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Firm–local community relationships in polluting industrial agglomerations: How firms’ commitment determines residents’ perceptions

Abstract

This research contributes to the literature on the management of firm–local community relationships in polluting industrial agglomerations. Taking as reference a previous quantitative study on residents’ perceptions of economic benefits and risk in the vicinity of two Spanish petrochemical complexes (Castellón and Tarragona), the aim of this paper is to analyse how companies in the two areas have built and manage, individually and collectively, their relations with the local community, while assessing the extent to which a more committed management has resulted in a more favourable perception by the public. For this purpose, we conducted in-depth interviews with managers of the main companies on the two sites. The results show different patterns of behaviour by firms in the two industrial agglomerations. Companies located in the area of Tarragona, where citizens’ perceptions were more favourable, have historically been more committed to building stronger socio-economic links with the local community and encouraging a sense of community, and to making greater efforts to engage local residents through a process of dialogue. Moreover, the existence of a collective strategy in Tarragona, coordinated through a local industry association, has also played an important role in facilitating the industry’s relationship with the local community. The findings of the study suggest the need to consider the industrial agglomeration and the firms’ collective actions in research on relationships with the local community alongside actions by individual companies.

Keywords

Industrial agglomerations, risk perception, firm–local community relationship, communication, stakeholder engagement, collective strategy.

1. Introduction

Firms need to consider how diverse stakeholders influence their operations (Freeman, 1984; Frooman, 1999). Firms do not operate in isolation. They are part of wider business ecosystems, in which they coevolve with a wide range of stakeholders- organisations and individuals (Moore, 1996). However, firms do not paid the same attention to all of their stakeholders when it comes to understanding and managing their needs and expectations most appropriately. Local communities located near firms' facilities –what Dunham et al. (2006) call *communities of place*– have traditionally been given less attention than other stakeholders (Calvano, 2008). Nonetheless, local communities are a central organisational stakeholder, especially in the context of certain industries whose operations generate considerable negative externalities that they are affected by (Beamish, 2001; Berry, 2003; Dunham et al., 2006; Walton, 2007). Local communities may put pressure on firms directly, or indirectly through their elected representatives, to improve the firms' environmental behaviour (Delmas and Toffel, 2004; Qi et al., 2011; Zhang et al., 2008).

Pressures from local communities are exerted at plant or facility level rather than at corporate level (Delmas and Toffel, 2004). Consequently, potential firm–local community conflicts arise in particular geographic locations. Furthermore, industries such as the petrochemical industry tend to be concentrated in the same geographical location, resulting in industrial agglomerations with significant negative externalities in terms of pollution (Bowen et al., 2009; Kyriakopoulou and Xepapadeas, 2013). People's perceptions are generally more closely associated with the entire industrial agglomeration than with the individual firms (López-Navarro et al., 2015). However, this aspect has been little explored in the literature on firm–local community relationships.

This article focuses on how firms located in polluting industrial agglomerations forge and manage their relations with the local community at both individual and collective levels. The

research starts from a previous quantitative study on the perceptions of residents in the vicinity of two petrochemical complexes on the Spanish Mediterranean coast (Castellón and Tarragona), specifically on the economic benefits and health risks the residents associate with the complexes. These industrial agglomerations cannot be understood solely in relation to the impact of their pollution and the perceptions of risks associated with them. Research on the relationship between industry and local communities has also looked into the dual role industries play in sustaining local economies and influencing people's quality of life (e.g. Castán-Broto, 2013; López-Navarro et al., 2016). The abovementioned study found that residents near the Tarragona petrochemical complex had more positive perceptions in both dimensions (higher economic benefits and lower risk); the Tarragona residents also reported higher levels of trust in the way firms manage risk, a variable traditionally associated with risk perception in the literature (Siegrist, 2000; Ter Huurne and Gutteling, 2009). The greater size of this complex in terms of activity and jobs might explain the residents' perception of higher economic benefits. One initial explanation for the differences in residents' risk perception might lie in the differences in the environmental performances of the firms on the two sites, if this difference is consistently appreciated by residents. However, the aggregate data provided by the public administrations (publically available data) show that the levels of the air pollutants analysed are similar, and below established thresholds, in both cases. Moreover, it should be noted that the number of pollutant substances for which information is made public is very limited and clearly insufficient for the public to be able to assess the risks. An alternative explanation for these results could lie in the way companies manage their relationships with the local community –their commitment to and engagement with the local community– a factor that can have a determining effect on residents' risk perception. As the literature points out (Frewer et al., 2002; Kim et al., 2015), risk perception has a strong social component as “it depends on the social and political context in which hazard risk is experienced” (Larock and

Baxter, 2013: 729). Indeed, risk perception may be influenced by the actions of those institutions, such as companies, associated with either the cause of risk or the risk itself (Renn and Benighaus, 2013). Moreover, as Luhman (1990) suggests, risk perception may be a result of social communication, so companies will try to improve their communication policy in order to better manage their relations with citizens, and thereby reduce the perception of risk (Hurlimann et al., 2008; Tortosa et al., 2014).

With this in mind, the objective of this research is to analyse how companies in these two industrial agglomerations have built and manage their relations with the local community at both individual and collective levels, while assessing the extent to which a more committed management has resulted in a more favourable perception by the public. To achieve this objective, we conducted in-depth interviews with managers of the main companies in the two petrochemical sites. Managers assessed the results of the previous study and explained how their firms manage their relationships with the local community. In addition to the interviews with managers, each organisation was examined in relation to the available company reports and grey literature, as well as the presentation of the firm online.

This research contributes to the field of business–stakeholder relationships by furthering our understanding of the nature and diversity of firms’ interactions with the public in industrial agglomerations, and how companies interpret residents’ perceptions of their industrial activity. The paper is structured as follows. First, in the theoretical background, we examine the literature on the firm–local community relationship and the firms’ responses in terms of their commitment and local community engagement. Second, we describe the two areas under study and present the results from the earlier quantitative study of residents’ perceptions mentioned above. The third section presents the qualitative methodology used in the empirical study. The results are then reported and discussed, together with the main conclusions drawn from the study.

2. Theoretical background

Natural advantages often explain the location of many industries and their consequent concentration in a particular geographical space (Krugman, 1999; Kyriakopoulou and Xepapadeas, 2013). Related industries may also need to locate in adjoining areas, generating a high concentration of economic activity in the same geographical area. These agglomerations generate economic benefits for companies and, by extension, for the economic development of the area in which they are located (Chertow et al., 2008). However, high industrial concentration, particularly in some sectors, is associated with pollution, and additional impacts that have substantial social and environmental costs (Baby, 2008; Bowen et al., 2009; Kyriakopoulou and Xepapadeas, 2013). The effects of environmental contamination on citizens' health have been extensively documented in the literature (Legot et al., 2012; Pope and Dockery, 2006). Apart from residents' awareness of the cause–effect relationship between industrial pollution and specific diseases, potential exposure to contaminants creates uncertainty around this issue, resulting in a perception of risks that further undermines citizens' quality of life (Boardman et al., 2008; Li et al., 2014).

Firm–Local Community Relationships

Stakeholder theory holds that firms need to manage relationships with their stakeholders properly with the ultimate aim of improving their performance (Freeman, 1984; Frooman, 1999). The organisation's very existence is conditioned by its stakeholders' approval of its operations; this approval comes when their needs and expectations are fulfilled and it may cause the organisation to adapt its activities or the way it puts them into practice (Kuo and Chen, 2013; Liu and Anbumozhi, 2009).

To a certain extent, the company is expected to take into account the impacts of its activities on all its stakeholders and honour the “social contract” between business and society (Du and Vieira, 2012). According to Sharma and Henriques (2005), certain stakeholders that were previously considered insignificant, such as local communities or NGOs, are now regarded as important agents in appraising firms’ social and environmental impacts. People who live in the immediate environs of a potentially contaminating firm (or industrial area) will campaign for a clean, healthy environment and attempt to minimise the risks deriving from its operations. The question of firms’ legitimacy in relation to their stakeholders’ demands, or the building of trusting relationships is particularly relevant in the context of environmentally sensitive industries –industries with a greater potential risk of serious damage to the community, the petrochemical industry being a case in point (Delannon et al., 2016; Du and Vieira, 2012).

Residents who are facing the challenges of living in a polluting industrial area try to form fair judgments about its consequences. A general assumption in the academic context is that most people do not have sufficient scientific and technological knowledge to be capable of judging the risk and benefit associated with an industry (Gregory and Miller 1998; Siegrist et al., 2005). However, whether residents have full knowledge of the risks involved may be the least important factor. On the one hand, there is a question about the extent to which complex risks can be fully appraised by anyone, including experts. On the other hand, risk perception is not simply a question of objectively evaluating the risk (typically based on the demonstrable probability of coming to harm, together with the severity of possible outcomes), but also has an affective dimension (Alhakami and Slovic, 1994; Langford, 2002; Slovic et al., 2004). This affective dimension is conditioned by the social and political context in which risk is experienced (Larock and Baxter, 2013). Residents’ perceptions and feelings about the industry and its consequences predominate (Utell et al., 2005). Polluting industries need to manage their relations with the local community properly in order to generate greater trust in firms and their

industrial activity and establish a sustainable social relationship (Earle, 2010; Siegrist, 2000; Terwel et al., 2009). Trust is undoubtedly one of the defining elements in the quality of the firm–local community relationship (Greenwood and Van Buren III, 2010; Jahansoozi, 2006; Tortosa et al., 2016) and helps to reduce risk perception (López-Navarro et al., 2013; Ter Huurne and Gutteling 2009; Trumbo and McComas 2008).

Firms' commitment to managing their relationships with stakeholders can vary greatly. One way it can be reflected is through their information disclosure policy, particularly regarding environmental aspects. Firms can use environmental disclosure as a tool to secure legitimacy for their activities from the local community. Environmental disclosure entails firms providing all the relevant information on their activities and performance in environmental issues. Indeed, the quality of environmental management is not readily observable, and is consequently characterised by strong information asymmetries (Kulkarni, 2000). Firms react to stakeholders' expectations and pressures with more environmental disclosure (Lewis et al., 2014; Liu and Anbumozhi, 2009), a phenomenon that is also evidenced in the literature in the case of demands from the local community in order to prove they are 'good neighbours' and obtain the licenses they need to operate (Florida and Davidson, 2001; Henriques and Sadorsky, 1996; Raines, 2002). Greater environmental disclosure should increase trust and reduce the risk perceived by the local community. Indeed, trust in a particular source will be largely associated with the amount of information received from that source (Peters et al., 1997).

However, environmental information disclosure (one-way, firm-to-local community communication) is only the first step in the company's involvement with the local community. Different levels of stakeholder participation and engagement have been proposed in the literature. Rowe and Frewer (2000), for example, identify three types of public engagement according to the communication flows between parties: communication, consultation and participation. Oxley Green and Hunton-Clarke (2003) suggest a typology of stakeholder

participation and also differentiate three levels: informative, consultative and decisional. In a more recent paper, Bowen et al. (2010) identify three corporate community engagement strategies: transactional (one way, firm-to-community communication), transitional (two ways, more firm-to-community than community-to-firm communication) and transformational (two ways, community-to-firm as much as firm-to-community communication). Involvement in dialogue-based communication programmes with the industry is essential to good business–local community relations (Ashworth et al., 2012; Capriotti, 2007; Renn and Kastenholz, 2000). Local actors not only require access to information; they also want to actively participate in a process of dialogue with industry about how risks are managed. Involving local actors in the firm management may be a key strategy to address wicked challenges. Thus, analysing local community participation and engagement and its effect on perceptions of risk is an important issue to investigate.

As well as exploring how firm–local community relationships are managed at the company level, the collective dimension represented by the industrial agglomeration must also be taken into account. The literature on firms’ environmental actions in relation to their stakeholders’ demands mostly focuses on the firm level, although some studies do address this question from the perspective of clusters or agglomerations of firms (Battaglia et al., 2010; Hoivik and Shankar, 2011). The cumulative effects of emissions from each company mean the industrial agglomeration is the truly relevant dimension for local residents (López-Navarro et al., 2015). Industrial agglomeration also makes it difficult to assign responsibility to a specific company, for example, when excess levels of a contaminant substance are detected (Saengsupavanich et al., 2009). Environmental sustainability cannot be tackled through an approach that views each company individually; rather, what must be considered is the combined total of companies in the industrial site and the accumulated effects that could occur in the geographical area in which the industrial agglomeration is located (Waage et al., 2005). Consequently, the development of

a collective strategy can improve relations with the local stakeholders (Battaglia et al., 2010). Overall, these different strategies are examined in the empirical context of petrochemical sites in Spain's Mediterranean coast, as explained below.

3. Context of study

The petrochemical complex in Castellón is located within the city's municipal boundaries. It covers an area of 3,635,400 m² in which nine companies are located. The socio-economic importance of the complex is reflected in the 1,000 direct and 4,000 indirect jobs it provides (Eco-audit, 2012). The complex began with the construction of an oil refinery, Esso Petróleos Españoles, and a caprolactam production plant in 1967. At the beginning of the 1970s, a conventional fuel-oil power plant was added, and in 1988 a cooperation agreement was signed between the refinery and the multinational British Petroleum. In the mid-nineties the company BP Castellón was constituted and fully integrated in BP Oil Spain. In the nineties and the first decade of the twenty-first century the complex in Castellón was given a final modernising impulse with the installation of other multinational chemical firms and a combined-cycle gas fired power plant was constructed to replace the conventional cycle plant. Today, alongside the BP oil refinery, the main companies on the site are UBE, a multinational chemical company that produces caprolactam, fertilisers, liquid manures and ammonium sulphate; and Iberdrola, a multinational company producing electricity using the combined-cycle process. Other companies include a plant for grinding clinker and producing cement, and a vegetable oil-based biodiesel production plant. The installation of several new firms in related sectors is also planned.

The petrochemical complex located to the south of Tarragona, in the municipalities of Tarragona, Vila-Seca, La Canonja and Reus, is situated 180 kilometres north of the Castellón

complex. It covers an area of 7,200,000 m² where 24 companies are sited, most of them belonging to the petrochemical sector. This complex generates approximately 5,000 direct and over 15,000 indirect jobs. Notably, there is another petrochemical complex in the same region to the north of Tarragona, generating a similar number of direct and indirect jobs. Taken together, Tarragona is the largest petrochemical cluster in southern Europe. As in the case of Castellón, the chemical industry first came to the south of Tarragona in the 1960s, in this case in 1965 when the company IQA (Industrias Químicas Asociadas) began its industrial activity there. At the end of the 1960s and the beginning of the 1970s, the number of factories related to the chemical sector proliferated. Since then, the continuous arrival of multinational companies to Tarragona has turned the site into the specialist core of the chemical industry. Today, the leading companies in this industrial site are Dow Chemicals, which in Tarragona produces chemical derivatives (polyethylene, polyols, and polyglycols); BASF, manufacturers of catalysts, polymeric solutions and polyester resin; and Bayer, which manufactures and markets polyurethane systems for the automobile, construction and footwear industries, among others. The high concentration of chemical companies in Tarragona may explain the constitution in 1977 of the Asociación Empresarial Química de Tarragona (Chemical Industry Association of Tarragona, AEQT), set up as a local industry association to represent companies from the sector located in the province. From its beginnings, the association aimed to improve the sector's competitiveness and to increase its contribution to the sustainable development of the territory. Although this paper takes the results of the earlier quantitative study as a reference, they are not presented here; however, information on the survey design, data collection, and the results are provided in Appendix A. The local residents' appraisals of the economic impacts are shown in Table A1. Results reveal more positive appraisals of the economic impacts in the Tarragona petrochemical complex than in Castellón (the mean is 3.25 compared to 2.75 for the case of Castellón), which may be because the Tarragona site is larger. However, there were

unexpected and significant differences between the two sets of results for the levels of perceived risk (Table A2). The value for risk perception was 2.95 in the case of Tarragona, but rose to 3.30 in the case of Castellón, despite being a smaller complex. Additionally, and related to risk perception, there were also significant differences in the residents' trust in the way firms manage risk (Table A3): 2.31 in Castellón and 2.82 in Tarragona. Our research hypothesis, as we noted in the introduction, is that these results can be explained by the way companies in the two areas have built and manage their relations with the local community, at both an individual and a collective level.

The data for the sample composition reported in Appendix A reveals slight differences in terms of age and educational level between respondents at the two sites (older respondents with lower educational levels in the case of Tarragona). Some studies have found that the variables age and educational level can affect trust and risk perception (Bronfman et al., 2016; Mah et al., 2014; Siegrist et al., 2005; Yu et al., 2018). To verify whether this is the case in our study, we analysed what impact respondents' age and educational level at the two complexes might have on the differences in the mean values of the study variables. In our case, we found no discernible relationship between the variables age and educational level and the other study variables.

4. Methodology

To address our research question, we used qualitative methodology involving in-depth interviews with managers of the leading companies in both complexes (BP Oil, UBE, and Iberdrola in Castellón; Dow Chemicals, BASF and Bayer in Tarragona). Despite the diversity of companies operating in the two complexes, these multinationals are the ones that determine the trends, concerns and attitudes of the whole site.

In-depth interviews were conducted with managers responsible for the communication and government relations department from each of the three companies at the two complexes analysed. In four of the firms, managers from the environmental and health and safety department also participated in the interviews; and in a fifth firm the head of the operations department was also present in the interview. We also interviewed two senior managers responsible for public relations at AEQT. A total of 13 people were interviewed, all of whom held senior positions and had many years of experience in the participating companies and could respond to the interview questions in an authoritative manner.

In addition to the interviews with managers, other publicly available material was also used in our research to characterise each firm's engagement strategy. This material included corporate websites and reports of the companies, as well as other public documents relating to the two complexes: the website of the local industry association in Tarragona, the AEQT, and the public report it published in 2012 (AEQT, 2012) (no such association exists in Castellón); and the information from the eco-audit report on the companies located in the petrochemical complex of Castellón (Ecoaudit, 2012). All six firms were given a code to protect the confidentiality of the results (C1, C2 and C3 in Castellón; T1, T2 and T3 in Tarragona).

The aim of the in-depth semi-structured interviews was to enable the managers, on learning the results of the residents' survey, to discuss possible reasons for the differences in responses from the residents near the two complexes, and to explain in detail how they manage their relationships with the local community. We believe that finding out what managers think about their firms' behaviour in light of the public's responses is a valuable element of this study. Three members of the research team took part in all the seven interviews; one of the researchers interviewed the respondents while the other two took comprehensive notes of their responses. The interviews were not recorded using audio equipment so as not to inhibit the participants who preferred to talk in a confidential way (the managers not only assessed their firms but also

gave their views on the entire complex and drew comparisons between the two sites). The interviews took place in the headquarters of each company and the AEQT and lasted for approximately two hours. After each interview, the three researchers revised the transcriptions and organised the information according to the interview guide. Key issues were subsequently identified according to the following criteria: relevance to the research aims, predominance of the same arguments across managers, and importance of their different opinions. Once key issues had been identified, linkages among them and with the existing literature were examined.

5. Results

The managers of the firms in the two petrochemical complexes came to the same conclusion about why the residents' appraisals of the economic benefits of the Tarragona complex were more favourable than those for Castellón, namely that they were likely due to the larger size and greater industrial activity in the Tarragona complex. However, the managers from the two complexes differed in their interpretations of residents' risk perceptions. The health and safety managers from two of the Castellón firms argued that the higher perception of economic benefits in the Tarragona complex, a consequence of its relatively higher industrial activity and its weight in the area's economy, might help to mitigate or reduce residents' risk perception. They stated that:

“In Tarragona, the appraisal of the environmental costs and the risk perception are not higher because it is an industrial city whose income comes mainly from the chemical industry, whereas this sector is not as important in Castellón because services and other industrial activities enjoy a larger share of its economy” (C2).

“These surprising results could be because the economic benefits of this industry are more easily perceived by citizens in Tarragona due to the greater size of this complex, and this affects their appraisals of the environmental impacts” (C3).

Both statements are linked to the traditional view that if people perceive economic benefits they will be more accepting of higher environmental impacts, which will offset their concerns about the hazards and their perception of risk. The legitimacy of economic interests appears to be determinant in the opinion of the Castellón managers, although they also emphasised that companies meet environmental standards set by current legislation. In their view, this compliance with the legislation is what defines them as responsible community members.

The Tarragona managers noted that the economic question and its effect on risk perception cannot be understood in isolation from the historical social and economic benefits that the complex has brought to the territory. Specifically, the health and safety department managers from two of the firms and the communications manager from the third firm stated:

“It is understandable that the Tarragona citizens’ appraisals of the environmental impacts and risk perception will not be as negative because of the positive contributions that [the complex] has had for the territory” (T3).

“The explanation for the lower appraisal of the environmental impacts and risk perception by residents living near the Tarragona complex is that they value what the complex has meant for the economic development of the area and the personal development of many of its citizens” (T2).

“The importance of the chemical industry in Tarragona is such that it has become part of its citizens’ lives; they feel that the complex forms part of their community, which is the reason for the better results in this study” (T1).

Although the first comment from the Tarragona company managers (T3) aligns with the arguments of managers in Castellón, the statements from the managers of the other two Tarragona companies (T2 and T1) seem to reflect a reasoning that goes beyond the mere association between economic benefits and acceptance of the environmental risks. They defend the importance that the Tarragona site has had for the personal development of its residents, and manager of company T1 also highlights the role the site has played in constructing a sense of community along with all its local citizens over the years. In fact, in the interviews, the director general of the AEQT and the communications director of company T3 also noted the residents' sense of pride in the territory in which they live, a feeling that the literature has linked to a positive community identity (Miller and Sinclair, 2012).

The close association of the Tarragona companies with the region and their commitment to building stronger socio-economic links with the local community, above and beyond providing employment, is illustrated in the education field. This is one of the key policies of the AEQT and the Tarragona firms, as evidenced in their websites and corporate reports. As well as the intense relationship between the main companies in the Tarragona complex and the university, these firms also collaborate with the education department of the regional government in what is known as the “*dual professional training*” programme, a practice that does not occur in Castellón. In this educational programme, companies affiliated to the AEQT are involved in the Industrial Chemistry training cycle. The AEQT also runs various educational programmes, such as the ‘Chemistry Classroom,’ designed to attract local primary and secondary school students to the world of chemistry. Company T1 also provides programmes for primary and secondary school students to introduce them to chemistry through experimentation in their schools. Another example is company T3, which since 2005 has sponsored a university professorship in sustainability with the aim of expanding knowledge and social awareness about sustainability

through training, research and dissemination of knowledge. The participation of the AEQT and businesses from the Tarragona complex in local education and training, significantly higher than similar efforts in the Castellón complex, not only improves the skills and knowledge of students in the field of chemistry, and thereby enhances the training of its future potential employees, but also allows them to showcase their commitment to the local community, demonstrating that they care about the development of the territory and its inhabitants, and thus strengthening a sense of community in which the chemical industry is an active agent. Tarragona firms and the AEQT also provide cultural, leisure or social care services for the local community, although to a lesser extent than their educational initiatives.

Regarding communication policies with the local community, which ultimately determine the model of citizen participation and engagement, the interviews seem to suggest that the Castellón firms are less committed in the way they manage this relationship. The communication policy these firms adopt (one-way and firm-to-local community), may be described as passive, as the firms report news in the local press only at specific moments. The content of their press releases refers mainly to positive issues of an economic nature about the firm in question, although a general reference is also made to the concerns about environmental issues, all aimed to ensure the community's acceptance of the industrial complex. This communication policy reinforces the previous argument that companies located in Castellón build their legitimacy on essentially economic grounds. Two of the managers from the communications department of the Castellón firms justify their passive communication policies as follows:

“Citizens’ unfavourable biased opinions about the complex and its firms lead us to think that is not necessary to generate numerous information impacts through the mass media. What is more, publicising everything our firm does in the complex is not something that citizens evaluate sufficiently” (C2).

“We might raise unfounded alarm in the population with too much information, so it is not worth spending more on communication than what we already do” (C3)

Exactly the opposite attitude emerges in the statements from managers in the Tarragona complex. These managers believe firms on the site should increase their media presence to explain everything they do in terms of economic development, and environmental and risk management. According to the communications manager of company T3:

“Our firm generates around 160 hits each year in the regional media, informing on the firm’s economic progress (direct and indirect jobs, salaries, taxes paid, etc.) and advancements in the productive process that lead to greater efficiency, security and respect for the environment”.

Managers in the Tarragona complex show greater commitment to the local community not only by disclosing more information to the public, but also by encouraging continuous dialogue with citizens and other stakeholders. As the communication managers of the Tarragona firms stated:

“Our firm’s communications policy used to be based on the principle of not speaking about the company, but this principle was replaced decades ago by a policy of transparency in every aspect of the firm, and even more so in its relationship with local residents” (T1).

“The fundamental value of our corporation, and of the firm located in the complex of Tarragona, is D for Dialogue, which means we must listen to people and always explain what has happened honestly” (T3).

“Transparency as a communicative principle demands we disclose information and maintain constructive dialogue with citizens in order to win their trust. We have nothing to hide” (T2).

One key way of promoting citizen dialogue and participation is the citizens' panels set up over a decade ago in each of the participating companies in the Tarragona complex and the AEQT. These panels meet regularly at various times during the year and are attended by managers from the firm in question and between 15 and 20 of the area's residents from different professions and social classes. The creation of citizens' panels for the company and the local community to share interests and exchange concerns is a qualitative advance in involving stakeholders in risk management. The importance of these citizens' panels is strongly defended by two of the communications managers from the Tarragona firms:

“Citizens' panels help build citizens' trust by making them feel they are being listened to; they feel they are participating and involved in the decisions taken on these panels” (T2).

“Citizens' panels help firms to prevent and anticipate possible conflicts with other participants. Dialogue with residents in these panels helps to generate trust and reduce the risk citizens perceive” (T3).

An important issue that highlights the significance of the industrial agglomeration as a reference unit for analysing business–local community relations is that the companies located on each of the sites analysed share similar levels of commitment in their communication policies. The interaction among companies in the same geographical area, combined with similar levels of pressure from the public, may lead them to develop a standard approach to their relationship with the local community. For example, it seems to be no coincidence that the citizens' panels of the three companies analysed in the case of Tarragona were created over a four-year period (1995–1998); or that none of the Castellón companies has implemented a citizens' panel. In addition, companies in the same area share a common view of the local residents, a

circumstance that is likely to determine how they interpret their relationships with the local community. The managers of two of the Castellón firms had this to say on the subject:

“Citizens have a biased and unfavourable opinion about the complex and the firms located in it that they have formed despite its complying with all the current environmental legislation” (C3).

“Society does not want to know about the benefits associated with the chemical industry and only pays attention to the risks deriving from its activity” (C1).

“It is difficult for residents to assess risk, and what is more, they do not know all the advantages that the complex brings to the area” (C2).

These statements reflect the managers’ highly critical attitude of the general public, based on prejudices such as citizens’ negative disposition to the petrochemical industry and their ignorance of the activity and its associated economic benefits and risks. However, the conception they hold of local citizens does not seem to prompt them to adopt a more committed communication policy. Companies in the Castellón complex do not seem to regard the local community as a relevant stakeholder. For example, company C1 drew attention to its own study that stakeholders highly valued; however, the local community was not among the stakeholders consulted in the study, which included public organisations, trade unions, and other companies. In contrast, the managers from the Tarragona firms did not express the same negative assessment of the community. They spoke of the need to encourage frank and close relationships with residents on an equal basis, and in their assessments, they consistently expressed their intention to improve aspects such as communication and dialogue:

“Residents’ lack of technical knowledge is a challenge for our firm. It is important to send out messages that everyone finds easy to understand if our aim is to disclose everything the firm does and make it accessible to people” (T1).

“We must communicate more, and more effectively, because that is the way to reduce the perception of risk [...] It is essential to listen. People have their reasons for their opinions [...] The obligation of this company and the sector is to communicate with people. We have to explain well and get everyone to understand us” (T3).

The companies in the Tarragona complex, both individually and collectively, appear to take a different line, reflected in their perception of the local community as a relevant stakeholder and in a greater commitment to participation and engagement. This seems to be the result of a gradual process, according to the communication manager of company T1 (p. 17), who noted that the company did not use to inform the public; or the communication manager of company T3, who described three stages in the company’s development, referred to as the three Ds (denying, data and dialogue). It would appear that companies in the Castellón complex are at the first stage (denial).

As well as similar commitments and attitudes to local citizens among the companies of each complex, collective actions in the context of firm–local community relations should also be considered. The local industry association (AEQT) in Tarragona plays a significant role in managing the relationship between the petrochemical complex companies and their key stakeholders, which include the local community. In the words of one of the AEQT public relations managers:

“This association acts as a lobby for the chemical industry in Tarragona with the aim of improving its relationships with national and regional governments, with neighbouring

town councils, the region's universities, neighbourhood associations, NGOs and residents in the area. As a result of cooperation between the AEQT, the Port of Tarragona and the Catalan and Spanish governments, a project is underway to develop an industrial cluster in the area that will act as a magnet to attract new multinational companies from the chemical and petrochemical sectors."

Higher commitment to the local community in Tarragona is to some extent coordinated through this local industry association. The AEQT acts as a local intermediary in helping to develop a collective strategy by taking the role of leader in the process. Its annual reports (AEQT, 2012; 2013) inform on the AEQT's educational actions at the regional level, and reveal that it has its own public panel, as noted in the results discussed throughout this section. It also organises open days to visit the petrochemical complex; it works alongside regional authorities on environmental matters through a collaboration agreement signed in 2005 and renewed in 2012 to reduce the firms' environmental impact and to improve communication on incidents; it informs the community about the complex's achievements in economic, social and environmental fields, and so on. On this last issue, one goal explicitly highlighted by the AEQT is to "strengthen communication to improve the image and relations of the chemical industry with the environment" (AEQT, 2013: 8). In the case of Castellón, only company C1 expressed an interest during the interviews in building better relationships with the other companies in the complex and in forming a local association at some time in the future. The manager of the firm's communication department argued that:

"The big difference between Castellón and Tarragona lies in the lack of an association in Castellón that could defend the interests of the chemical industry, in a coordinated and more efficient manner, and that would act as an interlocutor with the various stakeholders with the aim of improving relationships with them" (C1).

In Castellón the only joint action to date, instigated by the regional government, was the 2012 eco-audit report that was used to showcase the Castellón firms' recent environmental and risk management policy achievements. The undertaking and initial intention to publish and disseminate this eco-audit could be a sign of the complex's poor image and of the need to communicate the companies' joint actions in the environmental field. Despite the bias and significant limitations of its contents, this eco-audit could mark an initial but important step by firms from the petrochemical complex to disclose environmental information jointly. However, although the eco-audit was drawn up and presented at a press conference, to date it has not been officially released and, consequently, the local community has not been duly informed of its results. In the end, this attitude reflects the companies' historical lack of interest in improving their relationship with the local community. In September 2016 a press release was issued to announce the creation of an association embracing the companies located in the Castellón complex, INDES. The statement confirms that, "[t]his organisation has been created to promote the activity of the complex through combined efforts and activities of interest to all companies, present or future, located in it. At the same time, INDES aims to be a mechanism for integration both with neighbouring communities and with institutions and governments, working on all issues that affect them such as industrial safety, prevention of occupational risk or environmental preservation, in order to consolidate sustainable growth in their geographic area". Although this association has not yet begun its activities, its objectives appear to be very similar to those of the Tarragona association. Thus, despite the difficulties the companies expressed during the interviews, over time they seem to have become aware of the importance of taking a joint position to address the management of relations with the local community.

The in-depth analysis of the interviews with the managers enabled us to identify the differences in commitment to the local community shown by the firms analysed in the two industrial agglomerations. Table 1 summarises the main results of the qualitative research.

Insert Table 1 here

6. Discussion and conclusions

This study has focused on how firms located in polluting industrial agglomerations build and manage their relations with the local community, both individually and collectively, and how this factor can determine public perceptions. The research took as its starting point a previous study on the perceptions held by residents in the vicinity of two Spanish petrochemical complexes (Castellón and Tarragona) regarding the economic benefits and the health risks associated with them. Higher economic benefits were perceived in the Tarragona complex, which, as the managers interviewed from both complexes suggested, may be due to its larger size, but at the same time residents reported a lower perceived risk of this industrial agglomeration. This paper has identified three factors that may help to explain these different perceptions of risk: (a) the socio-economic links firms have established with the local community; (b) the firms' efforts to engage the local community; (c) the coordination of a collective strategy and the role of local institutions as intermediary agents.

a) The socio-economic links firms have established with the local community

The way in which firms have contributed to the territory, by building socio-economic links with the local community, is an initial factor explaining the differences in citizens' risk perceptions of the two industrial agglomerations. As Sharma and Herniques (2005) noted, local

communities are concerned about environmental impacts, but at the same time they depend on the jobs and economic benefits firms provide. In this sense, the larger size and greater industrial activity of the Tarragona complex may go some way to explaining the lower risk residents perceive. As the literature points out, the greater economic impact of an industry in the geographical location in which it is situated may explain why residents are more willing to accept negative impacts such as pollution that the industrial activity generates (Bronfman and Cifuentes, 2003; Gregory and Mendelsohn, 1993). However, beyond the simple trade-off between economic benefits and environmental risks, companies have forged their links with the local community in very different ways in the two industrial agglomerations. The Castellón managers' approach to consolidating their legitimacy with the local community is essentially based on economics –they bring wealth and jobs, and seek acceptance from the population on these grounds. In contrast, as well as underlining the importance the petrochemical industry has had in the region's economic development, the managers of the Tarragona firms emphasise the way the industry forms part of residents' lives and has contributed to forging a sense of community –the benefits the firms claim to go beyond the purely economic. This question is aligned with the idea that companies should be part of residents' lives, and they should work with the community to build a social contract in order to achieve greater mutual trust (Boehm, 2005; Castán-Broto, 2013). The greater commitment to the territory in the case of Tarragona firms, through building deeper socio-economic links, may partly explain why residents have a lower perception of the risks from the industrial activity in the complex (Bickerstaff and Walker, 2001; Burningham and Thrush, 2004; Bush et al., 2001; Miller and Sinclair, 2012; Wakefield et al., 2001).

b) The firms' efforts to engage the local community

Another factor that may explain the differences in residents' risk perception is the way the firms manage local community participation and engagement. The interviews with the Castellón firms revealed less involvement with the community, which was reflected in a very limited 'one-way' and 'firm-to-community' communication, designed at all costs to avoid raising the alarm in the population. Firms are suspicious of revealing information that, according to the managers interviewed, citizens could misinterpret, and thus contribute to raising their perceptions of risk. Moreover, and in line with the above argument, the information these firms transmit focuses on the economic benefits the industry brings to the territory. In the Tarragona complex, however, the firms actively disclose economic and environmental information and simultaneously encourage dialogue and public participation using resources such as citizens' panels. These panels draw companies' attention to the needs and concerns of the local community. In this vein, Ashworth et al. (2012) highlight the importance of participatory dynamics to guarantee the local community's trust in the industry and its credibility. The literature on stakeholder participation and engagement contends that dialogue is a more advanced stage than mere disclosure in the firms' commitment to its stakeholders (Bowen et al., 2010; Rowe and Frewer, 2000; Oxley Green and Hunton-Clarke, 2003). In general, all processes that involve dialogue may help to improve a company's or industry's environmental policy, to reduce conflict between parties, to implement better problem-solving processes, with flexibility and readiness, and as a result to build trust (Cavazza and Rubichi, 2014; Jahansoozi, 2006; Petts, 2008; Skouloudis et al., 2016; Wynne, 2006). Hence, firms' greater involvement with and commitment to the local community, manifested through more dialogue and proactivity in communication policies, can also contribute to explain the lower level of risk perception among the Tarragona residents.

Both the conception of the industry at the socio-economic level as an agent that helps build a sense of community, and the more concerted efforts to engage the local community through a

process of dialogue denote differences in the underlying objective in the firm–local community relationship: acceptance of the community in the case of the Castellón site, and a desire to form part of the community in the case of the Tarragona site. However, these two elements are not independent. The difference in the intensity of the socio-economic links in the industry–region relationship entails different levels of concern for and attention to the local community, which in turn leads to differences in levels of public engagement. Closely related to this are the divergent attitudes towards citizens shown by the firms’ managers in the two complexes. The traditional negative view of the general public and their supposed inability to understand issues related to industrial activity reported in the literature (Chowdhury and Haque, 2011; Cohen, 1998) is only perceived in the statements from managers of the Castellón firms. However, this conception of the local community does not seem to have prompted these firms to adopt a more committed communication policy. The Castellón companies do not appear to view the local community as a relevant stakeholder, while in Tarragona the opposite is true, which translates into greater effort by firms to engage the local community.

The comparative analysis of the two realities shows how the companies in the Tarragona complex have gradually evolved towards a model of local community relations that tries to incorporate elements of citizen participation in managing communication of risks, a process that has not taken place in Castellón. This evolutionary process can be traced through the interviews, which reveal similarities between past attitudes of companies in the Tarragona complex, and current behaviour patterns in the Castellón companies. In terms of the models for stakeholder participation and engagement proposed in the literature, the Castellón firms are at a very initial stage. Indeed, it is even questionable whether any local community engagement is taking place, considering their passive attitude in disclosing information to the local community. Following Oxley Green and Hunton-Clarke (2003), in Tarragona the level of local community participation and engagement could be defined as ‘consultative’, below the

‘decisional’ level at which the local community would actually participate in the decision-making process. Furthermore, according to Bowen et al.’s (2010) classification, Tarragona firms follow a ‘transitional strategy’ of engagement: communication is two-way, although it is more firm-to-community than community-to-firm, and there is no evidence of the joint project management or joint decision making that takes place in the most advanced ‘transformational strategy’. Although not the objective of the present investigation, future research should take a historical perspective to analyse the reasons that prompted the change of attitude in the case of the Tarragona companies.

c) The coordination of a collective strategy and the role of local institutions as intermediary agents

It is particularly relevant to highlight the similarities, in the frame of each industrial complex analysed, of the companies’ perceptions of citizens and their approaches to the way they manage their relationship with the local community. As Battaglia et al. (2010: 134) pointed out, firms in an industrial cluster “have similar social and environmental impacts; the firms have similar interactions with local actors; and they often face common social and environmental pressures from stakeholders”, and these factors can explain the resemblances in the firms’ behaviour towards the local community described above.

But beyond the fact that firms in each of the two industrial agglomerations share a vision of the local community and manage their relationships with it in a similar way, only Tarragona has a collective strategy in place. A local industry association such as the AEQT can strengthen a common approach to the local community across the complex. This association acts as a local intermediary in helping to develop a collective strategy by acting as a leader in the process, a role that has been identified in the literature on industrial clusters (Battaglia et al., 2010; Lund-

Thomsen et al., 2016; Molina-Morales et al., 2002). The efforts put into organising a collective strategy through the local industry association in the case of Tarragona have undoubtedly contributed to improving communication and relations with the local community, an aspect that has also been mentioned in previous research (Battaglia et al., 2010; Lund-Thomsen et al., 2016). It is precisely because of the need for collective actions with all stakeholders, especially the local community, at the industrial agglomeration level, that the companies in the complex of Castellón recently (September 2016) constituted an association along the lines of the AEQT. This may well indicate a greater awareness of existing problems and an attempt to improve future relations with the local community.

The study's findings suggest that as well as individual company actions, the industrial agglomeration and collective actions by the firms located in it should be taken into account in studies into relationships with the local community. It is necessary to go beyond the traditional 'firm–local community' relationship to pursue the appropriate management of an 'industrial agglomeration–local community' relationship. The importance of the industrial agglomerations has frequently been considered by public powers and corporations from the point of view of regional development. But in environmental terms the issues are usually restricted to the company level and even at that level the information can be unsatisfactory for the local community because in some cases companies with several plants (located in different places) do not provide detailed environmental information for each one of them. In sum, this study suggests that stakeholder theorists need to better specify the processes through which significant stakeholders like local communities should interact with an industrial agglomeration, and how the firms in them should manage the relationship with the local community collectively. In particular, while we hope this analysis contributes to the literature on business ecosystems we recognise the need for transformative research, particularly in relation to operational concepts that can transform the purpose and operation of firms because

“we still lack convincing empirical examples of how we can collectively reform local communities and prevailing practices towards a socially equitable future” (Matinheikki et al, 2017; S85). Another limitation of our study is the possibility of some bias in the managers’ responses due to our presenting the results of the previous quantitative study in the two complexes at the beginning of the interviews. Given the more favourable perceptions reported by the Tarragona residents, the managers in this region may have highlighted the positive activities carried out there, whereas managers at the Castellón site might have attempted to justify the more negative perceptions of the residents in the vicinity of this complex.

The elephant in the room is the actual environmental impacts that these complexes have in each site. Our results do not suggest the presence of differences in the environmental performance of companies located in the two complexes and, consequently, differences in the real risk to the health of the population. What emerges from the study is that the greater individual and collective commitment of the Tarragona companies in managing relations with the local community, compared to Castellón, leads to a more favourable risk perception by the public. And the perception of risk, whether or not it corresponds to a real risk, affects the health of the population in terms of anxiety and psychological stress. However, beyond the comparative analysis of the two realities examined, the considerable efforts highlighted by the managers of Tarragona in managing relations with the local community do not seem to translate into what could be described as a situation of high trust in the firms or low risk perceived by the population. Considering that local community perceptions were assessed on a five-point scale, trust in companies falls below the midpoint of the measurement scale (2.82), and perceived risk is around the midpoint (2.95). Although it is true that the characteristics of this type of industry are more likely to give rise to conflicts with the local community, these results reveal the need to continue efforts to improve the firm–local community relationships, in Castellón, but also in Tarragona. Nor should it be inferred from the study that efforts to improve management of

relations with the local community could supplant investments and technical improvements that would contribute to better environmental performance. Both issues are of great importance.

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Appendix A

Survey and sample characteristics

<ul style="list-style-type: none"> - The subjects for the study were randomly chosen from a sample of citizens living in the residential area surrounding the two petrochemical complexes (Castellón and Tarragona). - The survey took the form of face-to-face street interviews. - The fieldwork was carried out between March and June 2011. 	
Castellón	Tarragona
992 valid responses Population: 42,086; for a 95% confidence level, represents a sample error of +/- 3.10% (p=q=0.5) for the sample.	740 valid responses Population: 74,651; for a 95% confidence level, represents a sample error of ± 3.74% (p=q=0.5) for the sample
Men: 450 (45.4%) Women: 542 (54.6%)	Men: 343 (46.4%) Women: 397 (53.6%)
18-25 years: 128 (12.9%) 26-45 years: 480 (48.4%) 46- 65 years: 286 (28.8%) Over 65 years: 98 (9.9%)	18-25 years: 89 (12%) 26-45 years: 286 (38.7%) 46- 65 years: 216 (29.2%) Over 65 years: 149 (20.1%)
No studies/ Primary studies: 307 (30.9%) Secondary studies: 521 (52.5%) University graduates: 164 (16.6%)	No studies / Primary studies: 304 (41.08%) Secondary studies: 351 (47.44%); University graduates: 85 (11.48%)

Table A1. Economic impacts –Scale adapted from Azapagic (2004), Chang et al. (2009) and Johnson et al. (1994).

Items	Castellón	Tarragona
<i>The industrial estate helps to create jobs in the area</i>	3.26	3.83
<i>The industrial estate generates a higher level of income among the residents of the area</i>	2.85	3.44
<i>The industrial estate results in higher public funds for the municipality</i>	2.78	3.27
<i>The industrial estate means improved road infrastructures in the area</i>	2.96	3.34
<i>The companies in the industrial estate invest some of their profits in improving the quality of life of the community</i>	1.88	2.37
Economic impacts ¹ (mean)	2.75	3.25

Table A2. Risk perception –Scale adapted from Trumbo and McComas (2008).

Items	Castellón	Tarragona
<i>I believe my health is exposed to risks by living in this area</i>	3.51	3.23
<i>I frequently worry about the risks related to living in this area</i>	3.04	2.60
<i>I am concerned that living in this area poses risks that will extend to future generations</i>	3.57	3.17
<i>The risks to health associated with living in this area have increased in recent years</i>	3.09	2.82
Risk perception ¹ (mean)	3.30	2.95

Table A3. Trust in companies –Scale adapted from Ter Huurne and Gutteling (2009)

Items	Castellón	Tarragona
These companies protect local residents from possible harm deriving from their activities.	2.27	2.86
I believe these companies when they say that they do as much as possible to minimise the risks to residents.	2.15	2.63
These companies are concerned about the safety and health of citizens.	2.22	2.79
These companies know how to handle the risks deriving from their activities.	2.84	3.17
These companies listen to and are sensitive to the environmental worries of residents.	2.06	2.73
Trust in companies ¹ (mean)	2.31	2.82

⁽¹⁾ ANOVA analysis showed significant differences between the means at P < 0.01 in all cases.

Table 1. Summary of the main results of the qualitative research

Industrial agglomeration	Firms' aim	The socio-economic links firms have established with the local community (asserted benefits from firms)	The firms' efforts to engage the local community	The articulation of a collective strategy and the role of local institutions as intermediary agents	Local community perceptions
Castellón	Being accepted by the community	Economic contributions to the local community and region	<p>Passive attitude in offering information</p> <p>The information disclosed is essentially about the industry's economic benefits</p> <p>One-way, firm-to-local community communication (although limited)</p>	<p>Firms share a vision of the local community, but there is no collective strategy at the level of industrial agglomeration</p> <p>There is no local industry association which manages relations between firms and stakeholders</p>	<p>Lower perception of economic benefits</p> <p>Lower trust in companies</p> <p>Greater perception of risk</p>
Tarragona	Being considered as a part of the community	<p>Economic contributions to the local community and region</p> <p>Local community residents' personal development</p> <p>Taking part in building a sense of community</p>	<p>Proactive attitude in offering information</p> <p>The information disclosed is not limited to the industry's economic benefits</p> <p>Dialogue and local community participation (citizens' panels)</p> <p>Two-way communication; more firm-to-local community than local community-to-firm communication</p>	<p>Firms share a vision of the local community; a collective strategy at the level of industrial agglomeration is also in place</p> <p>A local industry association leads the collective strategy, representing companies and managing relations with the local community and other stakeholders</p>	<p>Greater perception of economic benefits</p> <p>Greater trust in companies</p> <p>Lower perception of risk</p>