

Assessing the relationship between Industrial Ecology, Industrial Symbiosis, and Territorial Development over time

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Since Frosch and Gallopoulos (1989) popularised the concept of Industrial Ecosystems by proposing industrial processes to resemble a natural ecosystem, there has been an increase in the literature written about Industrial Ecology. While Graedel and Allenby (1995) wrote the first book on the subject, early developments on the metabolisms of flows of materials were simultaneously proposed (Ayres, 1994) generating a clearer understanding of the concept and its associated methodologies. Further contributions examined the implications and limitations of Industrial Ecology for achieving a sustainable development (Brand and De Bruijn, 1999; Korhonen, 2004) and its links with policy (Allenby, 1999; Chertow, 2008) and territory (Ehrenfeld and Gertler, 1997; Deutz and Gibbs, 2008).

Since the 1990s, there has been a significant increase of the literature on Industrial Ecology and related subjects. The results of a first bibliometric analysis, using the concepts of “Industrial Ecology” and “Industrial Symbiosis” as keywords, demonstrated that the production of academic literature has transitioned from an average of 32 publications per year in the second half of the decade of the 90s (1995-1999) to an average of 288 publications per year during the last 5 years (2014-2018). That means an increase of 17% annually since 1963 (year of the first publication registered by the database of Scopus).

In a previous literature review on the concept of Industrial Ecology, a gap was noticed, namely that few studies connect the impacts of Industrial Ecology and Industrial Symbiosis strategies to the territory upon which they are based. Instead the literature tends to focus attention on only those geographical areas where Industrial Ecology activities and strategies take place, such as eco-parks, eco-industrial parks, and suchlike. It rarely examines larger territories, such as cities, regions and city-regions.

Accordingly, a comprehensive bibliometric analysis was undertaken in order to explore the relationship between concepts of Industrial Ecology, Industrial Symbiosis and territory. Searches relating to the concept of territory focused on four different concept categories: “Regional Development”, “Regional Planning”, “Urban Development” and “Urban Planning”. Those four concepts were recognised as the most frequent and relevant keywords/categories in the academic literature to demonstrate the link between territorial development and the concepts and code words “Industrial Ecology” and “Industrial Symbiosis”.

The result of the search showed that annual scientific production of Industrial Ecology literature has increased an average of 11% since 1975, going from an average of 1 article per year in the second half of the 90s (1995-1999) to an average of 10 articles published per year in the last five years (2014-2018). However, a result of 133 articles relating the concepts chosen represents a total of 3-4% of the publications containing only the words “Industrial Ecology” and “Industrial Symbiosis”.

The proposed article will develop a fuller bibliometrics analysis on the subject in order to contribute to the development of better ways to capture the benefits of the operationalisation of the concept of Industrial Ecology. The assumption is that territorially based strategies are more conducive for developing the potential of industrial systems to generate more sustainable practices. Industrial Ecology contributes to generate holistic framework to generate sustainable change, not only at the individual firm scale, but as a network of firms that generate a wider industrial ecosystem with the goal to minimise the environmental impact of their activities.