

科技部補助專題研究計畫報告

環境保護行為與學習典範模式的創新與建構

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中文摘要：本研究投稿獲得刊登，刊載於期刊Journal of Sustainable Tourism (SSCI, IF=7.968)。本計畫係有鑒於日益嚴格的環境法規，以及挑剔的消費者，面對環境保護和永續發展，對於學習典範產生驅動能力。第一年我們在旅宿業執行，依據學習理論進行驅動行為之研究。在研究的基礎方面，我們運用基於資源觀點 (RBV) 和資源依賴理論 (RDT)，探索在旅宿業實施的主動環境策略，以協助企業實現生態創新、綠色核心競爭力，以及綠色競爭優勢。我們通過人員培訓，並且調查了旅宿業積極的環境策略、生態創新、綠色競爭優勢，以及綠色核心競爭力之間的相關性。本計畫共計收回 366 份學員意見回復。經過分析之結果顯示，積極的環境策略學習，對於生態創新產生影響，進而直接影響綠色核心競爭力。此外，綠色核心競爭力，影響綠色競爭優勢。然而，生態創新對於綠色競爭優勢的影響並不顯著。因此，在環境保護學習的策略中，企業必須重新考慮現有技術，並且開發新的環境保護技術，以變得更具創新性和使命感，以滿足新興的環境需求和綠色競爭力策略。本研究還有助於我們了解生態創新如何影響旅宿行業的客戶滿意度和回頭率。研究結果的實踐和理論意義，為旅宿業環境保護行為與學習典範模式的創新與建構的管理方針，提供了指導原則。

中文關鍵詞：積極環境策略、生態創新、綠色競爭優勢、綠色核心競爭力。

英文摘要：Increasingly stringent environmental regulations and consumer awareness around environmental protection and sustainability are driving forces in the hotel industry. We explore the Proactive Environmental Strategies being implemented in the hotel industry using Resource-Based View (RBV) and Resource Dependence Theory (RDT) to help companies with Eco-Innovation, Green Core Competences, and Green Competitive Advantages. We investigated the correlations between Proactive Environmental Strategies, Eco-Innovations, Green Competitive Advantages, and Green Core Competences in the hotel industry. 366 responses were received and the results revealed that Proactive Environmental Strategies positively influence Eco-Innovation, which in turn directly affects Green Core Competence. Moreover, Green Core Competence affects Green Competitive Advantage. However, the effects of Eco-Innovation on Green Competitive Advantage were not significant. Therefore, companies must either re-consider existing or develop new technologies to become more innovative to meet the emerging environmental demands and green competitiveness strategies. This study also contributes to our understanding of how Eco-Innovation affects guest satisfaction and repeat patronage in the hotel industry. The practical and theoretical implications of the findings provide guidance to managers in the hotel industry.

英文關鍵詞：Proactive Environmental Strategies, Eco-Innovation, Green Competitive Advantage, Green Core Competence.

環境保護行為與學習典範模式的創新與建構

The Innovation and Construction in Modelling of Environmental Protection Behavioral and Learning Paradigms: A Case Study in Hotel Industry

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Abstract: Increasingly stringent environmental regulations and consumer awareness around environmental protection and sustainability are driving forces in the hotel industry. We explore the Proactive Environmental Strategies being implemented in the hotel industry using Resource-Based View (RBV) and Resource Dependence Theory (RDT) to help companies with Eco-Innovation, Green Core Competences, and Green Competitive Advantages. We investigated the correlations between Proactive Environmental Strategies, Eco-Innovations, Green Competitive Advantages, and Green Core Competences in the hotel industry. 366 responses were received and the results revealed that Proactive Environmental Strategies positively influence Eco-Innovation, which in turn directly affects Green Core Competence. Moreover, Green Core Competence affects Green Competitive Advantage. However, the effects of Eco-Innovation on Green Competitive Advantage were not significant. Therefore, companies must either re-consider existing or develop new technologies to become more innovative to meet the emerging environmental demands and green competitiveness strategies. This study also contributes to our understanding of how Eco-Innovation affects guest satisfaction and repeat patronage in the hotel industry. The practical and theoretical implications of the findings provide guidance to managers in the hotel industry.

Keywords: Proactive Environmental Strategies, Eco-Innovation, Green Competitive Advantage, Green Core Competence.

Introduction

Humans consume large amounts of natural resources to live daily, which has caused a rapid, and in some cases, irreversible damage to the planet's ecosystems (Hall et al., 2010). Natural resources are defined as water, timber, O₂, and solar energy that can be replaced in a person's lifetime (ecavo.com). Recognition of the environmental damage humans have created has given us opportunities to speak up

and act to protect the natural environment, which has substantially changed industry's competitive landscape. Companies, large and small, must reconsider their role protecting the planet's natural resources (Fraj et al., 2015). In addition, environmental regulations are becoming stricter and the consumers' environmental awareness is rising, affecting how businesses are being run. To maintain a competitive advantage and market share, companies must now improve their products, processes, and services in response to the social, regulatory, and environmental pressures and recognize future opportunities and trends where they can be recognized as environmental leaders. (Fraj et al., 2015; Hall et al., 2010; Sharma & Vredenburg, 1998)

Sustainability is a key concern in the hotel industry because hotels consume substantial amounts of important resources (Aboelmaged, 2018; Bohdanowicz, 2006; Fang, 2020a; Wang et al., 2020). The environmental impact of most hotels is from their excessive consumption of non-durable resources that include water, food, energy, paper, and their emission of pollutants and eco-unfriendly materials such as single-use and non-recyclable items into the local environment. The hotel industry also now faces enormous environmental and economic pressure from local and international stakeholders (Aboelmaged, 2018; Wang et al., 2020). Given the issues of global change that we are exposed to daily, the people of the world are becoming better informed on environmental issues. Stakeholders (e.g., customers, regulators, and local communities) are demanding and expect companies to change their business models so that their activities now minimize or protect and maintain the natural environmental conditions (Chan & Wong, 2006; Rueda-Manzanares et al., 2008; Sharma & Vredenburg, 1998). In addition, the results of environmental management studies suggest that the hotel industry has a substantial and significant impact on the environment and that the hotel industry needs to continue to improve its environmental performance (Gil et al., 2001; Fraj et al., 2015; Smerecnik & Andersen, 2011).

As a result, organizations such as the hotel industry are expected to take a proactive approach to avoid the excessive consumption of natural resources and reduce the impact of waste generation on the natural environment (Fraj et al., 2015; Lopez-Gamero et al., 2011). Business managers must rethink their strategies and respond to market demands and stakeholder expectations in a timely manner to meet complex environmental challenges and their responsibility for environmental conservation (Singjai et al., 2018). Eco-Innovation is a critical and necessary element to sustain market share and growth, as well as retaining and/or gaining a competitive advantage through structured and transparent procedures to achieve and demonstrate sustainability (Bossle et al., 2016; Wang et al., 2020; Xavier et al., 2017).

Eco-Innovation is a developing trend in the tourism industry because these strategies reduce environmental hazards, but also help managers reduce operating costs and obtain more positive responses from customers (Tzschentke et al., 2004; Dief & Font, 2010; Lionidou et al., 2013). Wang et al. (2020) and Aguiló et al., 2005) proposed that high-level management or the decision makers in the hotel industry should promote the implementation of eco-innovation strategies to better utilize the capabilities and resources of their companies and to generate competitive advantages over their competitors.

While Eco-Innovation strategies are well known in the manufacturing sector, they are uncommon in the hotel industry (Martínez-Perez et al., 2015; Alonso-Almeida et al., 2016; Garay et al., 2019; García-Pozo et al., 2015, 2019; Martin-Rios & Ciobanu, 2019). As such, hotel business models should change in response to market demands and consumer expectations for quality and more sustainable

products and services. In general, Eco-Innovation is the introduction, availability and use of new or substantially improved products (goods or services), processes, organizational changes for the customer, marketing solutions that reduce the use of natural resources (including materials, energy, water, and land), and the reduction and release of hazardous substances to the environment throughout the product life cycle (cradle to grave concept). Therefore, Eco-Innovation is a multidimensional concept.

According to Henriques & Sadosky (1999), companies that actively conduct environmental activities consider organizational employees, suppliers, and senior management (stakeholders) to be vital towards achieving their goals. The main stakeholders are the business owners that generally have financial interests in their own companies (Donaldson & Preston, 1995). In this article, we explicitly focused on employees because they assume a core responsibility for the successful implementation of environmental strategies, regardless of the specific environment in which the organization operates. Employees are therefore key to the formulation of environmental strategies (Darnall, et al., 2010; Kitazawa & Sarkis, 2000; Zutshi & Sohal, 2004) and environmental performance (Hanna et al., 2000). Because proactive environmental strategies usually promote innovation and change, members of an organization must act cohesively toward implementing and achieving long-term goals, which in turn, helps them effectively pursue the corporation's goals. Therefore, the effective deployment of eco-Innovation strategies may depend on whether a shared vision exists between the managers and employees (Collier et al., 2004; Pearce & Ensley, 2004).

Rigorous research must be conducted to gain insight for the hospitality industry. The present study has been conducted in response to increasingly strict environmental regulations and rising consumer environmental awareness. Companies cannot shirk their environmental responsibilities, but must adopt and promote the Eco-Innovation strategies that they've implemented, which could drive their Green Core Competitiveness (GCC) and enhance their Green Competitive Advantage (GCA). In this study, we hypothesized that Eco-Innovation affects a company's GCA and GCC. Therefore, we investigated the relationships between Proactive Environmental Strategies (PES), Eco-Innovation, GCA, and GCC.

Theoretical framework

From a resource perspective, environmental social responsibility is the sustainable use of a resource to gain a competitive advantage over its competitors (Hart, 1995). The tenets of environmental social responsibility emphasize that improvement is derived from the assessment of a company's resources and capabilities and the responsible use of natural resources, both of which are important for corporate decision-making (Argyres, 1996; Gulbrandsen et al., 2009).

To obtain natural resources needed to conduct business, enterprises must obtain the materials that they need directly from the environment or rely on an established supply chain to obtain the natural resources. Therefore, the stronger the need for external resources, the higher the dependence and the likelihood an organization will establish a network of relationships. To obtain the resources it needs, the organization must forecast its needs and constantly cope with external factors that in many cases are out of their control (Hillman et al., 2008; Aragón-Correa & Sharma, 2003).

There is considerable research aimed at understanding the internally driven perspective of PES by using the company's Resource-Based View (RBV) strategies (Sharma, 2000; Sharma & Vredenburg, 1998). A company's RBV is its business model that identifies the unique internal resources of a company so that it has a sustainable competitive advantage over its competitors, but a company's internal resources can also be used to meet the external resource it needs (Barney, 1991; Oliver, 1997; Cai & Li, 2018). It explains the relationship between proactive environmental strategies and the company's competitive advantage and performance (Christmann, 2000; Henriques & Sadorsky, 1999; Sharma & Vredenburg, 1998). In many cases most companies find it challenging to procure all of the resources required to develop and maintain a competitive advantage internally (Child & Faulkner, 1998; Dyer & Singh, 1998). Therefore, companies need to look externally to obtain the resources they need to have or maintain a sustainable competitive advantage. While Resource RBV strategies are focused on the internal resources, resource dependence theory examines impacts to company behavior and strategy during the process of obtaining the resources it needs externally (Barringer & Harrison, 2000).

Extension of the RBV framework can be accomplished by using externally driven perspectives with resource-dependent theories to outline the perspectives that affect internally driven perspectives. In other words, our model uses the internal and external resources that directly impact the corporate PES in the hotel industry. Internal resources include tangible and intangible internal resources that help corporations hone their competitive advantage include brand reputation (Foroudi, 2019; Kimpakorn & Tocquer, 2009), company culture and image (Kimpakorn & Tocquer, 2009), employee capabilities (Geller, 1985), market orientation (Geller, 1985), and intellectual property resources (i.e., patents, copyrights, trademarks in hotel design and service; Beldona, et al., 2012; Kossecki & Kossecki, 2020). The externally-driven resource needs are based on resource-dependent theoretical concepts that have implications for contract structure and external links, namely customers and suppliers (Wang et al., 2012), social capital (Sainaghi & Baggio, 2014), incentives, financial subsidies (Tundis et al., 2017), raw materials, energy (Xu, Chan & Qian, 2011), and government regulations. We believe that the internal and external perspectives are complementary and reflect the company's social responsibility, performance, and responsiveness.

In this study, our aim is to better understand the value of environmental protection and PES, by examining the interaction between RBV and resource dependence theory. We use RBV strategies in the hotel industry to better understand the internally driven requirements needed to implement PES (Sharma, 2000; Sharma & Vredenburg, 1998) and using an externally driven perspective, to expand and build on this framework using resource dependence theory to fill in the gaps identified in previous research studies. In other words, our model applies to both internal and external factors that influence PES. In addition, previous studies on PES used management or companies as the research objects. In this study we use empirical studies that focus on company employees. With companies becoming more proactive on environmental concerns, employee participation has become imperative for resolving environmental problems and developing Eco-Innovation programs and strategies (Andersson & Bateman, 2000; Buysse & Verbeke, 2003; Ramus & Steger, 2000; Sharma & Vredenburg, 1998). Environmental management is "a universal organizational philosophy that all individuals should participate in the company's green activities" (Sarkis et al., 2010).

Employees are not only stakeholders, but also the most important resources of a company (Crane & Matten, 2004; Greenwood, 2007). Among the main stakeholders, employees play a special role (Crane & Matten, 2004), making critical contributions to a business by applying themselves (Greenwood, 2007). The relationship between a company and its employees is highly dependent on company resources (Frooman, 1999), and the company–employee relationship is symbiotic. Because of this resource interdependence, employees that influence company strategies emphasize cooperation rather than conflict (Frooman, 1999; Sharma & Henriques, 2005).

Furthermore, Eco-Innovation can occur at any organizational level and in all departments (Ramus, 2003). Koo et al. (2014) demonstrated that cross-functional coordination between people in a company is positively related with environmental performance. Cross-functional teams can assist companies in addressing environmental concerns and improving environmental performance (Aragón-Correa & Sharma, 2003). However, we believe that the executors of relevant corporate strategies are the employees. So, employees are the research objects to fill the gaps identified in previous studies. We argue in this study that resource-based theory and resource dependence theory provide organizations with the best approaches to ensure competitive advantage and performance and determines the factors that change management activities.

Proactive Environmental Strategies

With green management, hotels develop and adopt environmental goals and strategies through continuous learning employee programs. Organizational goals and strategies apply innovation in pollution reduction, social responsibility, and competitive advantage (Pane Haden et al., 2009). Buysse & Verbeke (2003) define PES as those that are aimed at the preventing and protecting the environment against damage by stakeholders. Proactive Environmental Strategies are environmental protection approaches that companies use to influence employee behavior through manager role models and integrating environmental issues into corporate strategies (Reinhardt, 1999).

Klassen & Whybark (1999) suggest policies related to environmental activities are essential for successful environmental management. Environmentally oriented resources and capabilities are the core concept of this type of management. They advised the development of strategies to assess their environmental performance and provide employee training to reduce waste. Sharma (2000) defines a PES as “a consistent pattern of actions to reduce the environmental impact of operations that do not comply with environmental regulations or standard practices.” This management strategy is a top-down process because it is supported by senior management.

Proactive environmental strategies require companies to continually reconfigure and recombine resources to ensure evolutionary adaptability. For instance, hotels can develop a PES to create cross-functional teams with members from different fields and sectors (Enz & Siguaw, 1999). From the organizational point of view, a hotel must have environmental policies and issue environmental reports to employees (Lopez-Gamero et al., 2011). The hotel’s employees are the main participants in corporate environmental protection activities. Therefore, training programs must promote environmental communication (Bohdanowicz et al., 2011). Menguc et al. (2010) define PES that address natural environmental issues through pollution prevention and support from high-level managers. The implementation of green management processes is essential for any business strategy and environmental management plan. In general, establishing a strong network to link people inside and outside of their

respective industries and gaining more knowledge about environmental activities may increase the sensitivity of employees to environmental issues and enable them to benchmark the company's environmental activities with competitors in the market.

Eco-Innovation

Eco-Innovation is the mutual relationship between a business and the environment. Activities should avoid negative environmental impacts and concentrate on activities that are environmentally positive. Eco-Innovation has become a trend in the field of innovation and sometimes referred to as the development of new products and processes that create customer and business value by reducing negative environmental impacts (Fussler & James, 1996; Aboelmaged, 2018; Rennings, 2000). From another perspective, it 's the active pursuit of holistic innovation from a sustainable perspective or any innovation that improves environmental performance or reduces environmental damage (Kanerva et al., 2009). Eco-Innovation should go beyond developing new products and services to include processes, practices, systems, equipment, and technologies that should or need to be modified to promote overall environmental sustainability (Oltra & Saint Jean, 2009; Rennings & Zwick, 2003). Whether "innovation in environmental technology" or "innovation in green technology" Eco-Innovation refers to changes that are made to improve environmental management performance with a proactive attitude towards innovation in processes and management (Aboelmaged, 2018).

As an environmental practice, Eco-Innovation is related to the introduction of new green concepts or changes to existing concepts to improve environmental friendliness (De Marchi, 2012). Demirel & Kesidou (2019) therefore advocated for companies that are developing sustainability-oriented capabilities to meet the rapidly changing needs in the market and from evolving regulations and technologies. Moore et al. (2014) and Tatoglu et al. (2020) further emphasized the crucial role that companies play in the development and evolution of Eco-Innovation. The literature contains many terms for Eco-Innovation, such as environmental innovation, eco-friendly innovation, sustainable innovation, and green innovation from a natural resource-based view (Schiederig et al., 2012; Munodawafa & Johl, 2019). However, Anderson (2010) follows James (1997) to define it as innovations that generate revenue, reduces negative impacts on the environment, and creates measurable economic and social value for the organization. The related concept of eco-efficiency means reducing environmental impacts and the use of resources in the production and development of goods (Starik & Marcus, 2000). Carrillo-Hermosilla et al.(2010) assert that Eco-Innovation is an entrepreneurial mindset and key process that minimizes the consumption of environmentally harmful products in the leisure and tourism organizations such as hotels, restaurants, and cruise and is an essential factor in creating change.

Ramus (2001) believes that there are six types of Eco-Innovation research for employees that are actively engaged in environmental activities. They include: support for Eco-Innovation and environmental learning; encouraging the establishment and education of environmental functions; encouraging environmental communication; disseminating environmental information, praise and reward environmental actions, manage environmental goals; and responsibilities.

Green Competitive Advantage

In this study GCA in the hotel industry is defined as environmental strategies that successfully develop and implement environmental and sustainability practices that its competitors cannot replicate, which is consistent with Porter (1980) and Barney's (1991) definition. Green Competitive Advantage is essential for strengthening sustainable development. A competitive advantage reduces company operating costs and uses market opportunities and strategies to eliminate competitive threats (Barney, 1991). According to Prajogo & McDermott (2008), competitive advantage can be defined as the ability of a company to achieve an advantage in performance or different competitive priorities (e.g., cost, quality, or flexibility). Unlike traditional hotels, green hotels implement environmental protection measures, such as saving water and energy, adopting environmental procurement policies such as the use of non-toxic cleaning products or local suppliers and reducing emissions and waste (e.g., reducing laundering and providing recycling bins). Customer demand is another reason green management is a strategic tool for enhancing the competitive advantage of hotels (Lee et al., 2011). Many companies consider corporate environmental management to be an unnecessary and ineffective investment and even have the misunderstanding that green policies are harmful to the company's development. However, the pioneers of environmental management and green innovation have a "first-mover advantage or be recognized as an early adapter" that enables them to enjoy higher green benefits, improve their green image, and gain a competitive advantage over their competitors (Porter & van der Linde, 1995; Chen, 2008). There are also studies that show companies that are ISO 14000/14001 certified (i.e., they have and follow an Environmental Management System) have higher stock prices (de Vries, Bayramoglu & van der Wiele, 2012).

Chen & Chang (2013) define GCA as a condition in which companies take the lead in environmental management or green innovation. They are successful environmental and sustainability strategies that competitors cannot replicate. In the hotel industry, differentiation and cost competitive advantages depends on daily operating costs that include the unnecessary generation waste and resource savings (such as energy and labor) that can be reduced through Eco-Innovation practices (Kaenzig & Wüstenhagen 2010; Wang et al., 2020).

The present study defined GCA as a leader in the hospitality industry, where environmental management, sustainability, and green innovation are at the forefront of their business models and competitors cannot successfully replicate these environmental strategies. Competitive Advantage is critical to enhancing sustainable development.

Green Core Competence

Green Core Competence is the ability introduce new energy technologies and equipment and constantly optimize, improve, and innovate these technologies to advance a hotel or business as one of the greenest in their respective industry. Prahalad & Hamel (1990) argue that a company's competitiveness originates from its core competencies and products (i.e., the actual results of its core competencies) and that companies should establish and develop a set of core competencies. A core competence is derived from collective learning in an organization, particularly the ability to coordinate production skills and integrate technology flows (Prahalad & Hamel, 1990). A core competence is a process responsible for organizing implicit and explicit knowledge that contributes and supports

competitive advantages and results in higher organizational performance. To gain a competitive advantage, organizations attempt to gain more benefits than their competitors (Espino-Rodríguez & Ramírez-Fierro, 2017; Newbert, 2008).

Chen (2008) defines GCC as the collective learning of and abilities of green innovation and environmental management in an organization. Companies invest in green innovation because “greening” helps companies explore new market opportunities and increases their competitive advantage (Chen et al., 2006; Chen, 2008; Rennings & Rammer, 2009). Successful green innovations help companies improve efficiency, builds and strengthens core competencies, and enhances their green image, ultimately promoting their profitability and successful operation (Álvarez et al., 2001; Chen, 2008; Eiadat et al, 2008).

Few studies have explored the core competitiveness of a company’s green innovation or environmental management strategies and this study was designed to fill this research gap and propose a novel structure for the concept of GCC.

Hypothesis development

Proactive Environmental Strategies –Eco-Innovation

Environmental strategy refers to the management interface between an enterprise’s development and natural environment (Aragón-Correa & Sharma, 2003). A company’s positive environmental strategy includes a series of visions, goals, plans, and processes (Ateş et al., 2012) that reflect the company’s ability to effectively apply processes and procedures that are designed to reduce a company’s short- and long-term environmental risk. Tangible and intangible resources are conducive to a company’s competitive advantage (Dai et al., 2017; Zhang et al., 2019). A PES is a valuable resource that can bring various business benefits (Sharma & Vredenburg, 1998). Important stakeholders regard companies that adopt PES as good social advocates and perceive their corporate image and customer base to be respectable (Danso et al., 2019; Duque-Grisales et al., 2020).

Proactive Environmental Strategy development requires a business to identify solutions to environmental problems by innovating new products and technologies (Menguc & Ozanne, 2005). For example, ISO 14001 focuses on management strategies such as procedure and process improvement. The structural complexity of PES requires the identification of resources and skills that are adaptable to the natural environment (Gonzalez-Benito & Gonzalez-Benito, 2005). Any business environment has tremendous pressure, but one that is environmentally friendly is the basis for sustainable tourism. In the tourism industry, businesses focused on environmental factors are an asset, and if the tourism industry continues to grow, then environmental friendliness will be essential (Kasim, 2007).

Companies that adopt PES are more likely to seize opportunities when pursuing Eco-Innovation (Russo & Fouts, 1997). Owing to their commitment to sustainable development, they benefit from a first-mover advantage, thereby enhancing their reputation and legitimacy. Furthermore, such a move ensures that their products are at the forefront of Eco-Innovation (Hart, 1995; Porter & Kramer, 2006). Companies that adopt a PES usually receive environmental certificates, eco-labels, or green awards, making them stand out in the competitive market (Aragón-Correa & Rubio-López, 2007; Blomquist et al., 2015).

In this context, innovation and learning help achieve the goal of identifying and exploring environmental threats and opportunities (Majumdar & Marcus, 2001). Eco-Innovation should go beyond developing new products and services and include processes, practices, systems, equipment, and technologies that promote overall environmental sustainability (Chan, 2009; Chan & Hawkins, 2010; Oltra & Saint Jean, 2009; Rennings & Zwick, 2003). Sustainable management and the development of the hospitality industry requires effective energy and environmental management policies (Erdogan & Baris, 2007). On the basis of these arguments, we propose the following hypothesis: Hypothesis 1: Proactive Environmental Strategies have a positive effect on Eco-Innovation.

Eco-Innovation–Green Competitive Advantage

Eco-Innovation can be understood as any innovation that improves environmental performance or reduces environmental damage. It must go beyond developing new products and services to include processes and facilities that promote overall environmental sustainability (Kanerva et al., 2009; Oltra & Saint Jean, 2009; Rennings & Zwick, 2003). For example, a hotel can commit to saving energy and water resources, reducing waste, and minimizing environmental impact towards a circular economy (Baloglu & Jones, 2015; Deng & Burnett, 2002; Erdogan & Baris, 2007). In addition, they should actively promote green management and consumption, ecological protection, and resource conservation based on environmental management system indicators (Gossling, 2015; Hsiao et al., 2014).

Menguc et al. (2010) argue that such companies will surpass competitors and enjoy a competitive advantage in terms of first-mover advantage because they can show their customers that their company is environmentally friendly. In addition, companies with good environmental practices may enhance their environmental reputation (Miles & Covin, 2000). Furthermore, environmentally-positive practices can differentiate and increase sales through the implementation of Eco-Innovation strategies (Delmas, et al., 2011). Customers are more likely to support hotels with a good environmental management and sustainability records, which then provides the hotel or hotel chain with a competitive advantage (Molina-Azorín et al., 2009). Because Eco-Innovation enhances or differentiates one company from its competitors competitive advantages can be conferred to a hotel or hotel chain, because it simplifies and improves products and services and processes that bring higher quality of services, which then allows the company to obtain higher customer satisfaction and expand its market share (Jung et al., 2018; Wang et al., 2020). Eco-Innovation, therefore, will likely contribute to improving a hotel's cost competitive advantage that helps increase profitability (Bohdanowicz et al., 2011; Kasim et al., 2014; Wang et al., 2020). On the basis of these arguments, we propose the following hypothesis: Hypothesis 2: Eco-Innovation has a positive effect on GCA.

Eco-Innovation –Green Core Competence

Innovation is critical to the sustainability of an organization because innovation is required to survive in a highly competitive environment. Innovation reflects a company's ability to develop and implement innovative solutions, processes, procedures that benefit the environment (Calantone et al., 2002). Companies must seek new knowledge in existing technologies to create Eco- Innovations because

Eco-Innovation to meet emerging demands and green competitiveness is still in the development stage (Hellström, 2007).

The difference between green and traditional innovation is that the latter is not specifically targeted at environmental challenges. The former aims to meet the green requirements of regulators or the green concerns of target customers (Porter & van der Linde, 1995). Examples include introducing energy technologies or tools (such as lighting and temperature control systems and renewable energy such as geothermal and solar energy) in the service industry to provide energy saving improvements such as energy conservation, efficiency, and cost reduction. Other examples are avoiding disposable personal toiletries and single-use plastic products and reducing food waste (Bohdanowicz, 2006; Bohdanowicz et al., 2011).

Porter and van der Linde (1995) argue that companies that are pioneers of Eco-Innovation can have a first-mover / early adopter advantage; therefore, they can charge relatively higher prices for their green products and services and gain further competitive advantages because consumers are willing to make financial sacrifices that meet their personal environmental goals, which is an important environmental behavior (Stern, 2000). In addition, companies have invested considerable time and energy in environmental management, avoiding environmental protection protests and punishment, enabling them to improve their corporate image, open up to new markets, and enhance their competitive advantage (Hart, 1995; Lopez, Molina & Claver, 2009). On the basis of these arguments, we propose the following hypothesis: Hypothesis 3: Eco-Innovation has a positive effect on Green Core Competence.

Green Core Competence –Green Competitive Advantage

Companies outperform their competitors by using green energy products that increases customer satisfaction. Customer satisfaction is increased by promoting the environmental benefits of green products, product quality, superior service, and the environmental awareness measures adopted by the company (Dechant & Altman, 1994). Depending on the environment, strategy development and implementation are often based on local conditions and the internal resources provided to respond to these conditions. Therefore, the competitiveness of a hotel depends on its environmental and sustainability strategies and how well they are implemented (Brown & Dev, 2000). Innovations that contribute to environmental sustainability through the implementation of green strategies can help companies achieve sustainable competitive advantage (Hart, 1995; Hart & Dowell, 2011). Wang et al. (2020) proposed differentiated competitive advantage is a short-term best path, while cost competitive advantage is a long-term path towards organizational performance.

The findings of Lopez-Gamero et al. (2011) indicate that pursuing environmental management practices in the hotel industry has an indirect impact on differentiated competitive advantages by adjusting newly generated resources and capabilities. The authors identified 85 environmental practices that have a direct positive impact on the competitive position of a hotel that improves its competitiveness. On the basis of these arguments, we propose the following hypothesis: Hypothesis 4: GCC has a positive effect on GCA.

According to RBV strategies and RDT theory with regard to customer demand and Sustainable Development Goals (SDGs), we developed an improved framework that accounts for the internal and

external factors that provide, distribute, finance, and compete with other hotels (Figure 1). Proactive Environmental Strategies can effectively promote Eco-Innovation to increase green competitiveness and GCA. We followed this model and assessed hypotheses H1 to H4) in our study.

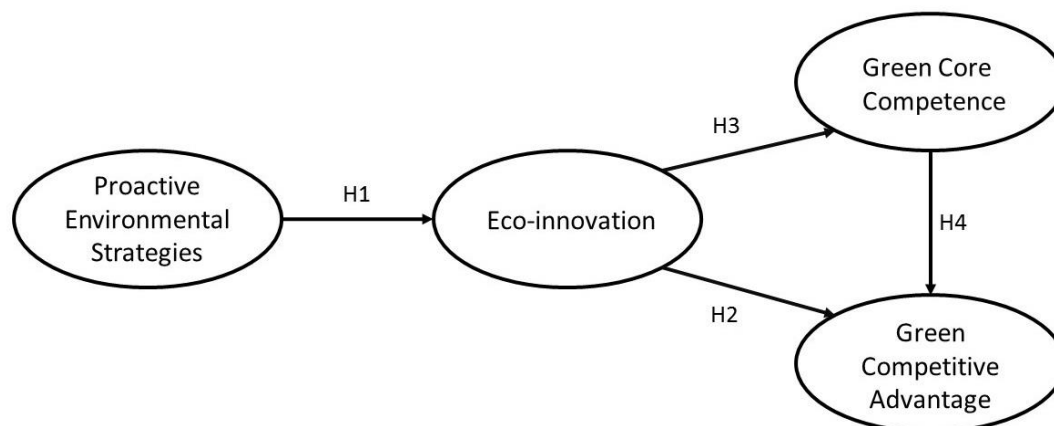


Figure 1. Proposed theoretical model.

Materials and Methods

Participants and Procedure

This study was conducted with hotel employees in Taiwan, which have been recognized by the Environmental Protection Administration, Executive Yuan, R.O.C. (Taiwan EPA) <https://greenliving.epa.gov.tw/GreenLife/WalkSing2013/MotelInfo.aspx#A> as environmentally friendly hotels. This website was launched by the Taiwan EPA as part of a promotion encouraging guests to bring and use their own toiletries and to allow sheets and towels to be changed less frequently during their stay in addition to other environmentally friendly initiatives, such as remembering to pack your own toothbrush and comb. The cost savings of implementing green initiatives were then rewarded back to the customers in the form of tax relief, meal coupons, product discounts, package itinerary or tourist attraction discounts, or a portion of the overhead savings were provided to sponsors to promote environmental protection activities for the guests. Hotels that were willing to accept questionnaire surveys were chosen based on their location (Northern, Central, Southern Taiwan and the Outlying Islands).

Questionnaires were distributed by post and the surveys were conducted between December 20, 2018 and March 20, 2019 by hotel employees with more than one year of employment. The responses were returned by post and of the 500 questionnaires that were issued 366 were completed and returned for a recovery rate of 73.2%.

Measures

The questionnaires were designed according to the study aims and related literature to measure each facet. A Likert 7-point scale ranging from “Strongly agree” to “Strongly disagree” was used. The facets were evaluated in accordance with the research model, as presented in Figure 1. Cai & Li (2018) and Aboelmaged (2018) were followed to measure Eco-Innovation. For the PES items we referred to Singjai et al. (2018). The GCC items were developed using Chen (2008), and the GCA items were adapted from

Chen & Chang (2013) and Lin & Chen (2017).

Results

Descriptive findings

Descriptive statistics were used with the questionnaire data to describe the results and sample distribution. Of all participants, 42.1% and 57.9% were male and female, respectively; 2.6%, 39.1%, 32.5%, 14.4%, 11.1%, and 4% were aged 20, 21–30, 31–40, 41–50, 51–60, and ≥ 61 years, respectively; 11.8%, 17%, 57.2%, 11.8%, and 2.2% were high school students, specialists, university students, research institute students, and research institute above, respectively; 26.9%, 17.3%, 15.9%, 4.1%, 7.4%, 13.3%, and 15.1% were in customer service department, housekeeping department, management department, public relations department, marketing department, human resources department, and other departments, respectively; and 5.5%, 17%, 20.3%, and 57.2% were high-level supervisors, intermediate supervisors, low-level supervisors, and not supervisors, respectively.

Non-response bias

To examine non-response bias, we compared early and late respondents according to the recommendations of Armstrong & Overton (1977). We grouped respondents from the initial mailing into early respondents ($n = 50$) and late respondents ($n = 50$). Independent-sample t-tests revealed no statistically significant differences between the two groups in any of the questions asked.

Common method bias

When data for the independent and dependent variables were collected from single informants, common method bias may lead to inflated estimates of the relationships between the variables (Podsakoff & Organ, 1986). Therefore, Harman's one-factor test was used *post hoc* to examine the extent of potential bias. Substantial common method variance is signaled by the emergence of either a single factor or one "general" factor that explains the majority of the total variance (Podsakoff & Organ, 1986). The results of a factor analysis revealed four factors, which collectively accounted for 74.811% of the total variance. The first factor accounted for 59.288% of the total variance. On the basis of these results, problems associated with common method bias were not considered significant.

Reliability and validity tests measure the stability, consistency, effectiveness, and reliability of a measurement tool. In this study, Cronbach's α was calculated to measure the reliability of the questionnaire items. Cronbach's α of 0.7–0.98 indicates high reliability (Nunnally & Bernstein, 1994). Cronbach's α for Eco-Innovation was 0.902, PES 0.885, GCC 0.771, and GCA and 0.895, respectively (Table 1). A measurement model should include assessments of convergence and discriminant validity (Bagozzi & Yi, 1988). Composite reliability (CR) is the reliability of all measurement variables that measure the same potential variable. The purpose of evaluating CR is to measure the consistency between all measurement variables of the same potential variable. Composite Reliability is indicated if its value is ≥ 0.6 (Bagozzi & Yi, 1988). The average variance extracted (AVE) is the average variation in the explanatory power of each measurement variable that calculates the potential variable; its value must be ≥ 0.5 (Fornell & Larcker, 1981). All CR values were larger than 0.60, and the AVE values were near \geq

0.5. The CR values are as follows: PES (0.8988), EI (0.9289), GCC (0.6916), GCA (0.809) and AVE value PES (0.4795), EI (0.7248), GCC (0.4577), GCA (0.6093) and shown in Table 1. According to the sample size and factor loading relationship proposed by Hair et al., (2009), when the number of individuals is greater than 350, an AVE value of 0.4 to 0.5 is acceptable. The sample size of 366 in this study therefore reached the standard.

Table 1. The measurement model.

	Cronbach's	AVE	CR
PES	0.885	0.4795	0.8988
EI	0.902	0.7248	0.9289
GCC	0.771	0.4577	0.6916
GCA	0.895	0.6093	0.809

Structural equation modeling tests the degree of fitness between the overall model, observed data, and causal relationship between variables. We used the indicators recommended by McDonald & Ho (2002) and Schreiber (2008), including χ^2 , degrees of freedom (df), and χ^2/df , Goodness of Fit (GFI), RMSEA, Comparative Fit Index (CFI), Bentler & Bonett's Normed Fit Index (NFI) and Non-Normed Fit Index (also called the Tucker Index; NNFI). The results of our Eco-Innovation–GCA model were as follows: $\chi^2 = 1292.39$, $df = 399$, $\chi^2/df = 3.24$, $GFI = 0.81$, $RMSEA = 0.078$, $CFI = 0.95$, $NFI = 0.93$, and $NNFI = 0.95$. These values are not ideal.

Structural equation modeling was used to evaluate the fitness of the our model and observed data, including the chi-square value divided by the degrees of freedom (χ^2/df , CMIN/DF), (GFI), root mean square residual (RMSR), (RMSEA), (NFI) and (CFI). Generally speaking, the NFI value is greater than 0.9 and the GFI value is greater than 0.9; and (RMSEA), mainly looking for the parent group and mode. The degree of adaptation, index values less than or equal to 0.05 means a good fit, values between 0.05-0.08 can be regarded as a good fit, values between; between 0.08-0.10 can be regarded as a "moderate fit"; and values greater than 0.10 means a "bad fit".

Given that the initial model-fit indices were far from acceptable, model modifications were implemented using a modification index (MI). The MI considers measurement error correlations and item correlations (multicollinearity; Joreskog & Sorbom, 1989). As a result, the overall model had results of $\chi^2 = 466.28$, $df = 205$, and $\chi^2/df = 2.28$. Bagozzi & Yi (1988) suggested using a ratio of chi-squared values to degrees of freedom (i.e., normed chi-square) to replace the chi-square value to characterize the model, with values ranging from 1 to 5 being acceptable. The χ^2/df value of the model was 2.3328, indicating that the results were good. All other indicators complied with their standards: $GFI = 0.90$, $RMSEA = 0.059$, $CFI = 0.97$, $NFI = 0.95$, and $NNFI = 0.96$. Therefore, the model had a good fit.

The results of this study allowed a path map for analyses of PES, GCC, and GCA relationships to evaluate hotel Eco-Innovation, to be constructed (Figure 2). A summary of the data analyses is provided in Table 2. The path coefficient of PES–Eco-Innovation (H1) was 0.73 ($t = 11.35$) and indicates PES contribute strongly to Eco-Innovation). The Eco-Innovation–GCA (H2) path coefficient was 0.10 ($t = -0.53$ and indicates Eco-Innovation has no direct impact on GCA. The path coefficients for Eco-

Innovation–GCC (H3) and GCC–GCA (H4) were 0.82 ($t = 6.20$) and 0.81 ($t = 3.45$), respectively, indicating Eco-Innovation positively impacted GCC and GCC positively impacted GCA (Table 2). Overall, the model proposed in this paper is acceptable.

Table 2. The results of the structural model

Hypothesis	Relationship	Estimate	t-Value	
H1	PES-EI	0.73	11.35	Significant
H2	EI-GCA	0.10	-0.53	Not significant
H3	EI-GCC	0.82	6.2	Significant
H4	GCC-GCA	0.81	3.45	Significant

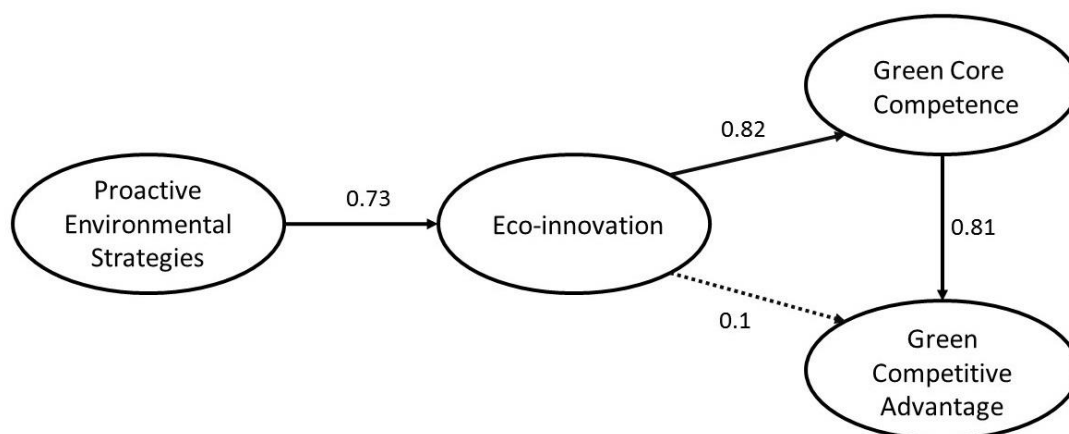


Figure 2. Final model. We added checkmarks behind the hypotheses that are supported and an x after the hypothesis that is not supported.

Discussion

This study expands on theories of pro-environmental strategy, Eco-Innovation, and pro-environmental competence and strengthens the theories of RBV and RDT. Organizations and their activities are always being affected by their environment. In dynamic environments, individuals and organizations are frequently under pressure because of the uncertainty of decision-making (Waldman et al., 2001). When people and systems are under pressure, they need particularly in uncertain, dynamic, and emergency situations during time constraints (Osman, 2010). To preserve the existing stock of resources and achieve organizational success, therefore, external and internal factors must be considered.

Hypothesis 1 was supported. Company employees are encouraged to adopt a positive attitude on environmental and sustainability initiatives and hotel activities should avoid the excessive consumption of natural resources and generation of waste (Fraj et al., 2015; Lopez-Gamero et al., 2011). The world is facing complex environmental challenges and hotels must reconsider their business strategies to respond to market demands and trends and fulfill their environmental responsibilities in a timely manner and at the same time (Singjai et al., 2018). Therefore, the use of PES for Eco-Innovation is crucial for hotels to maintain their operational requirements and environmental responsibilities and gain an advantage over their competitors.

The study results demonstrate that a hotel's PES is essential for making a strong and environmentally friendly commitment to Eco-Innovation. To reflect the willingness of a company to meet its environmental and sustainability responsibilities the employees must to be engaged to participate in the achievement of these responsibilities through formal and informal activities. Companies must communicate and demonstrate to employees that PES not only reduces operating costs, but it shows a positive/serious commitment to the employees on environmental issues. A hotel must truly commit to supporting a green future without considering environmental protection is a mere token or words without action to attract guests. Employees and customers sensitive to environmental regulations and compliance can distinguish whether their employer is serious about environmental responsibility and sustainability issues.

Hypothesis 2 is not supported. Eco-Innovation offers no GCA. Therefore, companies must either re-consider existing or develop new technologies to become more innovative because innovations that meet the emerging demands and green competitiveness are still in their infancy (Hellström, 2007). This seems counter-intuitive but we agree with Ramos (2001) that for Eco-Innovation to be more effective and substantially improve a business' GCA, employers must allocate the resources and time for its employees to participate in environmental education and training, encourage participation in environmental protection activities, and increase environmental awareness and environmental literacy. It is the company's responsibility to provide feedback, educate, and improve their employee's understanding of environmental protection concepts and give feedback and improve employees' environmental concepts, (Fang, 2020b).

There may be many reasons why Eco-Innovation did not substantially affect GCA, but a primary reason may be hotel employees deal primarily with operational and administrative tasks when implementing the green policies that are assigned by regulatory agencies. As such, they may not fully consider or understand how they can contribute to the company's GCC through enhancing environmental capabilities, engaging environmental technologies, or contributing to workplace knowledge. They may not have regarded Eco-Innovation as a positive cost-saving concept as did their competitors because of their lack of knowledge or understanding of GCC. However, Eco-Innovation influences GCA beyond cost savings. Success in the hotel industry depends on the company's corporate goals and social reputation with specific respect to market share, profitability, and sales (Brown & Dev, 2000; Cheng & Shiu, 2012). Porter and van der Linde (1995) argued that companies that pioneer Eco-Innovation show an advantage over their competitors. Eco-Innovation is a critical intangible resource that is difficult to imitate, but enables companies that employ strategies to gain long-term competitive advantages over their competitor and operate sustainably (Ar, 2012). Lopez-Gamero et al. (2011) reported that the implementation of environmental management practices in hotels exerts an indirect influence on the competitive differentiation of their company from their competitors through the adjustment of newly generated resources and capabilities.

Because the implementation of Eco-Innovation requires teamwork, the employees must be encouraged to provide innovative green concepts and share their ideas in an environmentally conscious corporate atmosphere. It is essential that resources and time are allocated for employees to participate in environmental education, orientation, and training (Aboelmegeed, 2018), in addition to activities that

foster environmental protection and awareness. Green Competitive Advantage embodies the idea that “the quality of the products or services that the hotel offers is better than that of the competitor’s products or services” and that “competitors will face difficulties challenging the hotel’s competitive advantage.” These measures ensure Eco-Innovation influences GCA (Chang, 2011; Gürlek & Tuna, 2018).

Hypothesis 3 is supported. Eco-Innovation is critical to the sustainability of an organization because innovation is needed for a company to survive in their respective and highly competitive environments (Calantone et al., 2002). Depending on the nature of the business or environmental setting, the development and implementation of strategic plans are often based on the local conditions and allocation of resources to meet these conditions. Therefore, the competitiveness of a hotel depends largely on the development and implementation of its business and strategic plans (Brown & Dev, 2000).

Eco-innovation technologies can reduce the quantity of unrecyclable waste and enable or encourage the reuse of waste, both of which promote green competitiveness. Recycling and innovation are symbiotic. The adoption of green competitive and Eco-Innovation strategies in the hospitality industry encourages companies to incorporate environmental concerns and behaviors into employee behavior and expectations. Therefore, education, training, teamwork, practice, performance evaluation, and feedback is part of normative “issue-focused stakeholder management” expectation of the employer (Raub & Martin-Rios, 2019). The incorporation of these measures into a company’s goals, mission, and vision institutionalizes green behavior among its employees and strengthens the core green competitiveness of a hotel.

Hypothesis 4 is supported. The hotel industry must support environmental goals and formulate clear best practice guidelines and realize that their competitors will adopt their methods and possibly improve on them and/or develop different methods to achieve the green environmental protection goals that are based on their resources, capabilities, values, stakeholder expectations, and long-term plans (Wang et al., 2020).

The green competitiveness of a hotel conveys the concept of environmental protection to its guests, allowing them to experience and integrate the concepts of reuse, recycle, and the SDGs into their lives (Aragón-Correa et al., 2015; Raub & Martin-Rios, 2019). Hotels generate a substantial amount of waste globally, particularly plastics (e.g., water bottles) and single use items such as slippers. Therefore, the adoption and implementation of Eco-Innovative technologies that regenerate these wastes into products such as coasters, hangers, first-aid kits, and wall-hangings are encouraged. Furthermore, the reuse of waste promotes the company’s image as an environmentally friendly boutique hotel that is committed to resolving environmental issues. A hotel such as this stands out from its competition by developing/adopting green strategies (Ling, 2019), that provides competitive advantages that translate to sustainability initiatives that address the company’s SDGs (Raub & Martin-Rios, 2019).

Management implications

We live in a time where environmental protection and regulations are important, but complex. How the hotel industry conducts its business to meet the regulatory standards and stakeholder expectations, while maintaining or improving customer service and profitability without passing these costs onto the customers is a challenge at all levels. These elements need to be major components of a

company's business plan and corporate leadership must allocate the time and resources needed to train employees to attain these goals. Innovation is essential, especially in an industry where customer expectations and regulatory standards are high if they want to meet the continually changing environmental regulations and retain or gain a market share. Today and in the future, the ability to stay ahead of one's competitors through innovation and environmental leadership will be essential to meet the increasingly more stringent environmental regulations and stakeholder/customer expectations. As such, companies must reconsider their environmental strategies and use PES and Eco-Innovation strategies to respond to market demand and corporate social responsibility.

This suggests that employees should/need to participate in PES and Eco-Innovation education, green creative ideas, and respond to green topics. Working in teams fosters creativity and builds on the collective wisdom/knowledge of the team from personal experience to the organizational level and acts as a catalyst for creating innovative ideas and concepts while enhancing the effectiveness of the company in promoting environmental protection. This model encourages employees to participate in green activities within their company. At the same time, it enhances the employees' recognition of various PES and Eco-Innovation measures, starting from a grass roots level to improve the environment.

With limited corporate resources and increased competition, the hotel industry lends itself well to improving the environment through developing and implementing ecological friendly and sustainable practices. Customers in the hotel industry tend to be loyal to the hotel chain or the hotel itself. Employing Eco-Innovation strategies and listening to your customers coupled with an environmentally friendly and progressive environmental management systems, a company can reduce its impact on the environment. This study proposes a framework that combines RBV and RDT, emphasizing company activities are increasingly becoming more restricted by environmental regulations, customer awareness environmental responsibilities, and developing pollution prevention capabilities that will reduce costs and pollution emissions. As far as environmental performance is concerned, using *ex-ante* prevention can achieve better environmental performance than *ex-post* controls.

The hotel industry is one of many that encountered difficulties and challenges in the process of Eco-Innovation with PES. Perhaps the biggest challenge is how to fully promote and implement an Eco-Innovation culture and strategies that all of the stakeholders can agree to without substantially increasing operating costs and having to pass increased costs to the customer. The operation and management of a hotel must strike a balance between the interests of the hotel owners and those of the employees to meet customer expectations. Therefore, in addition to constantly raising employee Eco-Innovation awareness the employees need to be engaged and be part of the solution.

In the future, we will not only celebrate the use of green and non-polluting products, but to also use green technology to carry out product promotional activities and infiltrate the Eco-Innovation culture into the activities of employees and guests to better achieve the goal of green management.

Limitations and future research

The Eco-Innovation of hotels will no longer be limited to the environmental aspects of construction, energy, and raw materials, but will be deeply implemented in service, forming a culture in the hotel industry and a way of life. This empirical study was conducted at green hotels across Taiwan and the

results may not be applicable to other countries or to countries with emerging economies. Further comparative research is required to ascertain the differences and similarities between Taiwan and other countries and countries with emerging economies. Furthermore, because the definitions of PES and Eco-Innovation originate from firm-level concepts, our research results are at the moment limited in their theoretical generalizability to the firm or guest levels. Because the green management practices of hotels exert an indirect influence (AboelMaged, 2018), this study is limited by its lack of analysis on differentiated competitive advantages through the adjustment of newly generated resources and capabilities (Lopez-Gamero et al., 2011). Few causal studies have addressed the indirect effects of Eco-Innovation on GCA and GCC on the green organizational culture in the hotel industry (Gürlek & Tuna, 2018). This study of proactive environmental strategies also contributes to our understanding of how Eco-Innovation affects guest satisfaction and repeat patronage with regard to hotel image.

Conclusion

According to the results of this study, Resource-Based strategies and Resource Dependence Theory posit that the hotel industry is symbiotically dependent on the environment, which includes its competitors and employees. In this context, competition drives innovation, resource protection, and sustainability. Resource-Based View strategies and Resource Dependence Theory state that the interactions between companies and the environment as well as companies and employees are comparable to resource protection and consolidation phenomena. From the perspective of resource control and interdependence, these relationships explain the influence of companies on environmental change, which makes the industry more aware of the environment. (Barringer & Harrison, 2000, Hart, 1995; Sarkis et al., 2010, Sharma & Henriques, 2005).

A PES is a valuable resource that can bring a variety of benefits to a company (Sharma & Vredenburg, 1998). The improvement of the hotel industry's competitiveness has made the implementation of Eco-Innovation a differentiating factor in the industry. Its contribution to sustainable development is increasingly being valued and beneficial in the form of providing a first-mover or early adapter advantage, which enhances a hotel's reputation and its status as an environmental leader (Hart, 1995; Porter & Kramer, 2006).

Eco-Innovation as a concept and a nexus of economic activities that encompasses primary, secondary, and tertiary industries in society and the goal of environmental and socially sustainable development (Frigon et al., 2020). In addition, the hotel's PES is essential for a strong environmental commitment to Eco-Innovation. The hotel's PES engages employees to participate in formal or informal activities to achieve environmental sustainability. Employees are then aware that PES is not simply a cost-reducing measure, but a commitment to the environment, community, and sustainable development, culminating in a company's success in green competitiveness and capabilities.

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109年度專題研究計畫成果彙整表

計畫主持人：方偉達		計畫編號：109-2511-H-003-031-			
計畫名稱：環境保護行為與學習典範模式的創新與建構					
成果項目		量化	單位	質化 (說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等)	
國內	學術性論文	期刊論文	0	篇	
		研討會論文	0		
		專書	0	本	
		專書論文	0	章	
		技術報告	0	篇	
		其他	0	篇	
國外	學術性論文	期刊論文	0	篇	Proactive environmental strategies in the hotel industry: Eco-Innovation, Green Competitive Advantage, and Green Core Competence. Journal of Sustainable Tourism. https://doi.org/10.1080/09669582.2021.1931254
		研討會論文	0		
		專書	0	本	
		專書論文	0	章	
		技術報告	0	篇	
		其他	1	篇	Applying a Comprehensive Action Determination Model to examine the recycling behavior of Taipei City residents, Sustainability, 132021, 13(2), 490; https://doi.org/10.3390/su13020490
參與計畫人力	本國籍	大專生	0	人次	
		碩士生	0		
		博士生	0		
		博士級研究人員	1		郭方宜(大學兼任教師/明新科技大學)
		專任人員	1		江懿德
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士級研究人員	0		
		專任人員	0		
其他成果		本研究進行調查，其結果可以將開展環境教育教學端的促			

(無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)

進學習，以提升環境技能與行動，培養負責任的環境公民以保護環境。本研究採取多角化環境保護對話模式，通過舉辦多次的工作坊，以及英文寫作，強化教學端之環境教育教學方法。計畫主持人方偉達教授現為中華民國環境教育學會常務理事，完成期刊論文二篇、技術報告，藉由國際交流合作計畫之執行，廣續將發表國際英文專書，增加我國環境教育學術發表之國際曝光程度，強化教學端環境教育教師專業知能發展，並促使環境教育建立永續發展目標。