APM Research Fund Series

Association for Project Management

The Relationship Between The Board of Directors' Social Capital and Construction Firms' Environmental Profiles

Azar Shahgholian and David Bryde (Liverpool Business School, Liverpool John Moores University, Liverpool)

November 2022

Because when projects succeed, society benefits

Contents

1 Executive summary

1.1 Why was this research undertaken?

The United Nations (UN) has called climate change the defining issue of our time (UN 2019). In line with this, we are witnessing a major increase in public awareness of the challenges faced in trying to deal with and mitigate the potential negative impacts of climate change and human-driven activities that provide a potential threat to our natural environment. Meeting these challenges and dealing with these threats comes under the broad umbrella of environmental sustainability. The concept of environmental sustainability[1] has been a hot topic in recent years and is becoming an increasingly important aspect of our everyday lives due to UN and UK government initiatives such as the Net Zero Strategy.

At the same time as public awareness is being raised, many companies are seeking to demonstrate their sustainability credentials in various ways, such as measuring and reporting their environmental profiles (Carbon Disclosure Project 2011); participating in voluntary initiatives targeted at environmental issues or publishing their environmental-related activities (Brammer and Pavelin 2006; Binh 2012; Qiu et al. 2016); and gaining accreditation against the ISO 14001 standard for an environmental management system (Chiarini 2017). Tracking these organisational developments has seen a growth in literature around the theme of sustainability in project-intensive companies, in general (Martens and Carvalho 2013) and, in particular, as an example of a sector that largely consists of project-intensive companies, the construction industry (Fernández-Sánchez and Rodríguez-López 2010). This reflects the fact that the activities of project-intensive companies often have a significant impact on the environment (Chang et al. 2018). For example, in providing the final product, and including all the activities that take place across the whole project life cycle, from inception of a new building/structure through to its completion, the construction industry makes up 20–35% of all the negative impacts against the main environmental impact categories, i.e. global warming, abiotic depletion, human toxicity and ozone layer depletion. Globally, the construction industry consumes 40% of total energy production, 12–16% of all water available, 32% of non-renewable and renewable resources, 25% of all timber and 40% of all raw materials, produces 30–40% of all solid wastes and emits 35–40% of CO_2 (Darko et al. 2017).

Previous studies acknowledge that there is often a lack of sustainability knowledge amongst employees in companies (Banihashemi et al. 2017) and a failure to integrate wider sustainability concerns at the operational levels (Karunasena et al. 2016). Hence, in line with previous literature which examines top-down approaches to transferring higher-order values, such as those linked to sustainability, down to operational levels, i.e. within specific project teams (Herazo et al. 2012), we argue that those at the highest levels in project-intensive organisations have a crucial role to play in ensuring that their companies deliver against sustainability-related targets. Building on this argument, the research findings summarised in this report shed light on how different characteristics of those at the highest levels in project-intensive companies in the construction sector, i.e. boards of directors, result in variations in sustainability-related activities of their companies.

1 For the remainder of this report, for ease of reading, we use the term 'sustainability' to encompass just environmental aspects and not to include economic and social elements, as typically conceptualised under the heading of "sustainability".

This study draws insights linked to the concept of 'board capital', which is used to distinguish characteristics – with such capital being reflected in the knowledge, experience and social networks of boards of directors and, hence, consisting of both human capital and social capital. Social capital fulfils a vital role in providing knowledge and resources which are useful for board decision making (Hillman and Dalziel 2003). Accessing and using the expertise, skills and other resources that are available inside or outside a focal company is a significant challenge in enabling better decision making. It is not always possible for one individual or group of individuals, i.e. a director or board of directors, to have complete knowledge to be able to adequately respond to all the challenges faced by the organisation. Therefore the social networks that exist amongst individuals working in different companies serve as a channel of influence, support, resources and information flow (Borgatti and Foster 2003), and they enable the harnessing of the power of these inter-organisational relationships to deliver enhanced performance.

Given that responding to the sustainability agenda is an increasingly important function of boards of directors, and an increasingly important dimension of company performance, by providing knowledge and allocating resources (Pfeffer and Salancik 1978; de Villiers et al. 2011) and by ensuring that management endeavours to address the environmental agenda effectively (Berrone and Gomez-Mejia 2009), we explore how boards of directors' social capital enables this function .

Hence, the research aims to answer the following question:

What are the relationships between the social capital of boards of directors and firms' environmental profile?

1.2 What did the study aim to achieve?

This report takes the first step in providing data-driven evidence of the power of the social network in enhancing organisational performance relating to achieving environmental sustainability goals in a project-intensive industry sector. The aim is to show how the social capital of those individuals working at a board level in construction companies, as an example of a project-intensive sector, is utilised in different ways when carrying out environmental management practices that maximise environmental performance.

1.3 Who is the intended audience?

The primary audience for this report is people responsible for appointing boards of directors, the board members themselves and others with overall responsibility for ensuring that projects meet environmental sustainability-related performance targets. The secondary audience is practitioners working at the project level in organisations responsible for delivering against the sustainability-related performance targets.

1.4 Benefits

By focusing attention on the social networks of their directors, organisations in project-intensive industry sectors, like construction, can support practitioners tasked with delivering against environmental-sustainability targets through:

- **Utilising the social capital of boards of directors** so that they maximise their managerial influence and information collection abilities. In doing so, appropriate and innovative policies and practices in relation to environmental sustainability can be brought into the organisation from outside and communicated and diffused to the project level.
- **Setting up effective environmental management and disclosure methods** which act as the enablers of environmental performance that practitioners are tasked with meeting at the project level. This ensures that the right organisational support is in place for project management in terms of delivering against multi-dimensional success criteria that include environmental sustainability.
- **Utilising knowledge obtained through business intelligence techniques,** such as big data analysis. Taking a data-driven and evidence-based approach, organisations are able to understand the character of their own board social networks and how specific characteristics relate to the environmental management and disclosure approaches adopted. Such knowledge raises awareness of limitations and weaknesses related to board social capital that can then be addressed.

1.5 How was the study carried out?

The research utilised three large existing datasets. Firstly, data on US companies listed as working in the construction and materials sector were collected from BoardEx, which contains information about the characteristics of these companies' social networks. Secondly, the characteristics of the companies' boards of directors and their financial performance were obtained from Compustat. Thirdly, the Carbon Disclosure Project (CDP) dataset provided information on environmental management practices and performance. We merged the above datasets to produce a panel dataset of 709 firms for the period 2010–2018.

To test hypotheses about the contribution of knowledge networks and environmental management practices to environmental performance, independent variables were created to measure 1) board social capital (managerial influence, information collection ability) and 2) environmental management practices (responsibilities, information disclosure and incentives). Data on board social capital came from BoardEx, and data on environmental management practices from CDP. Compustat provided the control variables of board size, CEO/chairperson duality and length of board tenure.

The research was conducted in two stages. Firstly, data-mining and clustering techniques modelled different types of social networks of boards of directors and how these differences impact on environmental management and disclosure practices. Secondly, regression analysis was used to develop a predictive model of the effect of board social capital/environmental management/disclosure practices on the level of environmental performance – whilst controlling for certain firm- and individual-related variables.

1.6 What did the research discover?

The results of the big data clustering analysis demonstrate that companies in the construction and materials industry sector can be grouped based on differences in their board social capital. Reflecting variations in the social networks of the individual board members, these groupings are firstly, those companies whose boards of directors have strong managerial influence capability versus those whose directors have weak managerial influence capability and, secondly, those companies whose boards of directors have strong information collection ability versus those whose information collection ability is weak. The findings also show that the composition of the groups changes over time – with companies moving from one to another. This illustrates the dynamic nature of social networks and individuals' positions within them.

This is important because those with high managerial influence capability and high information collection ability, which reflects a high level of board social capital, exhibit different characteristics in relation to their environmental management practices, i.e. the type of organisational structures set up with responsibility for environmental issues, the financial incentives paid to employees, and the nature of the information disclosed, for environmental performance, compared with those in the clusters of companies classed as having low social board capital. The relevance of this finding is that variations in practices and disclosure have an influence of the level of environmental performance, where performance is measured by a company's score on the CDP index. In addition, the inclusion of control variables in the analysis indicates that board size, market value of company and average tenure of individual board members are positively associated with CDP performance score.

In terms of the most effective environmental management practices, the findings indicate that disclosure of environmental information has a statistically significant positive relationship with environmental performance (CDP score), as does having a formal group set up in the company with responsibility for environmental issues. Finally, having monetary incentives in place is positively and significantly related to environmental performance. Taking all the study variables into consideration, i.e. boards of directors' characteristics, firm characteristics, social networks of directors and environmental management and disclosure practices, the study derived a regression equation that predicts CDP performance score. This can be used by companies to explore how different combinations of variables lead to changes in the level of environmental performance.

To conclude, the findings provide evidence to help answer the question: ***What are the relationships between the social capital of boards of directors and firms' environmental profiles?*** There is clear and strong evidence that the social networks of individual directors influence environmental sustainability-related practices, in terms of environmental management and disclosure through the managerial influence and information collection ability that individual people can access through their social networks. This influence and ability ultimately influence the environmental performance of the company, which, in the case of project-intensive industry sectors, such as construction, is manifested in the practices that take place at the project level.

2 Literature

This study draws from literature in two broad areas, environmental profile and board social capital, to answer the research question: ***What are the relationships between the social capital of boards of directors and firms' environmental profiles?*** As shown in Figure 1, environmental profile consists of three elements: environmental performance, environmental management and environmental disclosure. Environmental management is made up of having a responsible team, typically in the form of an environmental committee, to oversee the sustainability-related activities undertaken by the company, and having incentives in place, such as financial rewards, in relation to exhibiting certain behaviours and meeting targets related to sustainability. The research reported in this paper explores the relationships between board social capital, environmental performance, environmental management and environmental disclosure. As part of this exploration, we take into consideration the effects of various control variables such as characteristics of the companies and variations in board characteristics. In the next section, we briefly review the literature relating to these different concepts in turn.

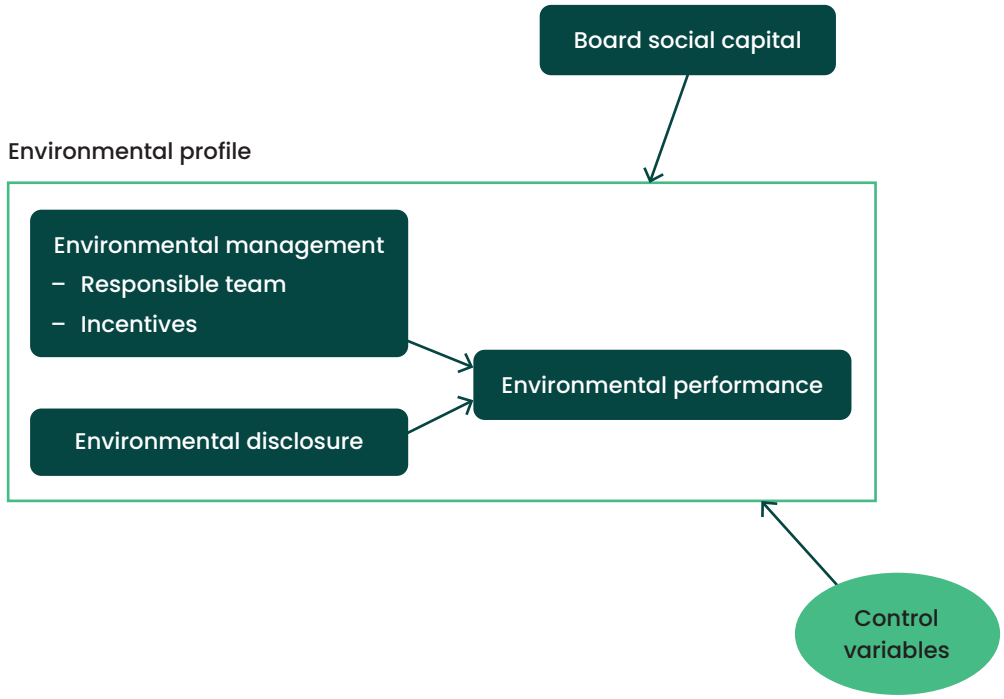

Figure 1: The conceptual framework

2.1 Environmental profile

The environmental profile of a company is multi-dimensional (Ilinitch et al. 1998), describing the environmental features and characteristics of activities, products and services of the firm that have an impact on the environment in which it operates (Trumpp et al. 2015). The three broad dimensions of environmental profile are environmental performance, environmental management and environmental disclosure. The concept of an environmental profile is a move away from a traditional approach to sustainability that is purely focused on measuring performance against certain metrics, e.g. energy efficiency and use of renewable energy, towards a "systematic and comprehensive approach and activities towards sustainability related knowledge management", with a focus on organisational learning (Baumgartner and Ebner 2010, p. 82) and embedding a culture of delivering against sustainability-related targets. Hence the starting point is not firstly on measuring environmental performance but rather on putting in place the enablers of performance, which are grouped under the headings of "environmental management" and "environmental disclosure". Once the enablers are there, measurement of performance follows. In the next sections, we briefly describe these dimensions of a firm's environmental profile.

2.1.1 Environmental performance

Environmental performance is multi-dimensional, encompassing such metrics as energy efficiency, eco-efficiency, land waste, water pollution and greenhouse gas (GHG) emissions. It reflects the outcome of a company's strategic activities that manage (or do not) its impact on the natural environment (Walls et al. 2012). Metrics can include input-based variables, e.g. resource consumption or total energy input, or output-based ones, e.g. GHG emissions or waste.

2.1.2 Environmental management

Environmental management has two main parts: firstly, having a responsible team in place, and secondly, providing incentives, for example in the form of enhanced pay.

2.1.2.1 Responsible team

The first element of environmental management is having a responsible team in place, at the highest level in the organisation, in relation to sustainability, which systematically plans, implements and reviews sustainability policies and activities (Liao et al. 2015). Given that boards are directly accountable for related irresponsible/responsible behaviours in relation to sustainability (Neville et al. 2019), one way in which boards may address environmental issues is by forming specialised board committees to oversee corporate environmental policy (Dixon-Fowler et al. 2017). Hence, this responsible team is typically formed as an environmental committee. The committee will evaluate the sustainability initiatives, provide transparent and consistent environmental-related information, and address social and environmental issues from the perspective of risk, strategy and commitment to stakeholders (Liao et al. 2015). A company's orientation towards sustainability is achieved through the presence of such a responsible team (Ayuso et al. 2014). Its presence at board level ensures there is a priority given to environmental plans. When the board is directly responsible for environmental issues, i.e. through a committee appointed by the board, it is more likely that the board will guarantee the development of an environmental profile by supporting other aspects of environmental management and environmental disclosure.

2.1.2.2 Pay incentives

One function of the responsible team is to set up various types of incentives to encourage groups of actors, mainly internal stakeholders, to take action in relation to environmental activities (Liao et al. 2015). In this respect, the role of paying financial incentives as an effective way to motivate employees to take particular actions is evidenced by previous research (Conyon 2006). Paying incentives could help to promote environmental management and shape company activities in a way that pays attention to the diverse interests of external stakeholders, such as the environment. Introducing an environmental-related incentive scheme can help to bring external stakeholders' interests and internal stakeholders' behaviours closer together. Firms may have several incentives to voluntarily improve environmental performance (Khanna and Anton 2002). Depending on the board's knowledge of employees' behaviour, it can design an appropriate reward scheme, either for all the employees or for a specific group such as a sustainability team or senior managers. In addition, a firm may set up an incentive scheme to show itself to the outside world as being an environmentally responsible company (Rodrigue et al. 2013).

2.1.3 Environmental disclosure

Environmental disclosure describes the impact firm activities have on the physical or natural environment in which they operate (Wilmshurst and Frost 2000). The need to undertake such disclosure reflects the fact that companies are facing growing demands to disseminate more relevant and reliable information on their environmental performance (Arena et al. 2015; Alberici and Querci 2016). Firms have a set of key performance indicators (KPIs) to evaluate the success of environmental activities. Therefore firms attempt to collect, measure, manage and evaluate against KPIs and then report their environmental information. This process provides transparency and enables comparability with other companies, in terms of their environmental profile (Baumgartner and Ebner 2010). Ben-Amar and McIlkenny (2015) explore the role of the boards of directors in preparing environmental reporting. When the board has access to more reliable and up-to-date environmental information, it has more opportunities to monitor management performance in relation to the different dimensions of the firm's environmental profile. Firms usually publish their environmental-related information through annual company reports, voluntary reports or other regulatory filings (Carbon Disclosure Project 2019), intending to provide insights into the main impacts on both the company profile and the environment.

A number of prior studies (Stanny and Ely 2008; Stanny 2013) have examined the incentives for voluntary corporate carbon disclosures. Key findings are: investors may penalise non-disclosing firms and interpret the absence of disclosure as an adverse signal about the firm's environmental performance and lack of commitment to reducing GHG emissions; companies facing direct economic consequences of perceived poor environmental performance are more likely to disclose; company size, previous disclosures and foreign sales are related to whether firms disclose information about climate change requested by institutional investors.

2.2 Board social capital

Board capital consists of human capital and social capital (Hillman and Dalziel 2003). The human capital of directors is formed by current and past professional experience (Carpenter and Westphal 2001), which enables them to develop specific skills and knowledge about the firm and industry operation (Khanna et al. 2014). Social capital is embedded in social connections (Kilduff and Brass 2010) and depends on the arrangement of social connections of a focal firm (Burt 2002). It is described as an investment in social relations with expected outcomes, which cannot be achieved by the use of human capital (Lin 1999).

Previous studies examining the contribution of social capital to a company's performance (Kim and Cannella 2008) assume that social networks of board directors serve as a channel of influence, support, resources and information flow (Borgatti and Foster 2003). Directors with specific knowledge are required within a board (Kor and Sundaramurthy 2009), and this knowledge is often acquired by bringing in directors from outside the company who have strong social connections and, hence, access to diverse perspectives (Conger et al. 2001). Research has highlighted the influence of social capital on the effectiveness of board monitoring (Devos et al. 2009) and the importance of interlocking relationships between directors (Zona et al. 2018), which affect the firm's decision making. The board-level social network is measured by the social network centrality metrics, which are Degree, Betweenness, Closeness and Eigenvector. It is generally accepted that the more central a company's directors, the more access to resources and information it has (Borgatti and Foster 2003).

Given that the board of directors is not only responsible for protecting shareholders' interests, but also for making decisions about issues which concern a variety of stakeholders, such as sustainability-related issues, implementing and developing the environmental profile of the firm is an agenda item for the board of directors. It is incumbent on the board of directors to develop the company's environmental profile, by providing knowledge and other resources (Pfeffer and Salancik 1978; de Villiers et al. 2011) and ensuring that management endeavours to address the environmental agenda (Berrone and Gomez-Mejia 2009).

Previous studies consider how variations in the character of boards of directors influence organisational approaches to engaging in sustainable practices (Naciti 2019). These characteristics include the CEO salary and compensation package (Berrone and Gomez-Mejia 2009; Walls et al. 2012); board size (Kock et al. 2012); or some of the directors' characteristics such as diversity, board independence, board size, board compensation, CEO-duality, insider/outsider directors and directors' average age and education (e.g. Post et al. 2014; Prado-Lorenzo and Garcia-Sanchez 2010; Zou et al. 2014).

Another stream of research has highlighted the importance of social networks for knowledge sharing and for the diffusion of new and innovative practices into an organisation. If one accepts that the policies and practices associated with a company's environmental profile require knowledge sharing across the whole of the organisation and effective diffusion, then it is useful to take a network perspective when analysing the character and composition of the senior management structure, i.e. at board level. There are a number of reasons for taking a network perspective:

- All organisations are social networks and therefore need to be analysed in terms of networks of relationships. Organisations operate in environments comprising networks of other organisations.
- Difficulty in seeing overall patterns of relationships by looking at one organisation due to "multiple, complex, overlapping webs of relationships".
- Actions of actors in organisations can best be explained in terms of their position within networks of relationships.
- The comparative analysis of organisations must take into account their network characteristics.

(Nohria, N. and R.G. Ecceles, 1992 p. 4)

Pryke (2004) undertook pioneering research into the characteristics of the social networks in the construction sector, and established the importance of the use of social network analysis (SNA) as a methodology in the analysis of the relationships that comprise the construction project coalition. Building on this research is work by Alsamadani et al. (2013), who used SNA to model safety-related communications, and Almahmoud and Doloi (2015), who utilised the method for assessing social sustainability in construction projects.

A few studies have examined the impacts of director social networks on firms' adoption of proactive environmental performance/practices. Specifically, Ortiz-de-Mandojana and Aragon-Correa (2013) found that director interlocks are positively connected with the environmental performance of a firm in two specific situations: (1) when the firm is linked to a larger parent company and (2) in cases of low and high levels of interlock diversity. They conceptualise enhanced performance as "positive environmental deviance", i.e. where companies go above and beyond the minimal normative expectations that offer broad social benefits and deviate from others within the institutional field-related performance. Walls and Hoffman (2013) found that organisations located on the periphery of the network, or whose boards of directors possess a high level of environmental experience, are more likely to deviate in positive ways.

The overall finding of studies is that firms can learn about the experience of other companies and avoid their mistakes through harnessing the power of their social network connections. Moreover, the social network between companies will help them to identify the necessary resources, such as products and processes, that will enable them to deliver against sustainability targets much quicker and with less cost.

The following hypothesis was derived to focus this analysis:

H1 There is a positive relationship between boards of directors' social networks and their companies' environmental performance.

3 How was this study carried out?

This study utilises data that have already been collected and is stored in large datasets. Firstly, data on US companies listed as working in the construction and materials industry sector were collected from a dataset called BoardEx. BoardEx holds information about the characteristics of these companies' social networks. Secondly, the characteristics of the companies' boards of directors and the company financial performance were obtained from a large dataset called Compustat. Thirdly, the Carbon Disclosure Project (CDP) dataset provided information on environmental management practices and performance in companies. Data were extracted from each of the three datasets and merged to produce a panel dataset of 709 firms in the construction and materials sector for the period 2010-2018. In order to deal with endogeneity, we lagged social network metrics and other board characteristics data by one year to allow for changes in environmental management, disclosure and performance to take place based on the board characteristics in the previous year. Table 1 shows the list of variables generated for the panel dataset and a brief description of each.

Variable	Source	Description
Board social capital		
Managerial influence	*BoardEx*	Degree and Eigenvector centrality metrics – this captures managerial influence of boards of directors' members from their direct links to other directors outside their companies (measured by Degree) and from their indirect links to other directors (measured by Eigenvector).
Information collection ability	*BoardEx*	Closeness and Betweenness centrality metrics – this captures information collection ability of boards of directors' members from their position within the network (measured by Closeness) and from their position to act as a bridge/broker between different networks (as measured by Betweenness) .
Environmental management		
Pay incentives *(incentive type to entitled group)*	*CDP*	This variable is constructed based on the CDP question: "*Do you provide incentives for the management of climate change issues, including the attainment of targets?*" Firms respond to this question by selecting "Yes" or "No". If the answer is "Yes", then there are two follow-on questions: *"Who is entitled to the incentive? (board/senior executive, other managers, sustainability team, any group of employees)"* *"What type of incentives are you are paying? (Monetary, non-Monetary, recognition)"*
Climate change responsibility	*CDP*	This variable is constructed based on the firms' responses to the CDP question: "*Where is the highest level of direct responsibility for climate change within your company?"* Firms have four choices to identify the position of the individual or name of the committee having this responsibility, namely: • board • senior manager/officer • other manager/officer • no individual or committee

Environmental disclosure		
Publishing climate change reports	*CDP*	Companies are asked to answer the following question: *"Have you published information about your company's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response?"* There are three options: • Annual reports – referring to the mandatory annual financial reporting, published to meet regulatory obligations • Voluntary communication – non-mandatory and optional sustainability/CSR[2] reports • Other regulatory filings - those required through regional or national legislation
Environmental performance		
CDP performance score	*CDP*	CDP uses a scoring methodology, which measures progress towards environmental stewardship, as reported by a company's CDP response, i.e. awareness of climate change issues and environmental management-related issues, and progress towards actions to address climate change. CDP performance is reported as a single score.
Board characteristics (Control variables)		
Average age	*Compustat*	Average age of directors.
Average tenure	*Compustat*	Average tenure of directors.
CEO-duality	*Compustat*	Whether CEO is also chairperson of boards of directors.
Board size	*BoardEx*	Total number of directors on a board.
Firm characteristics (Control variables)		
Firm size	*Compustat*	Ln(Total Asset).
Net income	*Compustat*	Net income.
Market to book value	*Compustat*	Market to book value.

Table 1. Variables used in the study, with data sources and descriptions

To answer the research question "***What are the relationships between the social capital of boards of directors and firms' environmental profiles?***", the study used data measuring 1) board social capital (managerial influence, information collection ability) and 2) environmental management practices (responsibilities, information disclosure and incentives) as the independent variables. As shown in Table 1, the data on board social capital came from BoardEx, and the data on environmental management, disclosure and performance from CDP. The performance score from CDP was the dependent variable. The data from Compustat, i.e. CEO/chairperson duality and length of board tenure, provided the control variables for the study.

The data analysis approach involved two stages. In stage 1, data-mining techniques were used to model the impact of board characteristics on environmental management and disclosure practices. Then in stage 2 regression analysis developed a predictive model of the effect of board social capital/environmental management practices on the level of environmental performance.

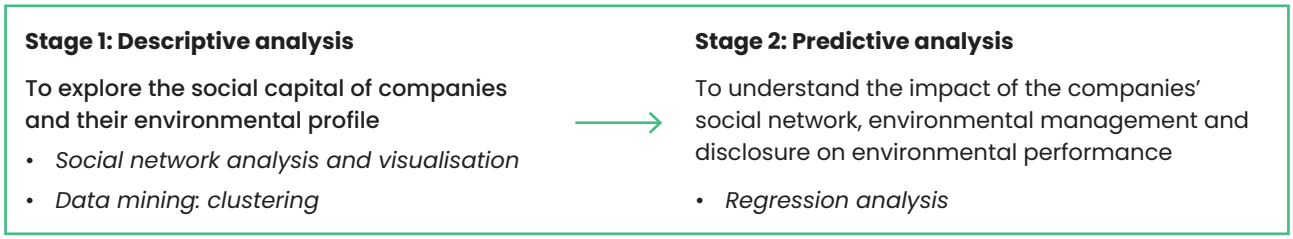

Figure 2: The analysis steps

Stage 1 – Descriptive analysis: social network analysis and clustering analysis

First, an undirected and unweighted social network was constructed between companies using shared directorates. Two construction companies are linked through a director if they share the same director in time *t*. Moreover, if directors from two companies sit on the board of a third company, the latter company will form a network of construction companies as well. Mathematically, a network is a square "adjacency" matrix where each cell indicates whether two individual directors are connected. A company's position in relation to others on the entire network is captured by calculating Degree, Closeness, Betweenness and Eigenvector using the NetworkX library in Python. Metrics were normalised, which helps when comparing them over time.

The procedure of Renneboog and Zhao (2011) was followed to distinguish between the different roles of networks: managerial influence accumulation and information collection. As outlined in Table 1, Degree and Eigenvector are representing managerial influence and Betweenness and Closeness are representing information collection ability. A clustering technique (the KMeans algorithm) was used to create a profile of companies based on each pair of variables for each year. The Elbow method and Silhouette score were then used to identify the optimum number of clusters.

Stage 2 – Predictive analysis: Regression analysis

The Ordinary Least Squares/Random-effects regression analysis was used to test the effect of board social capital and environmental practices on the level of environmental performance.

The regression equation is as follows:

$$CDP\ PerformanceScore_{it} = \alpha_i + \alpha_1 \times Network_{it-1} + \alpha_2 \times Env_{it-1} + \gamma^T \times Z_{it} + \varepsilon_{it} + U_{it} \quad [1]$$

where i denotes the firm and t the year. Variables are defined as follows: *CDP PerformanceScoreit* is the CDP performance score of firm i in year t; α_i is the firm fixed effect. ε_{it} measures within-entity error and U_{it} measures between-entity error. Vector Z_{it} contains the various firm-, board- and industry-level control variables discussed in Section 3. The variable $Network_{it-1}$ is one of the two social network measures previously defined for firm i in year $t-1$. The vector Env_{it-1} contains the variables of interest related to environmental management for firm i in year $t-1$: i.e. responsible team and incentives and environmental disclosure.

4 Findings

4.1 Stage 1: Types of board-level social networks in construction companies

Figure 3 shows the social network between companies in the construction and materials industry sector for the year 2018. Overall, all the companies in the dataset are connected (connected component = 1) but the density of the network is not very high. This means that not all companies are connected to each other directly. As with any social network visualisation, we can distinguish between the centre and the peripheral part of the graph. The companies which are in the centre of the graph have higher Degree, which means they are well connected to other companies. There are some companies that are acting as brokers within the network and connect various parts of the network, and therefore help facilitate information flow. In addition, the network analysis shows that it is not necessary to be at the centre of the graph to get access to many resources and information directly. Sometimes, you can be connected to a well-connected company and through this connection gain access to information (as measured through the Eigenvector value).

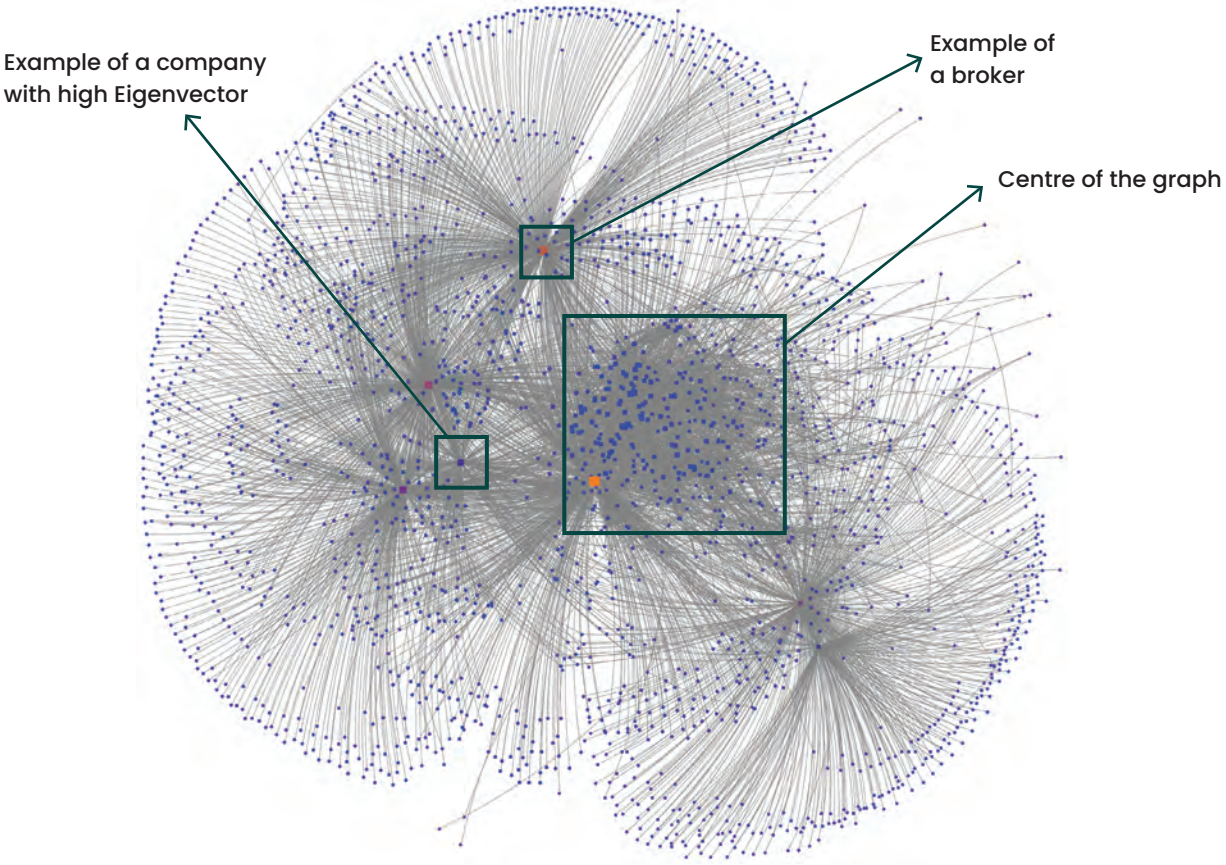

Figure 3: Social network visualisation for construction companies for year 2018

The Elbow method and Silhouette score showed that the best number of clusters in each year is two. So, for each year we use the Degree and Eigenvector variables to create two clusters which show a group of companies with strong managerial influence where they have high Degree and high Eigenvector. Another group of companies that have low Degree and low Eigenvector represent the companies with weak managerial influence. The same approach was applied on Betweenness and Closeness to identify two groups of companies with high/low information collection ability. This is shown graphically in Figure 4.

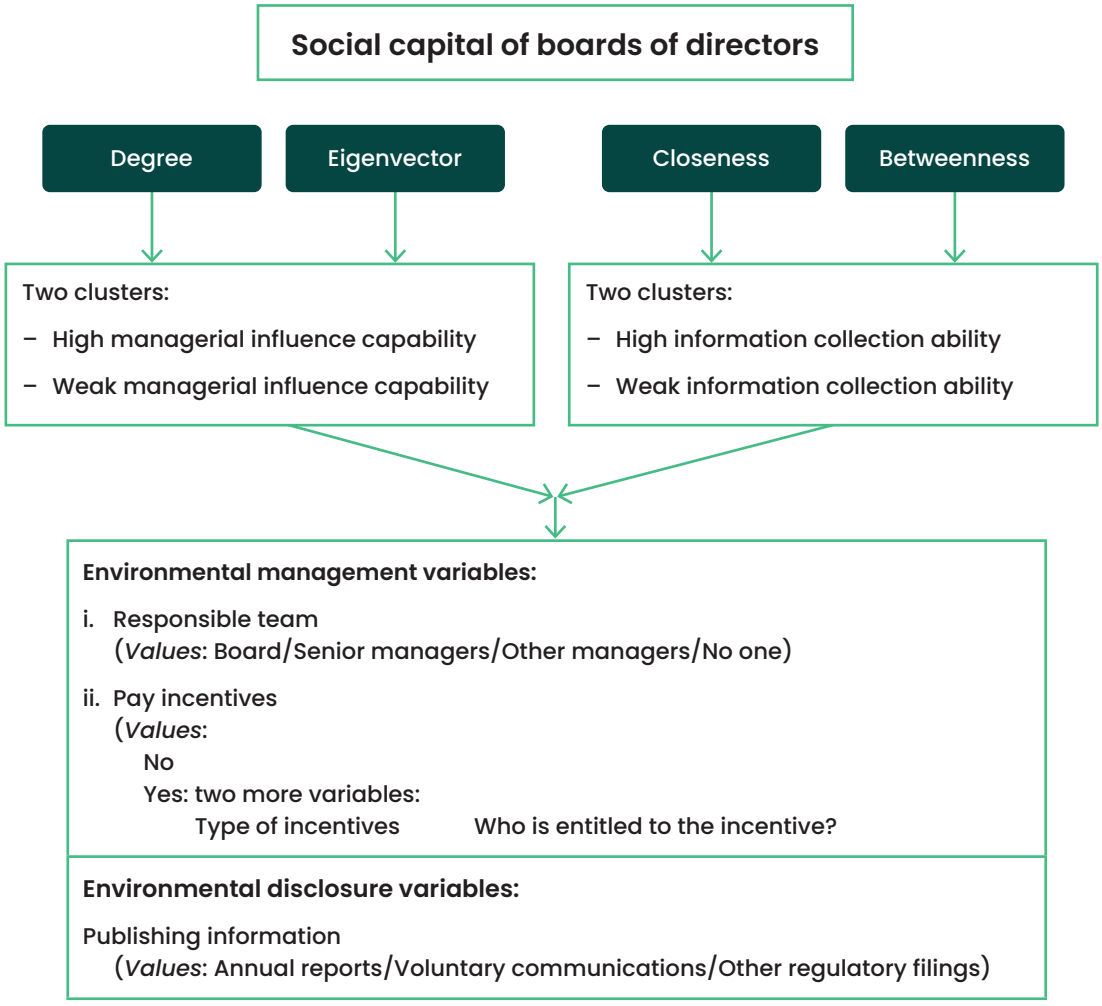

Figure 4: Clustering approach

The following two figures (5 and 6) show the clustering of companies based on the differences in their board social capital, i.e. strong vs weak managerial influence and strong vs weak information collection ability. These two scatter plots show that we can clearly differentiate between two clusters of firms in terms of managerial influence and information collection ability. In addition, Figure 6 shows that these clusters exhibited different characteristics in relation to their environmental management practices, i.e. the type of organisational structures set up with responsibility for environmental issues, the financial incentives paid to employees, and the nature of the information disclosed, for environmental performance. It should be noted that the same patterns are observed for all years.

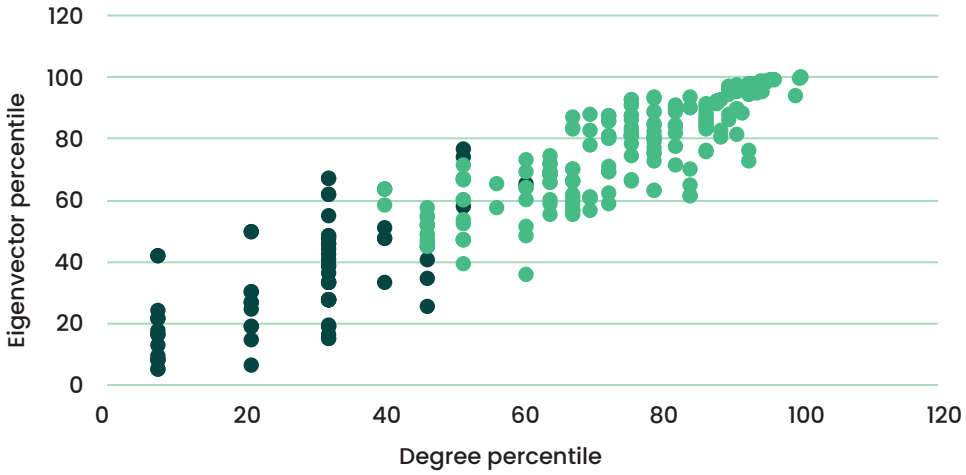

Figure 5: Two clusters based on variations in the level of managerial influence – as measured in terms of high v low Degree and Eigenvector (2018)

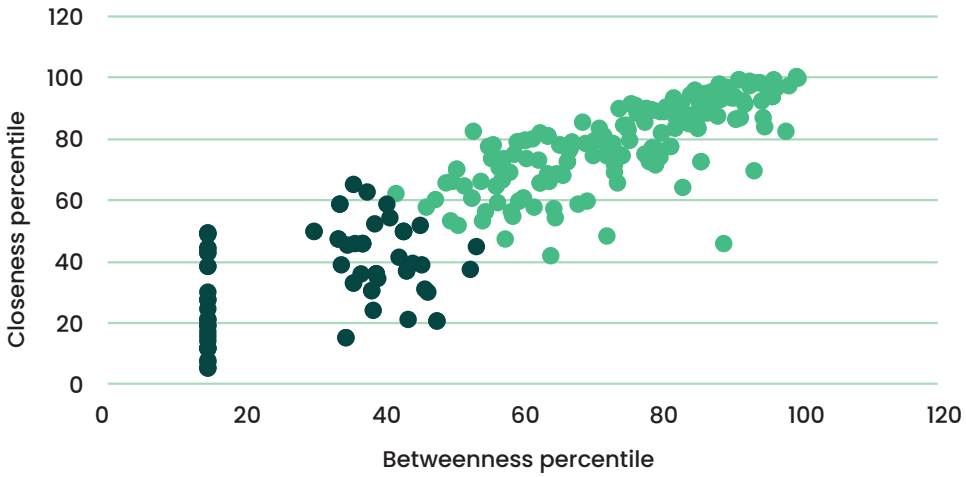

Figure 6: Two clusters based on variations in the level of information collection ability – as measured in terms of high v low Closeness and Betweenness (2018)

4.2 Stage 1: Relationships between board social networks, environmental management and environmental disclosure

A parallel coordinates plot, presented in Figure 7, shows a visual comparison of both social network variables and the environmental management and disclosure variables of companies together. Figure 7 clearly shows the following patterns and relationships: companies that have better social network connections, as reflected in higher managerial influence and information collection ability, are more likely to be publishing information on their environmental performance and to be paying monetary incentives and providing other forms of recognition – all attributes that lead to better performance.

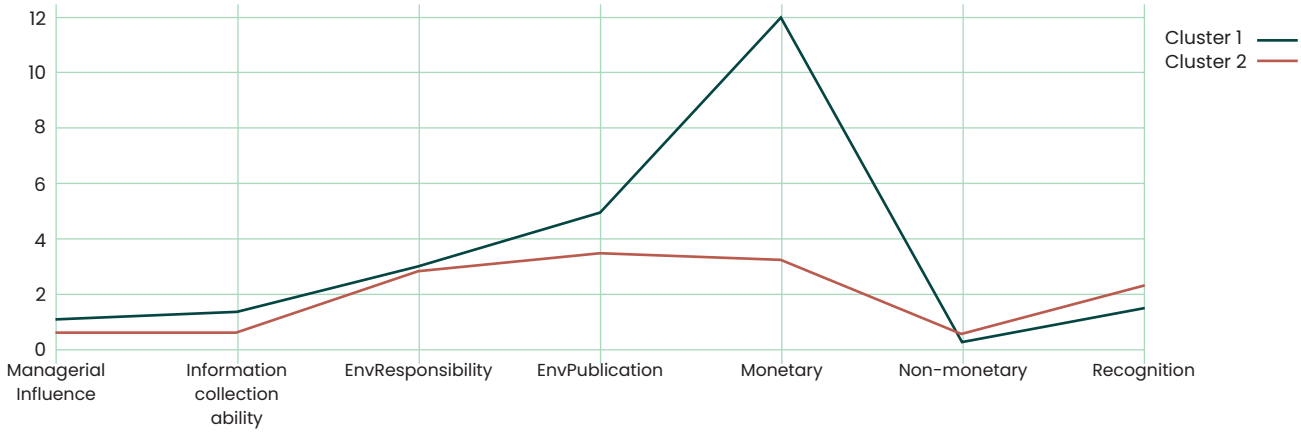

Figure 7: Parallel coordinates visualisation of patterns between social network characteristics and environmental management and disclosure variables for year 2018

4.3 Stage 2: Influence of board social capital, environmental management and environmental disclosure on environmental performance

To test our hypothesis, we examined the impact of social networks in terms of managerial influence and information collection ability on environmental performance.

Our results clearly show that *companies in the construction and materials industry sector with high managerial influence, as measured by the Degree and Eigenvector centrality metrics, have enhanced environmental performance.*

CDP performance score is positively and significantly related to the boards of directors' managerial influence (coefficient = 0.710, p = 0.030). The results further show that environmental disclosure has a positive and statistically significant (at the 5% level) relationship with CDP performance score (coefficient = 0.103, p = 0.000). The existence of a responsible team is also positively and significantly (coefficient = 0.219, p = 0.012) related to CDP performance score. Amongst the three types of incentives paid to various employees, only monetary incentives are positively and significantly (coefficient = 0.017, p = 0.068) related to CDP performance score. CDP performance score is insignificantly and negatively related to recognition incentives (coefficient = -0.011, p = 0.460) and negatively related to non-monetary incentives (coefficient = -0.022, p = 0.048).

The results of the regression analysis, after controlling for the effects of the control variables, in respect of managerial influence are shown in the equation below.

$$CDP\ PerformanceScore_{it} = 1.915 + 0.71 \times Network_{it-1} + 0.103 \times EnvPublication + 0.219 \times EnvResponsibility + 0.017 \times Monetary - 0.022 \times Non\text{-}monetary - 0.011 \times Recognition + \gamma^{T} \times Z_{it} + \varepsilon_{it} + U_{it} \quad [2]$$

We also analysed whether there is a relationship between environmental performance and information collection ability of the boards of directors. Our analysis demonstrates that companies in the construction and materials industry sector with high information collection ability, as measured by the Closeness and Betweenness centrality metrics, have enhanced environmental performance (coefficient = 0.690, p = 0.050).

Furthermore, the results show environmental disclosure has a positive and significant relationship with CDP performance score (coefficient = 0.103, p = 0.000). The existence of a responsible team shows a positive and significant correlation (coefficient = 0.219, p = 0.012). There are the same patterns for different types of incentives paid to various groups of employees. Monetary incentives are positively and significantly (coefficient = 0.017, p = 0.069) related to CDP performance score. On the other hand, CDP performance score is insignificantly and negatively related to recognition incentives (coefficient = -0.011, p = 0.046) and negatively related to non-monetary incentives (coefficient = -0.021, p = 0.048).

The equation resulting from the regression analysis in relation to information collection ability is shown in the equation below.

$$CDP\ PerformanceScore_{it} = 1.915 + 0.69 \times Network_{it-1} + 0.103 \times EnvPublication + 0.219 \times EnvResponsibility + 0.017 \times Monetary - 0.021 \times Non\text{-}monetary - 0.011 \times Recognition + \gamma^{T} \times Z_{it} + \varepsilon_{it} + U_{it} \quad [3]$$

The results for the control variables indicate that board size, market to book value and average tenure are positively associated with CDP performance score (p = 0.100, 0.000, and 0.050, respectively).

5 Reflections

Those involved in projects in construction companies are typically tasked with meeting sustainability-related targets in such areas as energy and water consumption and GHG emissions. This task is made easier when there is a top-down and strategic approach within the organisation focused on environmental management, i.e. having a high-level committee and appropriate incentives and environmental disclosure, both internally and externally. The nature of the approach adopted varies depending upon the characteristics of the social networks that boards of directors form with other companies in their sectors. These characteristics are level of managerial influence and information collection ability. So, those responsible for appointing board members, and the individual board members themselves, once in place, need to recognise that the types of social networks individuals have access to have an influence on environmental management and disclosure practices, which in turn affect what is done at the project level. Finally, in this respect, the dynamic nature of social networks highlights the fact that managerial influence and information collection ability can ebb and flow over time and cannot be taken for granted. Steps need to be taken to ensure that the social capital built up through access to the network remains at a high level.

Harnessing the social network is one effective way of diffusing innovation, in the form of new management structures and practices, and knowledge creation for companies, but it is usually ignored. Those companies that have boards of directors with high levels of social capital, have high managerial influence capability and high information collection ability. This capability and ability translates into higher levels of environmental performance. So the practical challenge for companies is to be proactive in developing their social capital and establishing boards that have the characteristics conducive to enhanced environmental performance, such as size of board.

Lastly, there is a temptation amongst those leading construction companies to focus exclusively on environmental performance, setting targets in this area for those managing the projects through which performance will be delivered and then putting pressure on regarding delivery. Once targets for performance are identified, the focus should be on the performance enablers, i.e. having adequate board social capital and the right environmental management and disclosure practices.

6 Implications for theory

Our work builds upon a well-established element of resource dependency theory, which posits that board directors are boundary spanners, who, through this role, provide tangible and intangible resources from outside the company into the firm's management (Wang et al. 1992). In terms of project management, tangible resources are methodologies and practices (know what) and intangible resources are a tacit knowledge-sharing process and facilitation (know how) (Almari and Gardiner 2014). We extend theory by revealing how the characteristics of the social networks of the board of directors influence the effectiveness of the boundary-spanning function in the context of environmental management and environmental disclosure. We show that specific network characteristics are aligned with different levels of managerial influence and information collection ability, which are important conditions for environmental management, disclosure and, ultimately, performance.

7 Implications for practice

There is evidence that in order to achieve firms' goals, the power of boundary-spanning board directors is harnessed at the project team level through the mediating role of the middle-level board structures that sit between the projects and the high-level boards of directors. An example is the area of innovation, where innovation review boards (IRBs), which are made up of internal executives whose mandate is to oversee the portfolio of innovations that are being delivered through innovation projects, have a crucial bridging role (Robeson and O'Connor 2013). There are a number of conditions for ensuring the effectiveness of the IRB in this role, one of which is demonstrating a high level of project team interaction. This interaction takes the form of frequent, informal interactions with the innovation project teams, rather than a few very formal project reviews.

Hence, project-focused firms in sectors like construction need to ensure that their middle-level project boards, whatever they are called, do not focus exclusively on governance activities, such as formal and planned project reviews, but also engage in more regular and informal interactions with their project teams. These interactions should be specifically focused on achieving enhanced environmental performance. In doing so, they will enable the boundary-spanning activities of board-level directors not only to lead to organisational-level practices in terms of environmental management, disclosure and performance but also to support the project teams tasked with delivering against environmental sustainability targets.

8 Limitations and areas for further work

In terms of the limitations of our study, we have proposed an explanation of our findings which suggests that levels of environmental performance are caused, in part, by board directors' social networks. We argue that, based on prior studies in other management contexts, this is a credible hypothesis. However, we are not able to claim that such a causal link is proven, and there are other explanations of the results that we have not explored. For example, board directors involved in firms that have better environmental performance have more to disclose and disseminate on their social network. Testing alternative hypotheses would be a fruitful avenue for further work.

In terms of other areas for further work, the authors of this report would welcome a further investigation into the mechanisms by which organisations translate the environmental management and disclosure practices undertaken at the organisational level, such as the dissemination and disclosure of information and the use of incentives, into action at the project level. In addition, how these organisational-level practices influence the behaviours of those involved in the management of individual projects. For example, a project-level analysis could usefully explore how the environmental profile of a company in a project-intensive industry sector, where there is pressure to deliver against environmental sustainability-related targets, is operationalising in project management activities – and how such activities are measured and reported at the organisational level.

Another useful area for further research is how the perceived environmental threats and opportunities in project management provide a bottom-up counter or balance to performance in addition to the top-down activities of management and disclosure. Moreover, comparisons between different project-intensive industries may provide further insights into different approaches taken. In addition, future research could consider whether there are other non-monetary incentives, e.g. ethical and legal, which drive environmental performance. Last but not least, our findings show clearly the value of the social network and the interactions that take place in these networks. It would be useful to explore in more depth how these social interactions actually take place, i.e. the role of communities of practices, such as professional bodies like the Association for Project Management, and other groups, as forums for interactions that lead to informal information sharing. To develop this research further, we recommend investigating whether the environmental profile of companies leads to the development of the social capital of companies.

9 Conclusions and summary

This study analyses how inter-organisational social networks of boards of directors contribute to environmental sustainability-related practices and performances in the project-intensive industry sector of construction. The findings provide hard evidence of the power of the social network in enhancing organisational performance relating to achieving environmental sustainability goals in a project-intensive industry sector. In their recruitment of board members and their utilisation of existing board members' capabilities, organisations can harness this power to drive environmental management practices that maximise environmental performance.

In general, the researchers found that the social networks of the members of boards of directors served to classify the approaches to environmental management taken by the organisations of which they had governance responsibility and strategic oversight. They concluded that the key characteristic of the social networks of board directors is in the Degree and Eigenvector metrics, which, respectively, are the number of connections an individual has to board members of other companies and a weighting of the importance of these connections based on whether they are direct or indirect links. In addition, the Betweenness and Closeness metrics help to estimate the information collection ability of directors, which could directly influence board decision making in relation to various agendas, including sustainability. Thus the authors believe that when boards of directors are seeking to develop their environmental management practices, organisation social network analysis has a useful role to play and needs to be incorporated into theories of how innovations are diffused into organisations and resources are utilised to achieve competitive advantage.

To summarise, the key findings are as follows:

- Environmental performance is positively and significantly related to the board of directors' managerial influence capability and information collection ability.
- Disclosure of environmental information has a positive and significant relationship with environmental performance.
- The existence of a formal group responsible for environmental issues is positively and significantly related to environmental performance.
- Amongst three types of incentives paid to employees for meeting environmental-related targets, only monetary incentives are positively and significantly related to enhanced environmental performance.

10 References

Alberici, A. and Querci, F. (2016). The quality of disclosures on environmental policy: The profile of financial intermediaries. *Corporate Social Responsibility and Environmental Management*, 23(5), pp.283–296. [online]. Available from: http://doi.wiley.com/10.1002/csr.1375.

Almahmoud, E. and Doloi, H.K. (2015). Assessment of social sustainability in construction projects using social network analysis. *Facilities*, 33(3–4), pp.152–176.

Almari, K. and Gardiner, P. (2014). Application of resource-based view to project management research: Supporters and opponents. *Procedia – Social and Behavioral Sciences,* 119, pp.437–445.

Alsamadani, R., Hallowell, M. and Javernick-Will, A.N. (2013). Measuring and modelling safety communication in small work crews in the US using social network analysis. *Construction Management and Economics*, 31(6), pp.568–579.

Arena, C., Bozzolan, S. and Michelon, G. (2015). Environmental reporting: Transparency to stakeholders or stakeholder manipulation? An analysis of disclosure tone and the role of the board of directors. *Corporate Social Responsibility and Environmental Management*, 22(6), pp.346–361. [online]. Available from: https://onlinelibrary.wiley.com/doi/full/10.1002/csr.1350.

Ayuso, S. et al. (2014). Maximizing stakeholders' interests: An empirical analysis of the stakeholder approach to corporate governance. *Business and Society*, 53(3), pp.414–439.

Banihashemi, S. et al. (2017). Critical success factors (CSFs) for integration of sustainability into construction project management practices in developing countries. *International Journal of Project Management*, 35(6), pp.1103–1119. [online]. Available from: http://dx.doi.org/10.1016/j.ijproman.2017.01.014.

Baumgartner, R.J. and Ebner, D. (2010). Corporate sustainability strategies: Sustainability profiles and maturity levels. *Sustainable Development*, 18(2), pp.76–89.

Ben-Amar, W. and McIlkenny, P. (2015). Board effectiveness and the voluntary disclosure of climate change information. *Business Strategy and the Environment*, 24(8), pp.704–719.

Berrone, P. and Gomez-Mejia, L.R. (2009). Environmental performance and executive compensation: An integrated agency-institutional perspective. *Academy of Management Journal*, 52(1), pp.103–126.

Binh, T.Q. (2012). Voluntary disclosure information in the annual reports of non financial listed companies: The case of Vietnam. *Journal of Applied Economics & Business Research*, 2(2), pp.69–90.

Borgatti, S. and Foster, P.C. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management*, 29(6), pp.991–1013.

Brammer, S. and Pavelin, S. (2006). Voluntary environmental disclosures by large UK companies. *Journal of Business Finance and Accounting*, 33(7–8), pp.1168–1188.

Burt, R.S. (2002). *The Social Capital of Structural Holes. The New Economic Sociology: Developments in an Emerging Field*. Cambridge: Harvard University Press.

Carbon Disclosure Project. (2019). Available from: https://www.cdp.net/en-US/Pages/About-Us.aspx.

Carbon Disclosure Project. (2011). *Climate Change Report*. https://www.snclavalin.com/~/media/Files/S/SNC-Lavalin/download-centre/en/report/cdp-report-2011.pdf

Carpenter, M.A. and Westphal, J.D. (2001). The strategic context of external network ties: Examining the impact of director appointments on board involvement in strategic decision making. *Academy of Management Journal*, 44(4), pp.639–660.

Chang, R.-D. et al. (2018). Sustainability attitude and performance of construction enterprises: A China study. *Journal of Cleaner Production*, 172, pp.1440–1451. [online]. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0959652617325817.

Chiarini, A. (2017). Setting strategies outside a typical environmental perspective using ISO 14001 certification. *Business Strategy and the Environment*, 26(6), pp.844–854.

Conger, J.A., Lawler, E.E. and Finegold, D. (2001). *Corporate Boards: Strategies for Adding Value at the Top*. San Francisco, California, USA: Jossey-Bass.

Conyon, M. (2006). Executive compensation, taxes, and incentives. *Academy of Management Perspectives*, Vol. 20, No. 1 pp.179–201.

Darko, A., Zhang, C. and Chan, A.P.C. (2017). Drivers for green building: A review of empirical studies. *Habitat International*, 60, pp.34–49. [online]. Available from: http://dx.doi.org/10.1016/j.habitatint.2016.12.007.

Devos, E., Prevost, A. and Puthenpurackal, J. (2009). Are interlocked directors effective monitors? *Financial Management*, 38(4), pp.861–887. [online]. Available from: http://doi.wiley.com/10.1111/j.1755–053X.2009.01059.x.

Dixon-Fowler, H.R., Ellstrand, A.E. and Johnson, J.L. (2017). The role of board environmental committees in corporate environmental performance. *Journal of Business Ethics*, 140(3), pp.423–438.

Fernández-Sánchez, G. and Rodríguez-López, F. (2010). A methodology to identify sustainability indicators in construction project management – application to infrastructure projects in Spain. *Ecological Indicators*, 10(6), pp.1193–1201.

Herazo, B., Lizarralde, G. and Paquin, R. (2012). Sustainable development in the building sector: A Canadian case study on the alignment of strategic and tactical management. *Project Management Journal*, 43(2), pp.84–100.

Hillman, A. and Dalziel, T. (2003). Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *Academy of Management Review*, 28(3), pp.383–396.

Ilinitch, A.Y., Soderstrom, N.S. and E. Thomas, T. (1998). Measuring corporate environmental performance. *Journal of Accounting and Public Policy*, 17(4–5), pp.383–408.

Karunasena, G., Rathnayake, R.M.N.U. and Senarathne, D. (2016). Integrating sustainability concepts and value planning for sustainable construction. *Built Environment Project and Asset Management*, 6(2), pp.125–138.

Khanna, M. and Anton, W. (2002). Corporate environmental management: Regulatory and market-based incentives. *Land Economics*, 78(4), pp.539–558. [online]. Available from: http://171.66.125.237/content/78/4/539.short.

Khanna, P., Jones, C.D. and Boivie, S., 2014. Director human capital, information processing demands, and board effectiveness. *Journal of Management*, 40(2), pp.557–585.

Kilduff, M. and Brass, D.J. (2010). Organizational social network research: Core ideas and key debates. *The Academy of Management Annals*, 4(1), pp.317–357. [online]. Available from: http://www.tandfonline.com/doi/abs/10.1080/19416520.2010.494827.

Kim, Y. and Cannella, A.A. (2008). Toward a social capital theory of director selection. *Corporate Governance: An International Review*, 16(4), pp.282–293.

Kock, C.J., Santaló, J. and Diestre, L. (2012). Corporate governance and the environment: What type of governance creates greener companies? *Journal of Management Studies*, 49(3), pp.492–514.

Kor, Y.Y. and Sundaramurthy, C. (2009). Experience-based human capital and social capital of outside directors. *Journal of Management*, 35(4), pp.981–1006. [online]. Available from: http://journals.sagepub.com/doi/10.1177/0149206308321551.

Liao, L., Luo, L. and Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *British Accounting Review*, 47(4), pp.409–424.

Lin, N. (1999). Building a network theory of social capital. *Connections*, 22(1), pp.28–51. [online].

Martens, M.L. and Carvalho, M.M. (2013). A conceptual framework of sustainability in project management oriented to success. *Project Management Institute*, 2013, pp.1–10.

Naciti, V. (2019). Corporate governance and board of directors: The effect of a board composition on firm sustainability performance. *Journal of Cleaner Production*, Volume 237. [online]. Available from: https://doi.org/10.1016/j.jclepro.2019.117727.

Neville, F. et al. (2019). Board independence and corporate misconduct: A cross-national meta-analysis. *Journal of Management*, 45(6), pp.2538–2569.

Nohria, N., and R. G. Eccles. Face-to-Face: Making Network Organizations Work. In *Networks and Organizations: Structure, Form and Action*, edited by N. Nohria and R. G. Eccles. Boston: Harvard Business School Press, 1992.

Ortiz-de-Mandojana, N. and Aragon-Correa, J.A. (2013). Boards and sustainability: The contingent influence of director interlocks on corporate environmental performance. *Business Strategy and the Environment* Volume 24, Issue 6.

Pfeffer, J. and Salancik, G.R. (1978). *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper & Row.

Post, C., Rahman, N. and McQuillen, C. (2014). From board composition to corporate environmental performance through sustainability-themed alliances. *Journal of Business Ethics* Vol. 130, No. 2 (August 2015), pp.423–435

Prado-Lorenzo, J.M. and Garcia-Sanchez, I.M. (2010). The role of the board of directors in disseminating relevant information on greenhouse gases. *Journal of Business Ethics*, 97(3), pp.391–424.

Pryke, S.D. (2004). Analysing construction project coalitions: Exploring the application of social network analysis. *Construction Management and Economics*, 22(8), pp.787–797.

Qiu, Y., Shaukat, A. and Tharyan, R. (2016). Environmental and social disclosures: Link with corporate financial performance. *British Accounting Review*, 48(1), pp.102–116. [online]. Available from: http://dx.doi.org/10.1016/j.bar.2014.10.007.

Renneboog, L. and Zhao, Y. (2011). Us knows us in the UK: On director networks and CEO compensation. *Journal of Corporate Finance*, 17(4), pp.1132–1157. [online]. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0929119911000526.

Robeson, D. and O'Connor, G.C. (2013). Board of directors, innovation, and performance: An exploration at multiple levels. *Journal of Product Innovation Management,* 30(4), pp.608–625.

Rodrigue, M., Magnan, M. and Boulianne, E. (2013). Stakeholders' influence on environmental strategy and performance indicators: A managerial perspective. *Management Accounting Research*, 24(4), pp.301–316. [online]. Available from: http://dx.doi.org/10.1016/j.mar.2013.06.004.

Stanny, E. (2013). Voluntary disclosures of emissions by US firms. *Business Strategy and the Environment*, 22(3), pp.145–158. [online]. Available from: http://doi.wiley.com/10.1002/bse.1732.

Stanny, E. and Ely, K. (2008). Corporate environmental disclosures about the effects of climate change. *Corporate Social Responsibility and Environmental Management*, 15(6), pp.338–348.

Trumpp, C. et al. (2015). Definition, conceptualization, and measurement of corporate environmental performance: A critical examination of a multidimensional construct. *Journal of Business Ethics*, 126(2), pp.185–204. [online]. Available from: http://link.springer.com/10.1007/s10551-013-1931-8.

UN. (2019). Sustainable Development Goals. *Sustainable Development Goals*. [online]. Available from: https://www.un.org/sustainabledevelopment/sustainable-development-goals/.

de Villiers, C., Naiker, V. and van Staden, C.J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management*, 37(6), pp.1636–1663.

Walls, J. and Hoffman, A. (2013). Exceptional boards: Environmental experience and positive deviance from institutional norms. *Journal of Organizational Behavior*, 34(March 2012), pp.253–271.

Walls, J.L., Berrone, P. and Phan, P.H. (2012). Corporate governance and environmental performance: Is there really a link? *Strategic Management Journal*, 33(8), pp.885–913. [online]. Available from: http://doi.wiley.com/10.1002/smj.1952.

Wang, J., Dewhirst, H. and Dudley, H. (1992). Boards of directors and stakeholder orientation. *Journal of Business Ethics,* Vol. 130, No. 2 (August 2015), pp.115–123.

Wilmshurst, T.D. and Frost, G.R. (2000). Corporate environmental reporting: A test of legitimacy theory. *Accounting, Auditing & Accountability Journal*, 13(1), pp.10–26.

Zona, F., Gomez-Mejia, L.R. and Withers, M.C. (2018). Board interlocks and firm performance: Toward a combined agency–resource dependence perspective. *Journal of Management*, 44(2), pp.589–618. [online]. Available from: http://journals.sagepub.com/doi/10.1177/0149206315579512.

Zou, H.L. et al. (2015). Are top executives rewarded for environmental performance? The role of the board of directors in the context of China. *Human and Ecological Risk Assessment: An International Journal*, Vol. 21, No. 6, December 2015, pp.1542–1565.

We are the only chartered membership organisation for the project profession

APM Research Fund Series

We set up the APM Research Fund to provide funding for small-scale research projects, as well as provide seed funding for larger research projects.

For more information, please visit apm.org.uk/research

Please contact us with your views and suggestions: research@apm.org.uk

Association for Project Management
Ibis House, Regent Park
Summerleys Road
Princes Risborough
Bucks HP27 9LE
0845 458 1944
apm.org.uk

@APMProjectMgmt
@AssociationForProjectManagement
@APMProjectMgmt
@AssociationForProjectManagement

Association for Project Management is incorporated by Royal Charter RC000890 and a registered charity No. 1171112. Principal office as shown.