

Chapter 6

Relationship Learning Strategy as a Mechanism of Network and the Effectiveness of Green Innovation

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Abstract The purpose of this chapter is to analyse, from a theoretical research approach, the relationship between relationship learning (RL), knowledge base (KB) and green innovation (GI) outcomes. This chapter attempts to argue that a deep and broad KB leads to better GI outcomes. In addition, the theoretical model proposes that firms that invest and involve themselves in RL mechanisms are more likely to indirectly foster GI. Also, we argue how cooperation among firms that occurs through networks or supply chains stimulates the RL mechanisms, eventually affecting the innovation.

In light of the knowledge-based view (KBV) and the relationship view (RV), the two main propositions suggest that firm's GI is greatly influenced both by an integrated broad and deep KB (directly) as the RL activities (indirectly). The proposed research model has conceptual implications (advancing in the application of RV perspective in the field of GI) and practical implications for managers (related to the design and improvement of his or her KB and the engagement in RL strategies).

6.1 Introduction

The global civilisation is more interrelated than ever before. The progressively fuzzy boundaries are incessantly crossing business, mindsets, technologies, people and even societies at a speed unknown until now. The new information and technologies era offers great advantages, but it also involves the anxiety by the imbalances in numerous areas that occur on a global scale.

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This is an unparalleled era in which human behavior and activities are producing physical changes in the Earth that, if passed the planetary limits, can lead to dangerous and unused situations.

New opportunities are opened to the firms, but also new challenges, so that sustainable development is an imperative and, without doubt, the biggest challenge facing today's society. Sustainable development seeks to understand the interactions concerning three complex systems: the world economy, the global society and the physical environment of the Earth (Sachs, 2015). It implies a normative approach on the planet, with the recommendation of a series of objectives to which the world should aspire. In this way, the new era is defined on the basis of new global objectives, the objectives of sustainable development, to promote socially inclusive economic growth and environmentally sustainable.

Therefore, the objectives of sustainable development should guide the world economic diplomacy of the new generation, allowing new forms of global governance: a challenge that involves both government and businesses.

Green innovation is an important way to mitigate or avoid environmental damage. Buyers around the world want and expect to purchase evermore environmentally friendly products and services. Indeed, green innovation is a strategic need for firms, and it offers a great opportunity for meeting buyers' wishes without harming the environment.

By the other hand, in the age of the knowledge-based culture, the knowledge-based assets are contemplated like powerful strategic drivers, and are constantly generated through people's cooperation and knowledge-sharing mechanisms (Grant, 1996). Nevertheless, knowledge creation process is not limited to the internal boundaries of an organisation; above all it is created through networks and cooperation links with customers, suppliers, partners and competitors. So, a knowledge base resulting from the supply-chain relationships is essential for effective green innovation. The ability to conform a deep and broad knowledge base, combining external and internal sources of knowledge, is crucial for supporting innovative processes, green products and services, and so creating better value for customers (Martelo-Landroguez & Cegarra-Navarro, 2014).

When firms share information and knowledge with customers and suppliers through supply-chain management activities, they enhance their knowledge base, capabilities and competitiveness through relationship-level learning. Several studies have acknowledged the need to manage supply-chain relationships and cooperation as strategic issues in firm's outcomes and green innovations (Azzone & Noci, 1998; Chen, Lai, & Wen, 2006; Chiou, Chan, Lettice, & Chung, 2011; Zacharia, Nix, & Lusch, 2011). This framework is operationalised by the 'co-production' and 'ad hoc innovation' thesis.

We propose in this chapter a conceptual model to analyse the effect of relationship learning (as inter-firm cooperation capability) and the firm's knowledge base on the green innovation performance. It has been accepted in the literature that both relationship learning strategy and knowledge base play a basic role in organisational green innovation. However, although there are plenty of research works that study

the existing relationship between knowledge management and the effectiveness of the innovation process, there are certain peculiarities with regard to this link which have yielded some inconclusive results. In addition, there are some distinctive characteristics of the green innovation versus innovation in general, and we have not found previous works in the literature that have studied these relationships for the case of the green innovation. This chapter revisits this research topic with a model that links relationship learning (RL), knowledge base (KB) and green innovation (GI) outcomes. This chapter attempts to argue that a deep and broad KB leads to better GI outcomes. In addition, this study found that firms that invest and involve themselves in RL mechanisms are more likely to foster GI.

The chapter has five sections. [Section 6.2](#) presents the conceptual framework and explains the variables of the proposed research model. [Section 6.3](#) describes the theoretical background, research model and propositions that link the variables. [Section 6.4](#) offers conclusions and implications (at both academic and managerial levels).

6.2 Conceptual Framework

Recently, literature about cooperation and networks has increased in significance and volume of publications to the extent that favours the development of core competencies and capabilities in the companies. A cooperation strategy allows firms to increase their levels of competitiveness (Li & Zhong, 2003). Especially in small- and medium-sized enterprises, collaboration with suppliers, customers and competitors to co-generate resolutions to problems is vital to a firm's corporate strategy and a way to gain competitive advantage (Belderbos, Carree, Diederer, Lokshin, & Veugelers, 2004). Essentially, firm's collaboration is a tool to pool and use outward and inner knowledge that influences the operative, social and financial results of the companies.

The increasing importance of cooperation, networks and interorganisational relationships has guided to the evolution of a variety of theories to clarify the development of relationships and organisational collaboration. In our opinion, there are two theories that provide the most powerful development of this research topic: the knowledge-based view (KBV) and the relationship view (RV).

The KBV theory proposes that knowledge is an essential strategic resource for a firm to retain a sustainable competitive advantage. As knowledge is created and disseminated throughout the firm, it has the potential to contribute to the firm's value by enhancing its capability to respond to new and unusual situations. The growing importance of knowledge as a critical resource has encouraged managers to pay greater attention to the firm's KM strategies. So, KBV suggests that knowledge is the most vital firm's resources (Grant, 1996; Spender, 1996). KBV recommends the role of the firm is to generate, obtain and utilise managerial knowledge that leads to high-class organisational performance (Nonaka, 1994).

The knowledge can be outlined in several means, the distinction being more accepted that distinguishes between explicit knowledge and tacit knowledge (know what vs. know how). Explicit knowledge can be communicated and is easy to transfer while tacit knowledge is hard to articulate and extremely uncertain to transfer (Kogut & Zander, 1992). Tacit knowledge creates competitive advantages more sustainable in the time, because it is hard to copy, imitate or reproduce, and the process of accruing and applying knowledge is more likely to create new sources of competitive advantage (Grant & Baden-Fuller, 2004).

The KBV classifies two different extents of knowledge management: (1) process and activities to increase a firm's stock of knowledge—exploration or knowledge generation and (2) actions that use existing knowledge to generate value—exploitation or knowledge application (Spender, 1996). In the interorganisational cooperation and networks area, this difference concerning knowledge generation and application agrees to the modes in which knowledge is shared among supply chain or network partners. Knowledge generation focuses on the networks as media of learning in which every partner uses the cooperation to transfer and absorb the partner's knowledge base. On the other hand, knowledge application focuses on a procedure of knowledge sharing in which every firm contacts its partner's stock of knowledge in order to exploit complementarities, but with the aim of upholding its idiosyncratic knowledge base (Grant & Baden-Fuller, 2004).

In this sense, Zacharia et al. (2011, p. 592) stated that *'noted collaborations might exist to exchange and integrate knowledge between buyers and suppliers when products are highly complex and knowledge is "imperfectly embedded" in the product exchange. In many interactions between firms, the exchange of explicit knowledge is required, and accomplished with very little collaboration ... However, when firms work together to address more complicated issues, tacit knowledge critical for success is likely to reside in both organizations. In such cases, the firm ... requires rich interactions among intra- and inter-organizational networks'*.

The relationship view (RV) of the firm is built on relational models theory (Haslam, 2004) to grow a stakeholder theory of individual stakeholders' contributions to joint value creation. In current knowledge-based economies the main basis of value creation has changed from physical resources to intelligent resources and knowledge, which are characteristically dispersed among manifold agents, stakeholders and firms. As a consequence, organisational success and social welfare in knowledge-based societies progressively rely on 'joint value creation' (Bridoux & Stoelhorst, 2016). This view proposes that distinctive interorganisational relationships are an imperative foundation of competitive advantage. When firms cooperate in a way that enables a blend of knowledge stocks and organised action, the synergistic effect of combined resources can be a source of competitive advantage (Dyer & Singh, 1998). Consequently, RV theory holds that organisations that can access and deploy knowledge bases and capabilities through such relationships are likely to realise greater success.

6.2.1 Relationship Learning (RL)

Once companies share information and knowledge with customers and suppliers, they enrich their knowledge base, capabilities and competitiveness through relationship-level learning. In our conceptual framework, we adopt broadly the meaning from Cheung, Myers and Mentzer (2011) and the creative definition from Selnes and Sallis (2003, p. 86) of the RL activities ‘as an ongoing joint activity between the customer and the supplier organisations directed at sharing information, making sense of information, and integrating acquired information into a shared relationship-domain-specific memory to improve the range or likelihood of potential relationship-domain-specific behaviour. Relationship learning is thus a process to improve future behaviour in a relationship. We further propose that relationships vary in terms of their learning capabilities, and thus some relationships perform better because they have developed appropriate learning mechanisms’. Consistent with Selnes and Sallis (2003) perspective, Cheung et al. (2011) contemplate RL as a multidimensional construct consisting of three components: *information sharing*, *joint sensemaking* and *knowledge integration* into a relationship-specific memory. As per Mesquita, Anand and Brush (2008), they advocate the relational vision to explain how these three dimensions influence the buyer–supplier cooperation relationship and consequently enhance the knowledge base. This previous statement can be supported in the nature of the RL construct, which may be conceptualised as a joint action in which the two parties struggle to generate more value jointly than they would produce separately. Selnes and Sallis (2003) believe that the capability of a relationship to learn is linked with how it is managed and the trust environment in which it is inserted.

Selnes and Sallis (2003) have identified, as a first dimension of RL, that information sharing between the two parties in a customer–supplier relationship is a starting point and a central element of working relationship and affects RL, thereby achieving operational efficiency. Second, the dialogue within the two parties in a customer–supplier cooperation relationship constitutes a relationship-specific element of interpretation (sensemaking) of the shared information. However, individual and groups vary in the ways they make sense of the same information, or lack the knowledge to make sense of it. For this reason, firms involved in an RL experience must use several mechanisms to joint sensemaking of information. Organisations in a customer–supplier relationship introduce management meetings, face-to-face communications in visit programmes, informal interpersonal networks and task-force teams and cross-functional teams as instruments to cooperate, solve operational problems in the relationship and create joint learning arenas. Finally, partners in networks ‘develop relationship-specific memories into which acquired relationship-specific knowledge is integrated’ (Selnes & Sallis, 2003, p. 83). Relationship memories are shared, and manifest in documents, computer memories, etc. They involve the common history, values of the partners and joint lessons learned, facilitating the knowledge integration process.

Despite its importance, little or no research exists about how firms' relationship learning may affect the link between knowledge base and green innovation performance, and not much is known about how relationship learning influences the deployment of a firm's existing knowledge base and thereby facilitates green innovation. Moreover, an investigation of the role of relationship learning may refine our conceptual understanding of the KB–GI link.

6.2.2 Knowledge Base (KB) Breadth and Depth

Innovation redesigns the competitive scenery and creates new market opportunities. Various approaches have been proposed to identify its drivers (Smith & Tushman, 2005). Among them, the KBV has gained importance (Zhou & Li, 2012). The principal assumption of KBV is that new product creativity is a function of the firm's ability to manage, maintain and create knowledge (Grant, 1996). More recently, Zhou and Wu (2010) asserted that a firm's existing KB, namely its knowledge breadth and depth, represents its main resource for innovation development.

According to the KBV, a firm's existing knowledge base sets up its possibility and ability to understand and employ new knowledge to decision-making, problem solving or innovations (Ahuja & Katila, 2001). Knowledge breadth and depth are two distinct dimensions of a knowledge base that reveal both the structure and the content of the knowledge a firm has. The knowledge breadth refers to the degree to which the firm's knowledge repository contains diverse and multiple domains. The knowledge depth indicates the level of sophistication and complexity of knowledge in key fields (Bierly & Chakrabarti, 1996). The breadth attribute captures the horizontal dimension of knowledge and heterogeneous knowledge content, whereas the depth attribute reflects a vertical dimension and unique, complex, within-field knowledge content (Zhou & Li, 2012).

6.2.3 Green Innovation (GI)

Industrial activity, heavy car usage and many other human activities lead to air emissions that cause climate change, pollution, greenhouse gas emissions and human disorders, so firms in the twenty-first century must offer green solutions that protect the environment.

Innovation is an important way to mitigate or avoid environmental damage. Sherry and Stubberud (2013, p. 47) reported the following on green technologies: '*Green technologies can have a double benefit for business—the feel good rewards that come from creating environmentally sustainable products and the practical financial benefits that can contribute to improved competitiveness and overall business success*'. Consumers throughout the world want and expect to purchase

evermore environmentally friendly products and services. Indeed, GI is a strategic need for firms, and it offers a great opportunity for meeting buyers’ wishes without harming the environment.

GI has become a dominant approach within manufacturing industries so that manufacturers can achieve eco-friendly improvement in reply to increasing environmental pressure. Previously, investing in eco-friendly activities was understood as an unnecessary investment; nevertheless today’s severe ecological rules and the existing popularity of environmentalism have changed competitive strategies, procedures and patterns for firms (Porter & Van der Linde, 1995). The ‘green’ tag is a stimulus for non-stop innovation, creating new market opportunities for firms to satisfy new consumer demands and thereby create customer capital (Leal-Millán, Roldán, Leal-Rodríguez, & Ortega-Gutiérrez, 2016).

GI can comprise both green products and green processes, and includes innovation in technologies involved in energy saving, pollution prevention, waste recycling, green product designs and corporate environmental management (Chen et al., 2006). Chang (2011, p. 361) stated the following regarding GI: *‘If companies are willing to undertake green innovation enthusiastically, they can obtain the advantage from differentiation and low cost which can even change the existing competitive rules’*.

6.3 Theoretical Background, Model and Propositions

The following sections explain the relationships among the key variables included in the proposed research model (Fig. 6.1). On the basis of our literature review, we propose that KB and RL play different roles in contributing to GI. Using the KBV and the RV perspectives, we propose that RL strategies are antecedents—precede—the KB breadth and depth. Then, we propose that the breadth and depth of the KB are connected with GI outcomes. The central theme of our proposed model, therefore, is that understanding the relationship among the knowledge base, its antecedents and its consequences can lead to a better comprehension of the link between learning process, knowledge management and firm green innovation.

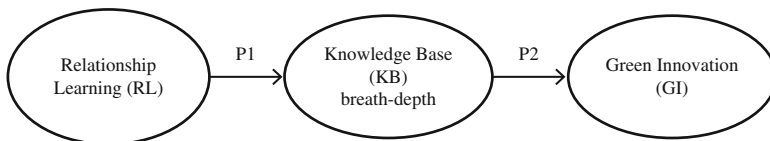


Fig. 6.1 Proposed model

6.3.1 *Relationship Learning as a Determinant of the Knowledge Base*

The resource-based view is grounded on the statement that gaining and maintaining sustainable competitive advantages is a function of the firm's essential resources and capabilities. This way, resources and capabilities are the main source of a firm's success; heterogeneity in firm resources will lead to dissimilarities in competitive advantage and firm performance. Therefore, a firm's knowledge management and learning systems characterise an effort to exploit valuable intangible resources, such as technical capabilities, knowledge bases or management know-how. Such resources and capabilities defy easy transferences but are deployable in multiple organisations, departments and people at a low cost. Consequently, the major driver of knowledge-based management is the stock of knowledge and knowledgeable resources stored by the firm. So, the importance of the KB is resulting from an increase in the economic rent that accrues from these firm-specific knowledge resources.

The antecedent that we propose pertains to the firms' RL strategies. KBV theory proposes that knowledge is an indispensable strategic resource for a firm to preserve a sustainable competitive advantage. As knowledge is created and disseminated both at the firm level as between different firms, it has the potential to contribute to the firm's value by increasing its ability to respond to new and sporadic situations. The growing importance of knowledge and learning process as a critical resource and capability has stimulated managers to pay better attention to the firm's RL strategies.

Firms that work in cooperation with different stakeholders generate learning processes in common and shared knowledge and information spaces. Consequently, they enhance their KB, its capabilities and competitiveness through relational-level learning. Thus, RL activities may influence the size and the effectiveness of the KB. According to the perspective of Selnes and Sallis (2003), we consider RL to be similar to, but theoretically distinctive from, the more broad concept of organisational learning. We specifically consider RL as a multidimensional construct consisting of three variables: information sharing, joint sensemaking and knowledge integration. Following Mesquita et al. (2008), we believe that the relational view provides the necessary perspective to explain how these dimensions influence KB.

Vargo and Lusch (2004) contend that the first flow between organisations in networks is information. It is this information that facilitates the co-production of products which meet market demands from the viewpoint of quality, delivery and prices. Consequently, *information sharing* is the give-and-take of information between buyer and supplier about end-user needs and preferences, marketplace configurations, technologies, and policies of partners, and unforeseen problems (Selnes & Sallis, 2003). Recent research on knowledge transfer mechanisms indicates that information about the market environment, customer and competitors is a driver of a market-oriented strategy. Operational efficiencies are achieved through the exchange of information and this can benefit both members. In particular, the exchange between

partners with regard to information, resources, markets and technologies, with subsequent advantages for learning, scale and scope economies, allows buyers and suppliers to enhance its KB, and achieve strategic objectives, such as risk sharing and outsourcing their value-chain stages (Gulati, Nohria, & Zaheer, 2000).

Joint sensemaking is defined as the development of understanding, knowledge, experience and memories between past actions, the success of these actions and future actions (Fiol & Lyles, 1985). The management of joint sensemaking activities has become increasingly important given its augmented role in new product development and KM processes. Organisations differ in the ways in which they make sense of the same information, and thus there are differences in the mechanisms or devices involved in the sensemaking process. Logically, these differences could cause asymmetries in the conformation of the KB of the partners.

Firms develop structures in which organisational members operate in a knowledge-exchange system and learn from worldwide experiences, but particularly through direct partnerships (Cheung et al., 2011). An important aspect of KM designed to facilitate learning from one firm node to another is through cross-organisational teams, information-sharing forums and informal meetings, and is designed to create learning arenas between organisations (Selnes & Sallis, 2003). It is the acquisition of tacit, team-based knowledge that helps firms accrue advantages in turbulent markets (Mesquita et al., 2008). Other authors claim that the use of joint sensemaking events assists performance-related outcomes by enhancing new product outputs and new process innovations as well (Cheung et al., 2011).

Knowledge integration appears when firms develop relationship-specific memories whereby knowledge specific to that relationship is stored in the organisations' collective thoughts, beliefs and values. Distinctive routines are also developed in the form of programmed formal and informal procedures for how the firm partners interact. Integration is the attribute of the state of cooperation that exists between departments that are required to attain a unity of effort due to the demands of the environment (Cheung et al., 2011). This definition is usually applied to units within a firm. However, the notion of integration can also be used to comprehend relationships between organisational units from different firms. Here, knowledge integration consists of an arrangement of interests (cooperation) as well as an alignment of actions (coordination) (Gulati, Lawrence, & Purnam, 2005) and how this benefits the enhancement of the KB. For instance, integrative tools like consolidated databases relative to product, service and market information help to facilitate knowledge transfers, and expand the KB of the firms, and consequently innovation.

By other hand, knowledge management (KM) studies suggest that KM strategies can be primarily categorised based on two key dimensions: KM focus and KM source. In the KM focus dimension, KM strategies can be categorised as explicit oriented and tacit oriented. The second dimension to position KM strategy is grounded on the firm's primary source knowledge. This way, KM strategies can be classified as internal oriented and external oriented across this length. External-oriented strategy hopes to bring knowledge from outside sources via either acquisition or imitation and then transfer the knowledge throughout the organisation. Internal-oriented strategy focuses on creating and sharing knowledge within the

limit of the firm (Choi, Poon, & Davis, 2008). The RL view would fit into this second type of external-oriented strategies, and the RL's activities and interfirm cooperation process help to locate, capture and absorb external knowledge that expands the organisational KB.

Several studies suggest a complementary relationship between KM strategies. The central proposition is that adopting a full set of KM strategies is related to high performance, while the adoption of individual KM strategies results in little or insignificant performance gain. These studies showed that a complementary set of explicit-tacit, even tacit-internal-oriented plus explicit-external-oriented strategies, resulted in higher performance (Bierly & Chakrabarti, 1996; Choi & Lee, 2003; Leal-Rodríguez, Roldán, Leal, & Ortega-Gutiérrez, 2013). This complementary set of KM strategies leads to there being synergies and expands the firm's KB and the GI outcomes. The more focused an organisation's strategy is on getting as much internal and external, tacit and explicit knowledge, the more depth and breadth its KB will gain. By applying this rationale, we propose that:

P1. Relationship learning has a positive influence on knowledge base

6.3.2 Green Innovation as a Consequence of the Knowledge Base

The study on organisational knowledge has recognised some scopes across which organisational KB can be discerned and has assessed the implications of these dimensions for knowledge-related consequences. The size of a KB has been associated to the organisation's innovative productivity (Ahuja & Katila, 2001). Likewise, the degree of overlying between different organisational KB has been connected to an organisation's capability to absorb outside knowledge from its geographical or technological neighbours (Lane & Lubatkin, 1998). Organisational KB has occasionally been characterised as sets of rudiments or individual pieces of knowledge embodying the content of what the organisation knows (Ahuja & Katila, 2001; Fleming, 2001). The previous literature has focused on the number of elements in a KB (its size) or the identities of those elements compared to the KB outside the organisation (its relatedness). Yet, it has not considered how the structure by which different knowledge elements are combined together or isolated from each other in different clusters will affect the organisation's capability to combine knowledge components for innovation.

Very useful innovations frequently occur from the interaction between deep knowledge born from specialisation and variety created through broad exploration (Katila & Ahuja, 2002) and the integrative mechanisms that link them both. Specialisation nurtures a deep understanding of a specific area, an ease of use arising from the recurrent application of a few components and superior knowledge of the interconnections among a set of components, as well as from the problems in connecting the components to each other (Katila & Ahuja, 2002). A broad exploration offers a contact to new ideas, innovative applications and distinctive new variations

and combinations of a given set of components (Katila & Ahuja, 2002; March, 1991). Integrative mechanisms ensure that the deep knowledge assimilated through specialisation is matched with the novel applications identified through a broad exploration. To explain the generation of useful innovations, it then becomes relevant to understand how different knowledge-based structures—from integrated to modular—can provide all three mechanisms of this mix: a exploration breadth, deep knowledge and integrative mechanisms. These permit an exploration breadth to be combined effectively with deep knowledge (Katila & Ahuja, 2002; Yayavaram & Ahuja, 2008).

To foster effective innovations, firms must fulfil two requirements: a broad and deep KB. A firm with broad knowledge has stored know-how through a diversity of masteries and heterogeneous market fields through its extensive knowledge exploration (Prabhu, Chandy, & Ellis, 2005). In addition to knowledge sharing, a broad KB provides the sharing process through which the organisation can connect and assimilate its broad knowledge. It does so across dissimilar fields in unexpected and unusual configurations which generate breakthrough ideas for great innovation (Zahra & George, 2002). On the other hand, an organisation with a knowledge depth is likely to benefit from market and customer knowledge attainment. This organisation with a deep knowledge base accumulated thorough familiarity and know-how about existing green technologies and green markets can develop green core competencies. These can be in the form of technical or professional expertise, and the organisation tends to involve in actions in its current, specialised fields to foster its GI.

Past research suggests that in the search process that underlies recombinant inventions, maintaining a balance between depth and breadth is critical to successful invention (Katila & Ahuja, 2002; Prajogo & Ahmed, 2006). The size and structure of an organisation's KB can determine how well it manages knowledge resources and creates an innovation capacity (Yayavaram & Ahuja, 2008). Such tacit–explicit and external–internal knowledge integration is likely to affect how firms entirely exploit the potential of their KB and generate GI. By applying this rationale, we propose that:

P2. A broad and deep knowledge base positively affects green innovation

6.4 Conclusions and Implications

This chapter has focused on a theoretical analysis of the relationship among RL, KB and GI. To this end, we have proposed a research model to argue that a deep and broad KB can positively influence GI performance. In addition, the proposed theoretical model stars a debate in favour that firms that invest and involve themselves in RL mechanisms and strategies are more likely to indirectly foster GI. Also, the model argues how cooperation among firms that occurs through networks or supply chains stimulates the RL mechanisms, finally affecting the enhancement of firm KB.

Using a conceptual framework founded on the knowledge-based view (KBV) and the relationship view (RV) this chapter has raised two main propositions, suggesting that firm's GI is greatly influenced both by an integrated broad and deep KB (directly) as the RL activities (indirectly). In summary, this study simultaneously examines (1) RL as an antecedent of the KB and (2) the GI as a consequence of the same.

Our chapter makes a contribution by enhancing the understanding of the RL activities in order to boost GI outcomes in the firms. The RL variable is regarded as key GI driver in environmental oriented companies because external information and knowledge flow offer potentially valuable experiences that, combined with internal knowledge, can be exploited to create new superior knowledge. Consequently, our model complements previous theory and offers theoretical arguments focusing on the social and relational aspects of the interfirm cooperation that facilitates organisational learning, knowledge management and innovation in organisations.

The discussed model also suggests that the GI advantages of KB are contingent on RL factors such as information sharing, joint sensemaking and knowledge integration. However, a subsequent empirical study will be needed to find out the contribution level of each of the three components to the enrichment of the KB and GI performance. In summary, this study reflects the central importance of acquiring and creating new knowledge through relationship learning during external social interactions and firm cooperation. The proposed model offers additional support for the idea that firms should be treated as knowledge-based entities. Furthermore, our chapter suggests that relational learning activities can have a robust impact on the KB–GI link, in such a way that the KB pays off better for those firms which are highly involved in RL. In other words, the link between the KB and GI outcomes may be strengthened when organisations engage in RL activities.

Our research model can provide firm managers with some direct implications about how to manage knowledge resources for green innovation. First, the level of green innovation in certain organisations is usually highly conditioned by a prior accumulation of related knowledge in his KB. Previous related knowledge is in many cases the result of exchange of external knowledge flows, and the source or the key to develop a sustainable competitive advantage based on pursuing GI. Therefore, the RL and interfirm cooperation strategy, KB and GI capability are closely linked.

Second, in line with the work of Zhou and Li (2012), managers should scan the KB that the firm already has and detect whether its size, type, contents and embedded advantages reveal depth and breadth. Then, managers should adjust their knowledge combination mechanisms to fit their organisations' existing KB. To expand the outcomes from accumulated knowledge resources and to enhance GI, we suggest that a firm with a broad and deep KB fortifies its external/internal knowledge/information-sharing processes and should make efforts to shape and increase the RL routines associated with acquiring, absorbing and combining outside knowledge.

Third, with respect to the KM strategy our theoretical model suggests that it is prudent for the companies to foster and ensure that the knowledge generated through

their everyday activity (thoughts, innovative ideas, competences, practical skills, problem-solving techniques, etc.) is properly assimilated, codified, articulated and warehoused within their own KB and repositories. Particularly, the external knowledge results from the cooperation and the relationship dimensions that firms maintain in their day-to-day experience. This knowledge acquisition and KB creation involve reflecting about and verbalising knowledge from customers, suppliers, competitors' best practices, external consulting analyses and results from joint experiences with other organisations.

Finally, the model contemplates RL as a basic issue in realising both KB and GI. Fitting to this belief, top managers should build strong RL cultures. This sort of culture hurries the exploration for new client information and knowledge, designing external partnership that highlights new green innovations and thus the value of the relationship between the firm and its customers. This relationship culture contemplates interorganisational knowledge flows as a major source of brainpower and new viewpoints.

There are some distinctive characteristics of the GI versus innovation in general that need to be based on a close cooperation and relationship mechanisms with multiple stakeholders. An effective GI needs cooperation with customer and suppliers for product eco-design, for cleaner production process, for green packaging, for using less energy during product logistics, for cutting the excess of inventories and materials, etc. Effective use of broad-deep KB and customer/supplier cooperation relationship on environmental or green concerns are two key capabilities to strengthen and stimulate the firm's GI performance.

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