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Extending structural capital through pro-environmental behaviour intention capital. An outlook on Spanish hotel industry

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- Purpose. This paper brings the attention of the Intellectual Capital (IC) research and practice communities to the value of IC in hotels' efforts to resolve or mitigate environmental problems over time. This research has been set to examine the relationships between key KM and IC concepts including environmental knowledge structures and exploitation and exploration of environmental knowledge (EK) as drivers of environmental organisational learning. The research has also examined the relevance of pro-environmental behavioural intention capital (PEBIC) as a component of structural capital and therefore an integral part of the intellectual capital of hotels.
- Design/methodology/approach. The data analysis technique used to test the proposed conceptual model is partial least squares structural equation modelling (PLS-SEM). Sample received from 87 companies from the Spanish hospitality sector in a longitudinal study (six years).
- Findings. The results support that environmental knowledge structures (exploitation and exploration) has a positive impact on pro-environmental behaviour intention capital (PEBIC) over time. In other words, environmental organisational learning has the capability to create structural capital in hotel over time.
- Originality/value. The research has addressed the challenges of exploration and exploitation of environmental knowledge and pro-environmental behaviour intention capital from a perspective not previously covered in the extant literature, further improved by the longitudinal nature of this study. Our focus on the hospitality sector makes this research relevant for management structures at numerous of hotels, as well as to their supply chains around the world. Additionally, this research highlights the value to create structural capital through environmental knowledge and organisational learning in the context of take care of our natural resources.

Keywords: environmental knowledge, knowledge exploration, knowledge exploitation, structural capital, intellectual capital, pro-environmental behaviour intention capital, organizational learning

1. Introduction

In the current socio-economic context, the attention of a wide range of scholars and practitioners has turned to the value of intangibles and intellectual capital in their efforts to address the ongoing challenges in areas such as healthcare management, socio-economic development and environmental sustainability (Dumay, 2013; Lin and Edvinsson, 2020). This research has been conducted to contribute to those efforts by addressing in particular the environmental challenges we face, from the intellectual capital perspective. Intellectual capital (IC) strategies and tools rely heavily on knowledge structures and their effective use (Hartono and Sheng, 2016). Knowledge structures serve to define expected relationships, behaviours and actions for organisational members (Lyles and Schwenk, 1992) . The evolution of the IC of the firm can in fact be perceived as an outcome of the successful use of its knowledge structures, leading not only to the growth of their knowledge base but also to the intention in their workforce to use such knowledge to resolve specific situations (Chan *et al.*, 2014). Thus, an important component of the IC of the organisation is its 'pro-environmental behavioural intention'. Pro-environmental behavioural intention is defined as the conditions in which the workforce are willing to contribute to the success of organisational strategies, particularly those that target environmental sustainability in its relationship with business performance (Martinez-Martinez *et al.*, 2019).

Pro-environmental behavioural intention capital (hereafter PEBIC) is probably viewed in this context as a mixture of self-interest and of concern for other people, for the next generation, other species, or whole eco-systems (Carson *et al.*, 2004; Bamberg and Möser, 2007), all of which is key in companies, countries and society in general. PEBIC is intention to realise environment-friendly behaviours. In this study, pro-environmental behaviour intention capital suggests that economic activities' companies must be exercised with a sensitive awareness of changing pro-environmental behaviour capital and priorities.

Contrary to the understanding of individual pro-environmental behaviour, PEBIC belongs as a concept to the entire company. According to Ajzen's (1989) theory of planned behaviour, PEBIC helps explain the actual behaviour of consumers, organisations and their capital (Carson *et al.*, 2004; Han and Yoon, 2015). Although a number of classifications exist (Guthrie *et al.*, 2004), there is consensus in the extant literature that as an integral component of the IC base of the firm, shared intentions –that is, its structural capital– persist throughout time even when individual employees leave the company (Roos, Edvinsson and Dragonetti, 1998; Petty and Guthrie, 2000; Ordóñez de Pablos, 2004). Bearing these ideas in mind, this study reports that PEBIC may be considered as an extension of structural capital and defines it as the result of using and retrieving environmental knowledge from one moment of time to another later. Structural capital is the supportive non-physical infrastructure that enables human capital to function.

In the particular case of the hospitality industry, the literature shows that structural capital becomes a key driver to a pro-environmental business strategy (Steg and Vlek, 2009; Stegerean, Petre and Chis, 2014; Massaro *et al.*, 2018) because companies are able to share and use environmental knowledge (Martinez-Martinez *et al.*, 2019) and according to Collis and Montgomery, (1995) structural capital contributes to the creation of a competitive differentiation. The hospitality industry need create competitive differentiation growth and take care of environment specially in this time of COVID-19. Environmental factors and their potential effects remain important and may become even more so in the case of health emergencies and pandemic crises. For example, although these are still initial speculations, there are concerns that pollution may facilitate the transmission of coronaviruses (Qu *et al.*, 2020). Environmental concerns are increasingly challenged by companies in their activities. The air quality in hotels and common spaces seem to be challenges to solve in short-term.

Environmental knowledge (EK) is defined in this research how information and skills through hands on experience living in close contact with their environment. In this sense, environmental

knowledge is essential to respond successfully to stakeholders' social expectations, creation of intangible capital and to environmental variations (Green and Ryan Julie, 2005; Imran, Alam and Beaumont, 2014).

Since firms currently are a major threat to the environment due to the great quantity of waste generated as their consumption of natural resources grows (Fraj, Matute and Melero, 2015), it can be assumed that organisational knowledge structures are key players in fostering the creation of environmental knowledge (Kollmuss and Agyeman, 2002; Delgado-Ceballos *et al.*, 2012). These knowledge structures allow the company's EK to remain modern and efficient (Cegarra-Navarro, Cordoba-Pachon and de Bobadilla, 2009; Ning and Wang, 2018). This means that the company's EK is not only the result of exploiting validated routines and protocols (i.e., knowledge exploitation), but it may also be the result of exploring new possibilities and unproven theories (i.e., knowledge exploration). It is observed that the capacity to create EK and to harmonize it within the company depends on the knowledge available both inside and outside the organization (Martinez-Martinez *et al.*, 2019).

Explorative and exploitative knowledge structures can encourage the acquisition and use of environmental knowledge in the hospitality industry (de Marchi and Grandinetti, 2013) and improve PEBIC (Chen, 2008; Steg and Vlek, 2009; Oliveira, Lima Rodrigues and Craig, 2010; Hargreaves, 2011; Chan *et al.*, 2014; Cheng and Wu, 2015; Lauren *et al.*, 2019). Organisational intentions measure the degree of how much effort companies are planning to exert in order to perform the behaviour, and therefore inform organisations' efforts to create benefits to society (Conner and Armitage, 1998). In fact, based on Ajzen´s (1989) views, Conner and Armitage (1998) and Hsu and Chang (2007) argued that behavioural intention exerts a positive influence on actual behaviour.

Despite the concept of "intention" has been successfully used to achieve organizational goals in scientific literature in fields such as knowledge management (Zhou and Fink, 2003; Lin, 2006, 2007; Chen, Chuang and Chen, 2012), information systems and technology (Hwang, Lin and Shin, 2018) or intellectual capital (Harrison and Sullivan, 2000), research on "PEBIC" over time at eco-friendly companies is extremely limited.

This study focuses on the relationship between PEBIC, measured at two points in time. From an IC point of view, PEBIC is a stock of shared knowledge that needs to be updated regularly to incorporate sustainability management into innovative processes and services (Hargreaves, 2011; Tapaninaho and Kujala, 2019). While exploitation and exploration of environmental knowledge are directly related to a pro-environmental behaviour intention capital, these areas have received less attention in the intellectual capital literature. With this work, we address and contribute to reduce such a research gap.

In order to achieve our goal, this article reports on a study that investigates environmental knowledge structures that contribute to PEBIC at two points in time t (2008) and t+6 (2014). In doing so, this study approaches the subject from a new perspective whereby pro-environmental behaviour intention capital is perceived as an outcome rather than an income. On this basis, the study proposes a conceptual framework which is presented in the next section. The methodology section then provides details of the empirical tool used to collect data to test the conceptual model, also describing the results of the analysis and discussion are included. Finally, conclusions and implications of the study are presented.

2. Conceptual Framework

2.1. The hospitality industry and environmental knowledge

Intellectual capital can contribute to creating value at different levels within organisations from different fields. Successful firms acknowledge that they have responsibilities with their

stakeholders, which go beyond merely compliance with the law. Some of the elements that such organisations consider as priorities for society (Islam and Managi, 2019; Kim and Stepchenkova, 2019) include social aspects such as sustainable development. Their stakeholders require organisations to create social, intangible and environmental value in addition to the economic value they create (Fletcher *et al.*, 2003; Bueno, Salmador and Rodríguez, 2004; Matos and Vairinhos, 2017; Duodu and Rowlinson, 2019). Thus, sustainable development depends on the behaviour at all levels, from individuals to groups, organisations and as a society (Bamberg and Möser, 2007; Steg and Vlek, 2009).

Tourism has become a very important social phenomenon which mobilises millions of people all over the world. The interaction between global economic growth and global social transformation has resulted in changes in character and behaviour of hotels and in public expectations about the role and responsibility of encouraging pro-environmental behaviour capital in order to transform in actions (Mair and Laing, 2013). Today, these rapid evolutionary developments have created a need to make different actions to protect the environmental as an answer to need of stakeholders (Martinez-Martinez *et al.*, 2019), also to create value for society (Hsiao, Chuang and Huang, 2018), and it is including in strategic business (for example in specifically budget heading).

If in the past the focus was on enhancing shareholder value in an strictly economic sense, now it is on engaging stakeholders for long-term value (Hillman and Keim, 2001; Andriof *et al.*, 2017). Stakeholders demand more pro-environmental behaviour capital from companies not only request in short-term but also in long-term (Steg and Vlek, 2009; Miller, Merrilees and Coghlan, 2015). So, companies are paying more attention to the needs of stakeholders in order to obtain benefit from improve their organizational performance or incorporate sustainability management into their processes and services or create intellectual capital in term of structural capital (Hargreaves, 2011; Garay, Font and Pereira-Moliner, 2017; Tapaninaho and Kujala,

2019). Additionally, any business requires a sustainable strategic development of its structural capital if it is to remain competitive in the knowledge economy. Numerous scholars have contributed to the definition of what constitutes the structural capital of the organisation and how it is measured (Petty and Guthrie, 2000).

In order to protect the environment, hotels have developed an ever closer relation with their stakeholders, allowing these to influence their strategic decision making, having an impact on their pro-environmental behaviour intention capital (Hargreaves, 2011; Steg *et al.*, 2014; Peng and Lee, 2019). Continuous environmental learning has therefore become an imperative for organisations in their efforts to embrace change for improved performance and occasionally their own subsistence (VanDeusen and Mueller, 1999; Gourlay, 2004; Easterby-Smith and Prieto, 2008; Rogers, 2012; Trong Tuan, 2013; Horng *et al.*, 2017; Cegarra-Navarro *et al.*, 2020).

Environmental knowledge can be considered as a general knowledge of facts, concepts, and relationships concerning the natural environment and its major ecosystems (Fryxell and Lo, 2003). It also has been described as a structure that connects data, analysis and people and offerings an occasion to validate the environmental strategy of a firm (Wernick, 2003). Thus, we would argue that "environmental knowledge application" is one thing and "applying environmental knowledge" another. While environmental knowledge application is a knowledge management process that requires being good at converting knowledge from one context to another (Gold et al., 2001), applying environmental knowledge learned to a new context may provide organizations with the encouragement to expand productivity (Senge, 1990). As Martelo-Landroguez and Cegarra-Navarro (2014) note, while knowledge application is the capability for operative action, applying knowledge is the operative action in the company, which may take in consideration numerous complex questions. This paper will therefore focus on our consideration that "environmental knowledge" is one way to apply learned knowledge to

address concerns about the environment and collective responsibilities necessary for sustainable development (Whyte, 2013; Martinez-Martinez *et al.*, 2019).

2.2. The relationship between environmental knowledge, exploitation and exploration of knowledge (organisational learning) and pro-environmental behavioural intention capital (structural capital) over time

Creating environmental knowledge requires from hotels both the ability to explore new possibilities for an early understanding of related risks and opportunities, and to exploit the latest guidelines and environmental regulatory requirements for daily operations. Our argument is based on the understanding of organisational learning as a process whereby knowledge is created through the combination of explorative and exploitative activities (March, 1991; Bontis, Crossan and Hulland, 2002; Chiva and Alegre, 2005; Mom, Van Den Bosch and Volberda, 2007; Mihalache and Mihalache, 2016). When both processes take place simultaneously, new knowledge is created as a result of the rearrangement of existing knowledge structures, the revision of previous knowledge structures, and the building and revision of new theories (March, 1991; VanDeusen and Mueller, 1999). Environmental knowledge has been an important variable that explains pro-envionmental behavior (Jensen, 2002; Kollmuss and Agyeman, 2002; Pothitou, Hanna and Chalvatzis, 2016).

On the other hand, in recent years attention has been drawn to the necessity of combining both exploration and exploitation of environmental knowledge, and that these should be integrated within an ambidextrous plan (Brix, 2019) with the aim of transferring new environmental knowledge (Li *et al.*, 2013). Thus, the first and second hypotheses were formulated as follows:

H1: Exploration of knowledge (t) positively influences environmental knowledge (t)

H2: Exploitation of knowledge (t) positively influences environmental knowledge (t)

2.2.1 Pro-environmental behavioural intention capital as a component of structural capital

The environmental challenges faced by the hospitality sector have been analysed from diverse perspectives. Including their structural capital dimension, with literature covering the elements required to support the emergence and development of the relevant intellectual capital in the form of a pro-environmental behavioural intention capital (Massaro *et al.*, 2018; Zientara and Zamojska, 2018), from the urgently need to eliminate or save waste of resources (Warren, Becken and Coghlan, 2017) and from the need to provide green products or services, to cope with the risks of changes in environmental (Triguero, Moreno-Mondéjar and Davia, 2014), but not, from the point of view of, the knowledge processes required for the development and application of environmental knowledge and pro-environmental behaviour intention capital, is this point where it is found a gap. Numerous researches have focused on the extent to which environmental learning affect organisational performance from a financial point of view (Leonidou *et al.*, 2015; Martínez-Martínez *et al.*, 2019). However, while exploitation and exploration of environmental knowledge are directly related to a pro-environmental behaviour intention capital, these areas have received less attention in the intellectual capital literature (Kollmuss and Agyeman, 2002; Rezapouraghdam, Alipour and Darvishmotevali, 2018).

Previous research has shown that corporate green brand should be built not only from the provision of but also from green behaviour among stakeholders (such as employees) in their daily activities (Bamberg and Möser, 2007; Suganthi, 2019). The ability of an organisation to adapt to a changing environment requires a balance between the exploration and the exploitation of environmental knowledge in order to attain long-term competitive advantage (Kim and Rhee, 2009; Martínez-Martínez *et al.*, 2019).

One of the most important enablers to implementation of environmental learning strategies is the self-perception of stakeholders as actors in the process of driving hotels to be

environmentally friendly (Martinez-Martinez *et al.*, 2019). Besides, a growing pro-environmental behaviour capital base activities of firms attract to the customer (Delgado-Ceballos *et al.*, 2012). A pro-environmental behaviour that focus on involving different kinds of internal and external stakeholders with a win–win vision (Gezon, 2014; Miller, Merrilees and Coghlan, 2015), this vision is referred to that both the companies and society win. In this sense, environmental knowledge has much to contribute to pro-environmental behaviour intention capital (Steg and Vlek, 2009; Unsworth, Dmitrieva and Adriasola, 2013).

Pro-environmental behaviour intention capital is pertinent elements of adaptive capacity in interacting with natural resources and in relation to the outcomes of companies that cope with the risks of changes in environmental. Understanding pro-environmental behaviour intention capital in its broadest meaning, including all activities carried out by the company and mutually benefitting company and society (Mair and Laing, 2013; Miller, Merrilees and Coghlan, 2015; Martínez-Martínez *et al.*, 2019). At this point it seems key to point out that when reference is made to pro-environmental behaviour intention capital in some cases it will not be a tangible or there will even be deficient in common measurement indicators this outcomes (Whitmarsh and O'Neill, 2010; Zientara and Zamojska, 2018).

The ability to use environmental knowledge (t) could aim to create new market opportunities (Bontis, Crossan and Hulland, 2002) and improve pro-environmental behaviour intention capital. Furthermore, present (t) pro-environmental behaviour intention capital incentives will be aligned so that the firm will be motivated to improve its future (t+6) pro-environmental behaviour intention capital. The following hypotheses are therefore formulated:

H3: Environmental knowledge (t) positively influences pro-environmental behaviour intention capital (t)

H4: Environmental knowledge (t) positively influences pro-environmental behaviour intention capital (t+6)

Based on the above, the path relationships between variables are hypothesised as shown in Figure 1.

Insert Figure 1 about here

3. Method

3.1 Data collection

The Spanish tourism industry is a relevant sector for the following reasons. Fist and based on the World Travel and Tourism Council (2017), 13% of the Spanish gross domestic product (GDP) and 11% of all Spanish employment are due to the Spanish tourst industry. Secondly and considering previous research, Spanish tourism is a well-established sector with a high level of environmental commitment (Martínez-Martínez, Cegarra-Navarro and García-Pérez, 2015), these circumstances allow us to analyse aspects shown in Figure 1.

On the basis of the Iberian Balance Sheets Analysis System 2007. SABI (Iberian Balance Sheet Analysis System) is a database with financial information of more than 2,6 million companies in Spain and Portugal. The National Classification of Economic Activities (CNAE-552) was used to delimitate the key activities focus on, at that point in time we obtained a popullation of 560 hotels with more than 10 employees. From early September to the end of October 2008 we phoned and requested to participate in the sttudy these hotels. As a result, 127 valid questionnaires were obtained. Six years later, between January and February 2014 the survey was repetated among the same hotels. On this occasion, the response rate to this new survey was 65.5% of the hotels which participated in the study in 2008 (15.53 per cent of the total population), representing a total number of 87 valid responses. The explanation of this difference

betweeen 2008 and 2014 is in circumstances such as the refusal of the managers to participate in this new survey, the fact that that some hotel managers had changed their jobs or hotels had closed down (the analysis period includes some years of the global financial crisis). This research combines quantitative and qualitative methods for an improved understanding of the tourism business requires a broader research methodology than presently exists (Davies, 2003; Khoo-Lattimore, Mura and Yung, 2019).

On the other hand, other type of information was collected by informants from specific hotels and on documents collected from other sources, for example, company websites (environmental management system) or hotel materials. We interviewed to four business managers. The combination of a quantitative methodology together with personal interviews with managers contribute to offer a more enriching discussion of the results with important practical implications, highlights by managers.

3.2 Measures

The appendix lists the fifteen items that have been used to validate our statistical analyses (Churchill, 1979), below we explain the operationalization of each construct.

Knowledge exploration (ER)*:* The exploration of knowledge requires the sharing of new values and thoughts (Dewhurst & Cegarra-Navarro, 2004), as well as the exchange of ideas and formal dialogues (Mom, Van Den Bosch and Volberda, 2007). Four items were used to include these aspects that help the company explore new possibilities and opportunities (Mom, Van Den Bosch and Volberda, 2007). These include: the collect information about the most important groups, to support the exchange of ideas and formal dialogues, manuals and documents on customer service procedures and emphasizing the search and sharing of new values and thoughts.

Knowledge exploitation (ET): Exploiting knowledge involves not only the creativity of those who adapt it to their own decisions but also taking into consideration the opinions and the point of view of other stakeholders to solve different questions (Bontis, Crossan, & Hulland., 2002). Four items based on these issues were adapted for measuring and opetationisng this construct. These include: modifiying a product or service because the customers demand it, rewarding the creativity of employees, supporting the use of metaphors to resovler employee doubts and sharing information with the most important collectives of the question.

Environmental knowledge (EK): We have designed a four-item scale drawing on the ideas established by Martínez-Martínez, Cegarra-Navarro, and García-Pérez (2015). These include: the utilisation of organic products; the use of less polluting industrial processes and products; and the implementation of a green program and environmental emergency plans.

Pro-environmental behaviour intention capital: In this study, PEBIC by asking questions about the budget related to pro-environmental behaviour intention actions, indicators in each work to measure pro-environmental behavior intention capital in short-term, indicators in each work to measure pro-environmental behaviour intention capital in long-term (Burritt, Hahn and Schaltegger, 2002; Bamberg and Möser, 2007). In some research were considered that for companies the major of the "intentions" is when they plan a budget line for specific actions (Quirke, 1991; Burritt, Hahn and Schaltegger, 2002). In other words, if companies have a budget line to actions related to sustainability, it is the major way to indicated that they if will make care to environmental and promote pro-environmental behaviour intention capital through the care of the environment (Kollmuss and Agyeman, 2002; Vining *et al.*, 2002). These include: the company has budget heading for taking care of environment with actions, the company´s indicators in each work to measure pro-environmental behaviour intention capital in short-term are better than previously and the company´s indicators in each work to measure pro-environmental behaviour intention capital in long-term are better than previously.

Data Analysis

PLS-SEM requires specific attention with regard to model identification (Henseler, 2017), in our case, all measures were considered as composites type A (i.e. refractive constructs), then PLS-SEM is the most suitable data analysis technique to test this kind of models (Richter and Cepeda, 2016). It implies that the total variance of all constructs is used to estimate model parameters (Hair *et al.*, 2017).

Our analysis follows different stages according to the recent advances of PLS-SEM reporting (Henseler, Hubona and Ray, 2016; Hair *et al.*, 2017) and the recent call for PLS-SEM emancipation due to the different epistemological nature of the measures (common factor versus composites) (Rigdon, 2016). Firstly, for analysing the model's goodness of fit, the value of the standardized root means square residual (SRMR) was 0.075, which is below the maximum threshold of 0.08 (Hu and Bentler, 1999). In addition, Unweighted Least Squares (d_{UL}) and Geodesic (d_G) discrepancies were below the 99%-quantile of the bootstrap discrepancies (HI_{99}).Therefore, our model reached satisfactory level of goodness of fit (Henseler *et al.*, 2014; Hair *et al.*, 2017).

Once the model fit is established, we carry out the assessment of the measurement model. The confirmatory composite analysis is a recent global measure of it. For that purpose, we checked the internal consistency reliability (ρ_A), the composite reliability (CR), and the Cronbach's alpha (CA). As shown in Table 1, all values of ρ_A, CR and CA are above the common threshold values (Nunnally, 1978; Henseler, Ringle and Sarstedt, 2015; Henseler, Hubona and Ray, 2016), suggesting that all variables in the model are reliable (Table 1). Further on, we assessed discriminant validity by analysing heterotrait-monotrait ratios of correlations (HTMT), as proposed by Henseler et al. (2012). As shown in Table 1. all values of HTMT are below the

recommended threshold of 0.9, which provides evidence of discriminant validity (Henseler, Ringle and Sarstedt, 2015).

4. Results

Once the model was assessed. We estimated path coefficient and tested statistical significance using a bootstrap procedure with a number of 5.000 subsamples. For that purpose, we run PLS-SEM analysis using the SmartPLS v. 3.2.7. (Thiele, Ringle and Sarstedt, 2015). Table 2 provides path coefficients, t-statistic and significance levels of Hayes and Scharkow (2013) showed that the bootstrap confidence interval is a good approach for detecting path coefficients. All the path coefficients in Table 2 are supported. The percentile bootstraps at 95% confidence intervals have this outcome (Table 2). Furthermore, the Stone-Geiser Q-square test for predictive relevance of pro-environmental behaviour intention capital at (t+6) was 0.201, which demonstrates that the structural model has satisfactory predictive relevance because that value is higher than 0. The proposed model also explains the 42.5 percent of the variance in pro-environmental behaviour intention at capital (t+6) (R^2). Together, from the above analysis, hypotheses 1, 2, 3, 4 and 5 found support and confirm the theoretical model (Figure 1). In other words, the results can support that environmental knowledge structures (exploitation and exploration) has a positive impact on PEBIC over time. So, environmental organisational learning has the capability to create structural capital in hotel over time.

Insert Table 2 about here

5. Discussion

Attention to the environment is increasingly a vital part of the overall strategy for companies in all sectors. However, a transition to an environmentally sustainable business requires that organisation be capable to have a pro-environmental behavioural intention capital, as a

component of structural capital, which allows them to apply existing knowledge in new ways, or to acquire and manage new kinds of knowledge (Unsworth, Dmitrieva and Adriasola, 2013).

This study considers that a pro-environmental behaviour intention capital at two points in time (t) and (t+6) is possible to exist as a result of the presence of environmental knowledge (t) which is acquired or applied in the processes of environmental knowledge exploration and exploitation. This study makes a valuable contribution in this regard. Regarding this, results show that a pro-environmental behaviour intention capital over time occur when hotel has environmental knowledge (t) or previous, and this study highlights how hotels can obtain environmental knowledge. For example, according to managers´ interviews; *"hotels for implementing ISO 14001 need to know that exist it, existing environmental knowledge can favour a pro-environmental behaviour capital*". Specifically, the four managers interviewed agree to point to; *"the need of hotels to have a background knowledge to facilitate a pro-environmental behaviour intention capital"*. In this sense, our results support the same idea; environmental knowledge (t) contributes to increase pro-environmental behaviour intention capital over time. In other words, environmental knowledge (t) contributes to increase structural capital over time.

In terms of Hypothesis H1 and H2, the results suggest that the combination of exploration and exploitation of knowledge has a positive effect on environmental knowledge. A possible explanation for these findings may relate to exploit knowledge, in order to latest guidelines and environmental legislation. However, the complexity and dynamic of environment also requires new knowledge, so, when both processes, exploration and exploitation, take place simultaneously, new knowledge is created as a result of the reorganisation of existing knowledge structure and the building and revision of new theories could be possible (March, 1991; VanDeusen and Mueller, 1999; Bontis, Crossan and Hulland, 2002; Dewhurst and Cegarra Navarro, 2004; Mom, Van Den Bosch and Volberda, 2007). In terms of business

organization an ambidextrous plan (Brix, 2019) is necessary to exploring the concerns of the stakeholder in relation to the environment (Li *et al.*, 2013). For instance, in words of the managers of interviews; *"the combination of exploration and exploitation of knowledge relate to environmental knowledge, in consequence, hotels can come up with solutions and initiatives related to environmental, besides, they can incorporate eco-innovation into their processes".* All of the participants considered structural capital as a key aspect in their efforts to care for natural resources, as in the majority of cases individuals are the drivers of pro-environmental practices (i.e. routines and processes) which drive hotels to have a more a pro-environmental behavioural intention.

With regard to Hypothesis H3, the results show that the more environmental knowledge (t), the major the presence of pro-environmental behaviour intention capital (t). This can be interpreted as that when stakeholders´ have environmental knowledge, environmental behaviour capital became more environmentally favourable (Steg and Vlek, 2009; Unsworth, Dmitrieva and Adriasola, 2013). On the other hand, environmental knowledge (t) and pro-environmental behaviour intention capital (t) can be self-reinforcing (i.e. when individuals look for information relevant to address environmental issues). At this respect, the managers of interviews consider that; *"people with greater environmental knowledge are more likely to behave responsibly in order to protect the environment".* However, Bartiaux, (2008) did not identify a significant correlation between knowledge of environmental issues and pro-environmental behaviour. A possible explanation of this different could be that households do not have the pression of stakeholders and their pro-environmental behaviour could be caused by other motivations not only existing environmental knowledge.

Regarding the Hypothesis H4, the results show that environmental knowledge (t) can contribute not only to increase a pro-environmental behaviour intention capital (t) in short-term but also over time. A possible explanation for this finding is that becoming aware of environmental

problems is an important determinant of pro-environmental behaviour intention capital, in this sense, environmental knowledge (t) is necessary by problems awareness by companies but not only in short-term also affect to long-term (Bamberg and Möser, 2007). The managers of interviews remark that; *"environmental knowledge (t) and pro-environmental behaviour (t) reduce the mistake and people have a more pro-environmental behaviour intention capital in long-term".*

Related to H5, pro-environmental behaviour intention capital (t) has a positive effect on pro-environmental behaviour intention capital (t+6). This can justify because when people are more aware of the deterioration of the environment, people change their routines and introduce new or modified ones to take care of the environment or the ability to use environmental knowledge could aim to create new market opportunities (Bontis, Crossan and Hulland, 2002). To more environmental knowledge structures, they more conscious they will be about the environmental problem and behaviour will be more favourable to protect environment. The managers of the interviews highlight: *"pro-environmental behaviour intention capital (t) is relevant for motivating to pro-environmental behaviour intention capital (t+6)".*

5.1. Managerial implications

From a practical perspective, the findings of this research can improve the understanding and practice of managers in terms of exploration and exploitation of environmental knowledge.

It is important to consider that the use of our model in the hospitality industry may not only lead to pro-environmental behaviour capital for hotels but also for all stakeholders and that will benefit environmental sustainability. In other words, we have paved the way to future research in this area so that hotel managers are motivated and guided through implementation of environmentally-friendly strategies. Based on the results, the following suggestions are offered to help management enhance organizational behaviour more focus on environment by

establishing a successful environmental knowledge strategy. This research highlights that it seems more appropriate in the long-term for hotels to act strategically that they are forced to invest in more practices focus on improve "pro-environmental behaviour intention capital", besides, they are aware because stakeholders, specially, their customers demand it (Delgado-Ceballos *et al.*, 2012).

Other implications for practice include enabling hotel managers to analyse the cognitive proximity of the hotels and its stakeholders to estimate the success of current and potential environmental learning strategies such as eco-innovation or taking more risks towards innovation in this area to gain a competitive advantage (Kleysen and Street, 2001; Garcés-Ayerbe *et al.*, 2016).

Finally, implications from the intellectual capital perspective include our views of pro-environmental behavioural intention capital as a component of structural capital, which has the potential to contribute to environmental sustainability in the long-term, thus becoming an important contribution to the field of green intellectual capital.

6. Conclusions

This study aimed to analyse the role of knowledge exploitation and knowledge exploration as drivers of environmental knowledge and related processes within an organisation, as well as the potential effects on pro-environmental behavioural intention capital as a component of structural capital. The study of intention has aimed to inform the potential for organisations' efforts to create benefits to society on the basis that behavioural intention exerts a positive influence on actual and future organisational behaviour and structural capital.

This research finds a gap in the literature in three main areas; firstly, the concept "pro-environmental behaviour intention capital" has been referred to in different ways in the literature, this research considers the concept as an intangible asset and a component of structural capital.

Secondly, previous studies analysed the effect of actions on pro-environmental behaviour intention capital as input, and thirdly, research on the relationship between environmental knowledge, exploration and exploitation of environmental knowledge and pro-environmental behaviour intention capital is absent.

In addressing the above gap, this study collected 214 responses from the Spanish hotels in a longitudinal research, considering two point; 2008 (127) and 2014 (87). The data was allowed addressing the challenges of environmental learning (exploration and exploitation of environmental knowledge) and pro-environmental behaviour intention capital in the hospitality sector. In doing so, our research has highlighted some of the key factors that help create a competitive advantage through the incorporation of practices related of exploitation and exploration of environmental knowledge in hotels, contributing to knowledge in both theoretical and practical terms.

6.1 Theoretical significance and contribution

Nowadays, many managers, professionals, academics from different backgrounds, consultants and policymakers recognise the value and role of intangibles and IC at all levels within the economy (Dumay, 2013). This research makes a significant contribution to the academic's literature on the subjects of IC and environmental sustainability by addressing organisational learning –that is exploration and exploitation of environmental knowledge, as well as pro-environmental behaviour intention capital from a new perspective.

Building on the relationship between knowledge structures (exploration and exploitation of knowledge) and the intention of the workforce to use environmental knowledge, this longitudinal study contributes to the understanding of the factors driving the growth of the intellectual capital base in organisations. This may be the first study in the hospitality industry to establish such a link between exploration and exploitation of environmental knowledge with pro-environmental

behaviour intention capital over time. The results of the analysis provided strong support for the hypothesized relations. These findings provide a theoretical basis that can be used to analyse the structural relationships between exploration, exploitation, environmental knowledge and pro-environmental behaviour intention capital in other context (for example, other country or another sector).

Therefore, this research can be useful to examine the relations and measures of the constructs between each of the exploitation, exploration, environmental knowledge and pro-environmental behaviour intention capital separately.

In addition, this work contributes to the conceptual understanding of important facets of the concepts environmental knowledge and pro-environmental behaviour intention capital in the hospitality industry. This research may contribute to environmental knowledge and pro-environmental behaviour capital research in hotels in which is essential for the sustainability of the world.

On the other hand, we have found a direct relationship between environmental knowledge (time t), pro-environmental behaviour intention capital (time t) and pro-environmental behaviour intention capital (time t+6 years). Our study suggests that the environmental knowledge of hotels contributes positively to their pro-environmental behaviour intention capital over time. This relationship is significant not only in the long-term, but also in the short-term, which defines of the key contribution of this study and the intellectual capital field. This is also an important managerial implication as it informs hotel managers could consider it, for instance, with budgeting and planning their actions related to sustainability.

6.2. Limitations and avenues for future research

This study has some limitations. First of all, it is focused solely on the hospitality sector. Although tourism is a relevant sector with direct effects on the environment, other industries and countries/regions could be considered in future studies.

Second, the survey was directed only to individuals holding management positions in the targeted hotels. Future studies could seek to learn not only from management but also from staff and from other stakeholders and compare, how the perception of environmental responsibility varies across the range of stakeholders.

Third, this study analysed a period of six years and this offer an interesting point over-time however, it could be interesting to analyse a more extensive period. A future line of work would be to collect new data over the next few years.

Finally, pro-environmental behaviour intention capital is measured without differentiating hotels and their aims. For instance, it would be interesting to differentiate between hotels that seek to be perceived as pro-environmental behaviour for the purpose of improving their reputation, those that work to increase their levels of customer loyalty or other motivations. This research analysed pro-environmental behaviour intention capital without considered for example, the reasons of classifications of environmental behaviour intention capital, this is because this research is focused on determining if there is a connection between exploration and exploitation of environmental knowledge and pro-environmental behaviour intention capital not the specific components of pro-environmental behaviour intention capital as a component of structural capital. On the other hand, this study focuses on structural capital, but the other two dimensions of intellectual capital not were considered in this work. However, these limitations are a new opportunity in future research.

Others future research could address such differences with a view to understand, for example, which kind of environmental behaviour actions are perceived as more or less significant within

a particular sector or context. In addition, it could be interesting in future research to include a gender perspective and consider identify the environmental barriers to achieve a pro-environmental behaviour capital in companies. Finally, individual case studies should be conducted to learn about individual environmental motivations to include pro-environmental behaviour intention capital in their business strategies, as well as, considering a future research that involve a more component of structural capital and its effects on environmental knowledge.

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Appendix: Questionnaire items

Knowledge Exploration: Indicate the extent to which each of the agents indicated below has capacity to influence on the hotel's environmental performance (0= no capacity and 10= high capacity):
ER_1: Your company cares about collecting information about the most important groups
ER_2: Your company supports the exchange of ideas and formal dialogues (for example meetings)
ER_3: Your company has manuals and documents on customer service procedures
ER_4: You emphasize the search and sharing of new values and thoughts
Knowledge Exploitation: Indicate the extent to which each of the agents indicated below has capacity to influence on the hotel's environmental performance (0= no capacity and 10= high capacity):
ET_1: When our customers want us to modify a product or service, we make efforts to modify it
ET_2: Your company rewards the creativity of employees
ET_3: Your company supports the use of metaphors to resolve employee doubts
ET_4: Your company shares information with the most important collectives of the question
Environmental knowledge (0= high disagreement and 10= high agreement):
EK_1: Priority is being given to organic products (biodegradable, recyclable, etc.)
EK_2: The company (hotel) uses less polluting industrial processes and products
EK_3: The company (hotel) has developed a green program (waste management, control of effluents, inventory of pollution sources)
EK_4: The company (hotel) has developed a drafting of environmental emergency plans and measures
Pro-environmental behaviour intention capital (0=much worse than last years and 10=much better than last years):
PEBIC_1: The company has budget heading for taking care of environment with actions
PEBIC_2: The company´s indicators in each work to measure pro-environmental behaviour intention capital in short-term are better than previously
PEBIC_3: The company´s indicators in each work to measure pro-environmental behaviour intention capital in long-term are better than previously

Figure 1: Theoretical Model

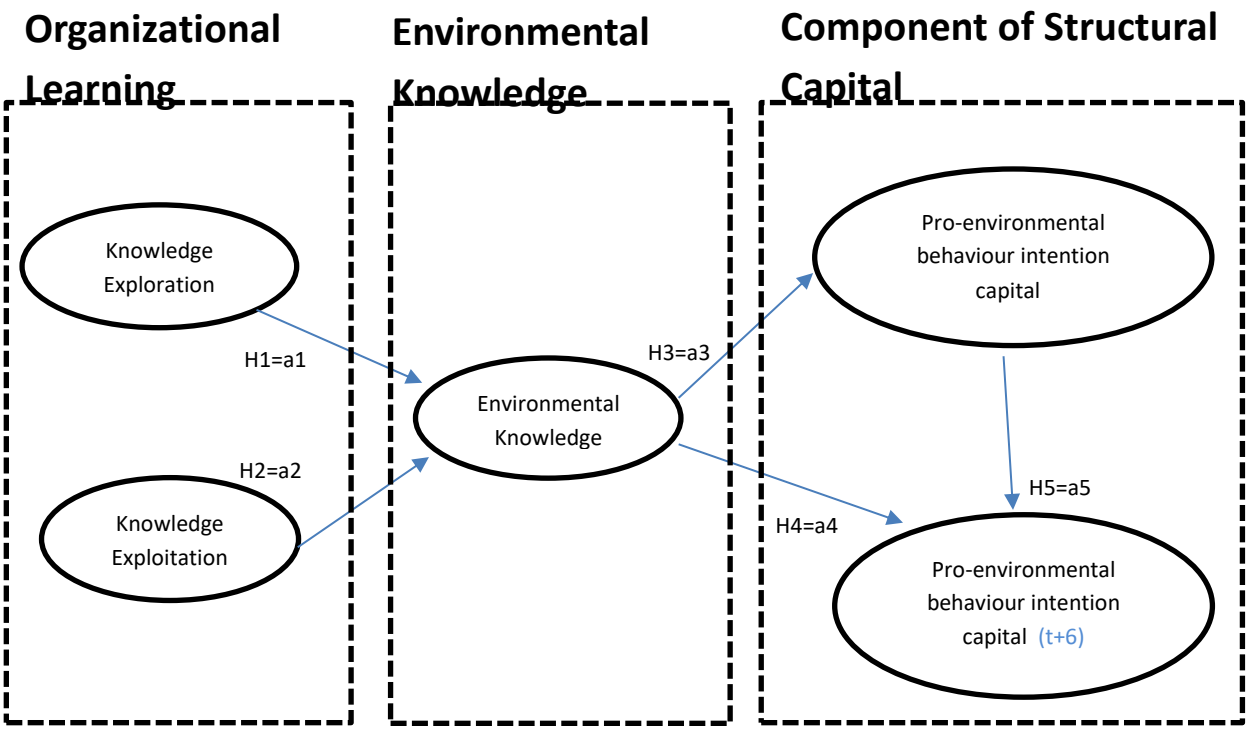

Table 1
Reliability, convergent validity, and discriminant validity values of outer model

				HTMT				
Construct	(ρ_A)	CR	AVE	ER(t)	ET(t)	EK(t)	PEBIC(t)	PEBIC(t+n)
ER(t)	0.872	0.865	0.711					
ET(t)	0.885	0.861	0.705	0.750				
EK(t)	0.853	0.814	0.646	0.773	0.727			
PEBIC(t)	0.867	0.866	0.790	0.458	0.471	0.741		
PEBIC(t+n)	0.902	0.901	0.835	0.604	0.544	0.607	0.734	

Notes:
(ρ_A)= Dijkstra-Henseler's rho ; CR = Composite Reliability; AVE = Average Variance Extracted;
ER= Knowledge exploration; ET= Knowledge exploitation; EK= Environmental knowledge; PEBIC= Pro-environmental behaviour intention capital

Table 2
Construct effects on endogenous variables (incl. lower and upper bounds of 95% confidence interval)

Hypotheses	Path Coef.	Confidence intervals		Supported
		$95\%CI_{li}$	$95\%CI_{hi}$	
H1: ER(t) → EK(t)	a1=0.460***	0.249	0.652	Yes
H2: ET(t) → EK(t)	a2=0.321**	0.134	0.535	Yes
H3: EK(t) → PEBIC(t)	a3=0.531***	0.366	0.693	Yes
H4: EK(t) → PEBIC(t+n)	a4=0.424***	0.216	0.581	Yes
H5: PEBIC(t) → PEBIC(t+n)	a5=0.424**	0.163	0.702	Yes

Notes:
[(based on t(4999), one-tailed test); ** t(0.01, 4999) = 2.327; *** t(0.001, 4999) = 3.092]
ER= Knowledge exploration; ET= Knowledge exploitation; EK= Environmental knowledge; PEBIC= Pro-environmental behaviour intention capital