized through general, comprehensive planning and tend to address very specific issues with a reduced overall impact. Within this confused regulatory scenario, where different systems of legislation and standards coexist and, in some cases, even overlap, communication among the actors is frequently impaired by an insufficiency of channels of interaction among stakeholders, especially local actors (companies, employees, civil society, local administrations, etc.), which often leads to a tendency to offload responsibilities.

This is a scenario that appears to still be prominent. All too often sustainability is conceptualized more to “remain in the game” played among the big international industries than as an asset in and of itself. Especially in Italy there is clearly a lack of a strong and acknowledged public actor capable of sustaining small and medium industries in this change.

Accordingly, many questions remain open for serious discussion. These include the path to translating European and international goals into effective local strategies of development, and then into those very strategies that would support the integration of sustainable planning at all levels of corporate action, and that could ensure real collaboration with local stakeholders. Regardless, it still seems fair to affirm that there remains significant, unexploited potential in relations that can possibly be developed among industrial and urban areas and concerned actors and stakeholders. Further research should broaden the samples selected, allowing a deepening of the understanding of the reciprocal influences that arise between companies and local communities, and the impact of different territorial forms of governance and local actors on the development of sustainable systems.

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	Company 1		Company 2	Company 3				
Annual revenue	about 90 million euros		about 180 million euros	about 160 million euros				
Employees	About 100 employees	About 100 employees	About 600 employees	About 100 employees	About 100 employees	About 100 employees	About 25 employees	About 100 employees
Number of plants	1	1	2	1	1	2	1	1
Location	Industrial area in the municipality, inside the perimeter of the ring road, 3 km from the city centre (population circa 200,000)	Industrial and commercial area of a small town, adjacent to a highway, and to a regional nature park, 10 km from the city centre (population circa 100,000)	Provincial road, in the middle of the countryside, outside industrial and urban areas and far from logistical infrastructure, 11 km from the city centre (population circa 40,000)	Industrial and commercial area of small town, adjacent and to a natural park, 10 km from highway, 12 km from the city centre (population circa 100,000)	Industrial area, 5 km from highway, 2 km from the city centre (population circa 25,000)	Industrial area, adjacent to Po River, 20 km from the city centre (population circa 100,000)	Industrial and commercial area 10 km from Rome's "Grande Raccordo Anulare" [Ring Road]	Industrial and commercial area in a small town, adjacent to a national park, 9 km from the city centre (population circa 100,000)
Environmental impact of production activities	Metal turning, use of water in industrial processes and production of contaminated water	Metal turning, use of water in industrial processes and production of contaminated water	High amount of logistics activity (all warehousing is in-house), high greenhouse gas emissions from the supply chain located in the surrounding area	Metal turning, use of water in industrial processes and production of contaminated water	Low environmental impact	Metal turning, metal painting, use of water in industrial processes, production of contaminated water	Low environmental impact	Metal turning, metal painting, use of water in industrial processes, production of contaminated water
Home-work commute	Use of personal cars average, also alternative transportation, including public transportation and bicycles	Use of personal cars prevalent, average distance driven over 20 km	Exclusive use of personal cars, average distance driven over 30 km	Exclusive use of personal cars, average distance driven over 30 km	Use of personal cars average, also alternative transportation, including public transportation and bicycles	Use of personal cars prevalent, average distance driven over 25 km	Use of personal cars prevalent, average distance driven over 40 km	Use of personal cars average, also alternative transportation, including public transportation and bicycles
Approximate number of direct suppliers	60	80	315	320	280	380	240	50
Actions to monitor or assess social or environmental sustainability of direct suppliers	None	None	Monitoring protection of workers' rights of suppliers located in the Far East.  Selection of 80% of suppliers within 100 km of the plant.	None	None	None	None	None
Investments in local territory	None	Donations and sponsorship of sports teams	Donations, end-of-life of unsold products to local and national entities with social benefit purposes	Donations and sponsorship of sports teams	None	None	None	None

Investment in environmental sustainability initiatives	None	Photovoltaic panels	Photovoltaic panels	None	None	None	None	None
Level of sustainability awareness*	Medium-high for white-collar workers, very low among blue-collar workers		Medium-high	Low				
Level of employee engagement in sustainability initiatives	Circumscribed initiatives in which the individual worker can contribute		Presence of dedicated tools to engage employees, but participation is low	No actions and no space for employees to introduce sustainable innovations				
Initiatives with local government	None		None	None				
Network relationships with other stakeholders	None		Roundtable discussions with local suppliers. Applied research initiatives in collaboration with universities, hospitals and prisons	None				
Circular economy/ Waste management initiatives	Closed loop between foundry and organization for recycling and re-refining aluminium scrap		Use for a line of products of at least 80 percent recycled paper and at least 60 percent recycled plastic from local suppliers	Closed loop between foundry and organization for recycling and re-refining aluminium and other scrap metals				

\* The level of sustainability awareness has been defined via cluster analysis on the quantitative data collected via questionnaires